RAMDEOBABA UNIVERSITY

[RBU]

NAGPUR – 440013

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**	

Liberal/ Performing Art Bucket

Sr. No.	Course Code	Course Title	L	P	Credits	Continuous Evaluation	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	0	2	1	25	25	50	NA

		Classical Dance: Kathak							
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	VSEC	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	VSEC	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	MDM	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-IV

S. No.	Course Type	Course Code	Course Name	L	P	C	Continuous Assessment	End Sem / Internal Eval	Total	Duration of End Semester
1	PCC	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	MDM	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	VSEC	24CS18PR0606	Mini Project – II	0	4	2	75	75	150	-
10	AEC	24CS18PR0607	Advanced Competitive Coding	0	2	1	50	-	50	-
11	AEC	24CS18PR0608	Participative Learning	0	2	1	50	-	50	-
12	MDM	24CS18TH0609	MDM-IV	3	0	3	50	50	100	03 Hrs
			TOTAL	**16**	**18**	**25**	**525**	**425**	**900**	

Exit Option: Award of Undergraduate Degree after securing 132 credits and an additional 8 Credits			
Exit Courses			
1.	**Project**	-	**8**

Semester-VII/VIII

Sr. No.	Course type	Course Code	Course Name	L	P	C	Continuous Assessment	End Sem Exam	Total	Exam Duration
1	PCC	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	INTR	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	Elective-1 (With Lab) [SEM-6]	Elective-2 [SEM-7]	Elective-3 (With Lab) [SEM-7]	Elective-4 (With Lab) [SEM-8]	Elective-5 (With Lab) [SEM-8]
Cloud	Distributed and Parallel Databases	Administration Cloud	Development on Cloud	AI & ML on Public Cloud Platform	Cloud Security
Security	Intrusion Detection and Prevention System	Ethical Hacking	Vulnerability Assessment and Penetration Testing	Cyber Risk Assessment & Management	Auditing IT Infrastructure for Compliance
Image processing and NLP	Computer Graphics	Digital Image Processing	Natural Language Processing	Computer Vision	Deep Learning for Computer Vision and NLP

OPEN ELECTIVE

Semester	Course Name
Semester-III [Open Elective-I]	Cyber Laws & Ethics/ Statistical Computing with R/Introduction to Data Science
Semester-IV [Open Elective-II]	Tools for Data Science/Web Development/Mobile App Development
Semester-V [Open Elective-III]	Data Analytics Visualization/Open-Source Technologies/Basics of Ethical Hacking

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 Objectives

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

Course Outcomes

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

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

SYLLABUS

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

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

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

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

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

Unit V: Structures, Simple structures, Array of Structures

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

Text Books :

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

Reference Books

1. Mastering C: K. R. Venugopal and S. R. Prasad, Tata McGraw Hill

2. Let Us C: Yashwant Kanetkar, BPB Publication

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 Objectives

1. Understand programs involving decision-making, loops, arrays and structures.
2. Learning the concept of pointers in real-life programming.
3. Explore the concept of file handling.

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 Objective

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

Course Outcomes

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

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

SYLLABUS

UNIT-I

Basics of number Systems and operations

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

UNIT-II

Minimization Techniques and Switching Circuits

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

UNIT-III

Combinational Logic Circuits

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

UNIT-IV

Sequential Circuit-I

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

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

Course Outcomes

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

1. 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 :

CO1: Use all the features of Chemical databases for drawing 2D and 3D structures

CO2: Explain the role of stereochemistry in drug development

CO3: Implement the various approaches in Molecular Modelling

CO4 : Provide a detail strategy on drug activity and drug discovery.

CO5: Analyse the principles of various spectroscopic techniques and utilize them for qualitative and quantitative analysis

CO6 : 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**

CO1: Use open online tools and various search tools for understanding the properties and functioning of various biomolecules.
CO2: Estimate the rate constants of reactions and order of the reaction using computational tools
CO3: 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'sLaw.
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 Objective

The objective of this course is to equip the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling more advanced level of mathematics and applications that they would find useful in their disciplines.

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 **Course: English for Professional Communication**

L: 2 Hrs, P: 0 Hr, Per Week **Total Credits: 2**

Course Objectives

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

Course Outcomes:

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

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

Unit I: Vocabulary Building **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 Heasly. 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 Objectives
To enhance competency of communication in English among learners

Course Outcomes
On completion of English Lab course, students will be able to achieve the following:
CO1: Apply effective listening and speaking skills in professional and everyday conversations.
CO2: Demonstrate the techniques of effective Presentation Skills
CO3: Evaluate and apply the effective strategies for Group Discussions
CO4: Analyse and apply the effective strategies for Personal Interviews
CO5: 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 Course: Foundational course in Universal Human Values

L: 1 Hrs P: 0 Hr, Per Week Total Credits: 1

Course Objectives:

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

Course Outcome:

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

1: Develop a holistic perspective of life

2: Better understanding of inter-personal relationships and relationship with society and nature.

3: An ability to strengthen self-reflection

SYLLABUS

Unit I:- Aspirations and concerns 5 hours

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

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

Unit II:- Health 4 hours

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

Unit III:- Relationships and Society 5 hours

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

Reference Material

The primary resource material for teaching this course consists of

Text book:

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

Reference books:

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

Syllabus for Semester I, Bachelor of Computer Application

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

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

Course objective

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

Course Outcomes

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

CO1: Understand the importance of dance and Bharatnataym as an Indian dance form
CO2: Develop skills to perform the dance form at its basic level.
CO3: Evaluate their strengths and interest to take bridge course to give *Pratham* (1st level formal exam of Bharatnatayam).

Syllabus

Practical -1: Orientation in Bharatnatayam
Practical-2: Tattu Adavu till 8, Naatta Adavu 4 Steps, Pakka Adavu 1 step, Metta Adavu 1 Step, Kuditta Metta Adavu 4 Steps,
Practical -3: Practice sessions
Practical-4: Tatta Kuditta Adavu (Metta), Tatta Kuditta Adavu (Metta) 2 Steps, Tirmanam Adavu 3 Steps, Kattu Adav - 3 Steps, Kattu Adav - 3 Steps
Practical-5: Practice sessions
Practical-6: Tiramanam (front) 3 Steps, Repeat of Tiramanam (Overhead) 3 Steps,
Practical-7: practice sessions
Practical – 8: final practice sessions and performances.

Recommended reading

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

Syllabus for Semester I, Bachelor of Computer Application

Course Code: 24HS02PR0105-02 **Course: Fundamentals of Indian Classical Dance: Kathak**
L: 00 Hrs, T: 0 Hr, P: 2 Hrs, Per Week **Total Credits: 01**

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

Course Outcomes
On completion of the course, students will be able to achieve the following:
CO1: Understand the importance of dance and Kathak as an Indian dance form
CO2: Develop skills to perform the dance form at its basic level.
CO3: Evaluate their strengths and interest to take bridge course to give *Prarambhik* (1st level formal exam of Kathak).

Syllabus
Practical -1: Orientation in Kathak. Correct posture of kathak, Basic Movements and exercise Stepping, Chakkar of 5 count (Bhramari),
Practical -2: practice sessions of practical 1
Practical -3: Hastaks, Hastaks and Steppings, Reciting asamyukta Mudra shloka, Hastak and steppings
Practical -4: practice sessions of practical 3
Practical -5: Todas and Asamyukta hasta mudra shlok, Vandana of Shlok, 2 Todas and Vandana, Ghante Ki Tihai,
Practical -6: practice sessions of practical 5
Practical -7: 2 1 Chakkardar Toda and Ginnti Ki Tihai, 2 Todas and 1 Chakkardar Toda, practice sessions
Practical -8: Final performances.

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

Syllabus for Semester I, Bachelor of Computer Application

Course Code: 24HS02PR0105-03 **Course: Introduction to Digital Photography**
L: 00 Hrs, T: 0 Hr, P: 2 Hrs, Per Week **Total Credits: 01**

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

Course outcome:
At the end of the course the students will be able to achieve the following:
CO1: Develop an understanding of the technical aspects and aesthetics of Photography.
CO2: Apply the rules of digital photography for creating photographs.
CO3: Develop skills to enhance photographs through post processing.
CO4: Create a portfolio of their photographs in selected genre.

Syllabus
Practical 1: **Orientation in digital photography:** Genres, camera handling and settings
Practical 2: **Rules of Composition**
Practical 3: **Rules of Composition**: practice sessions
Practical 4: **Understanding Exposure and Art of Pre-Visualization**
Practical 5: **Rules of Composition and Art of Pre-Visualization:** practice sessions
Practical 6: **Post Processing Photographs and Portfolio creation**
Practical 7: **Post Processing Photographs:** practice sessions
Practical 8: **Portfolio finalization and presentation in selected genre.**

Reference material

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

Syllabus for Semester I, Bachelor of Computer Application

Course Code: 24HS02PR0105-04 **Course: Introduction to Basic Japanese Language**
L: 00 Hrs, T: 0 Hr, P: 2 Hrs, Per Week **Total Credits: 01**

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

Course outcome
After the completion of the course the students will be able to achieve the following:
CO1: Basic understanding about Japan as a country and Japanese culture.
CO2: Ability to use vocabulary required for basic level communication in Japanese language.
CO3: Able to frame simple sentences in Japanese for everyday conversations

Syllabus
Practical-1: Orientation about Japan, its language, and its culture
Practical-2: Communication Skills 1: Vocabulary for basic Japanese language
Practical -3: Practice sessions
Practical-4: Basic day to day greetings in Japanese language and their usage through role-play
Practical-5: Practice sessions
Practical- 6: Communication Skills 2: framing sentences
Practical- 7: Practice sessions
Practical- 8: Introduction of Japanese Culture, Arts, Traditions, Etiquettes and Manners etc.

Recommended reading
1. Marugoto Starter (A1) Rikai - Course Book for Communicative Language Competences, by The Japan Foundation, Goyal Publishers & Distributors Pvt. Ltd (ISBN: 9788183078047)
2. Japanese Kana Script Practice Book – Vol. 1 Hiragana, by Ameya Patki, Daiichi Japanese Language Solutions (ISBN: 9788194562900)

Syllabus for Semester I, Bachelor of Computer Application

Course Code: 24HS02PR0105-05 **Course: Art of Theatre**
L: 00 Hrs, T: 0 Hr, P: 2 Hrs, Per Week **Total Credits: 01**

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

Course Outcomes:
On completion of the course, students will be able to achieve the following:
CO1: Understand and synthesize the working of the prominent genres of theatre across the world.
CO2: Apply the skill of voice and speech in theatre and public speaking
CO3: Apply the art of acting and also develop generic skills such as confidence, communication skills, self-responsibility, motivation, commitment, interpersonal skills, problem solving, and self-discipline.
CO4: Apply skills acquired related to technical/production aspects of theatre and also develop problem solving and interpersonal skills.

Syllabus:
Syllabus
Practical 1: **Orientation in theatre**
Practical 2: **Voice and Speech training**
Practical 3: **Voice and Speech training**: practice sessions
Practical 4: **Art of acting**
Practical 5: **Art of acting:** practice sessions
Practical 6: **Art of script writing**
Practical 7: **Art of script writing:** practice sessions
Practical 8: **Final performances**

Reference books:
1. Boleslavsky, R. (2022). *Acting: The First Six Lessons* (1st ed., pp. 1-92). Delhi Open Books.
2. Shakthi, C. (2017). *No Drama Just Theatre* (1st ed., pp. 1-171). Partridge.
3. Bruder, M., Cohn, L. M., Olnek, M., Pollack, N., Previto, R., & Zigler, S. (1986). *A Practical Handbook for the Actor* (1st ed.). Vinatge Books New York.

Syllabus for Semester I, Bachelor of Computer Application

Course Code: 24HS02PR0105-06 **Course: Introduction to French Language**
L: 00 Hrs, T: 0 Hr, P: 2 Hrs, Per Week **Total Credits: 01**

Course objective:

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

Course outcomes:

On successful completion of the course the students will be able to achieve the following:
CO1. Demonstrate basic knowledge about France, the culture and similarities/differences between India and France
CO2. Learn to use simple language structures in everyday communication.
CO3. Develop ability to write in basic French about themselves and others.
CO4. Develop ability to understand beginner level texts in French

Syllabus
List of Practicals

Practical-1: Orientation about France, the language, and culture
Practical-2: Communication Skills 1: Vocabulary building for everyday conversations
Practical -3: Practice sessions
Practical-4: Reading and writing Skills : Reading and writing simple text in French
Practical-5: Practice sessions
Practical-6: Communication Skills 2: listening comprehension
Practical-7: Practice sessions
Practical-8: Writing Skills: Write basic French and practice

Recommended reading

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

Syllabus for Semester I, Bachelor of Computer Application

Course Code: 24HS02PR0105-07 **Course: Introduction to Spanish Language**
L: 00 Hrs, T: 0 Hr, P: 2 Hrs, Per Week **Total Credits: 01**

Course objective:

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

Course outcomes:

On successful completion of the course the students will be able to achieve the following:
CO1. Demonstrate basic knowledge about Spain, the culture and similarities/differences between India and France
CO2. Learn to use simple language structures in everyday communication.
CO3. Develop ability to write in basic Spanish about themselves and others.
CO4. Develop ability to read and understand beginner level texts in Spanish

Syllabus
List of Practicals

Practical-1: Orientation about Spain, the language, and culture
Practical-2: Communication Skills 1: Vocabulary building for everyday conversations
Practical -3: Practice sessions
Practical-4: Reading and writing Skills : Reading and writing simple text in Spanish
Practical-5: Practice sessions
Practical-6: Communication Skills 2: listening comprehension
Practical-7: Practice sessions
Practical-8: Writing Skills: Write basic Spanish and practice

Recommended reading

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

Syllabus for Semester I, Bachelor of Computer Application

Course Code: 24HS02PR0105-08 **Course: Art of Painting**
L: 00 Hrs, T: 0 Hr, P: 2 Hrs, Per Week **Total Credits: 01**

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

Course outcome:
At the end of the course the students will be able to achieve the following:
CO1: Become familiar with the basic methods, techniques & tools of painting.
CO2: Train the eye and hand to develop sense of balance, proportion and rhythm.
CO3: Develop the ability to observe and render simple natural forms.
CO4: Enjoy the challenging and nuanced process of painting.

Syllabus
Practical 1: **Orientation in Painting tools & basics of lines, shapes, light, shadows and textures**
Practical 2: **The art of observation** how to see shapes in drawing
Practical 3: **Introduction Water color** how to handle water paints
Practical 4: **Introduction to acrylic colors** how to handle acrylic paints
Practical 5: **Explore layering paint and capturing the quality of light with paint.**
Practical 6: **Create landscape painting**
Practical 7: **Create Abstract painting**
Practical 8: **Paint on Canvas** (try to recreate any famous painting)

Reference material

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

Syllabus for Semester I, Bachelor of Computer Application

Course Code: 24HS02PR0105-09 **Course: Art of Drawing**
L: 00 Hrs, T: 0 Hr, P: 2 Hrs, Per Week **Total Credits: 01**

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

Course outcome:
At the end of the course the students will be able to achieve the following:
CO1: Become familiar with the basic methods, techniques & tools of drawing.
CO2: Train the eye and hand to develop sense of balance, proportion and rhythm.
CO3: Develop the ability to observe and render simple natural forms.
CO4: Enjoy the challenging and nuanced process of drawing.

Syllabus
Practical 1: **Orientation in Drawing tools & basics of lines, shapes, light, shadows and textures**
Practical 2: **The art of observation** how to see shapes in drawing
Practical 3: **One/two-point basic linear perspective**
Practical 4: **Nature drawing and landscapes**
Practical 5: **Gestalt principles of visual composition**
Practical 6: **Figure drawing**: structure and proportions of human body
Practical 7: **Gesture drawing:** expression and compositions of human figures
Practical 8: **Memory drawing:** an exercise to combine the techniques learnt

Reference material

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

Syllabus for Semester I, Bachelor of Computer Application

Course Code: 24HS02PR0105-10 **Course: Nature Camp**
L: 00 Hrs, T: 0 Hr, P: 2 Hrs, Per Week **Total Credits: 01**

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

Course outcome:
After the completion of the course the students will be able to do the following:
CO1: Develop an affinity with nature by observing and understanding it marvels with guidance from experts
CO2: Develop an understanding of the challenges and solutions associated with nature and its conservation.

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

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

Syllabus for Semester I, Bachelor of Computer Application

Course Code: 24HS02PR0105-11 **Course: Developing Self-awareness**
L: 00 Hrs, T: 0 Hr, P: 2 Hrs, Per Week **Total Credits: 01**

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

Course Outcomes:
On completion of the course, students will be able to achieve the following:
CO1: Gain foundational understanding of graphology and through self-analysis will achieve greater awareness about their strengths and weaknesses & areas for personal growth
CO2: students will be equipped with tools and techniques for continuous self-improvement, using signature analysis and graphotherapy as part of their personal development journey
CO3: understand how to use Neuro Linguistic Programming (NLP) strategies to set and achieve goals effectively, overcoming mental blocks and limiting beliefs.
CO4: Enhance ability to absorb, retain, and recall information, which can benefit academic and professional performance.

Syllabus:
Practical 1: **The Power of Handwriting (Handwriting is Brainwriting)**
Practical 2: **Know yourself through handwriting**
Practical 3: **The Role of Signature in your life**
Practical 4: **Graphotherapy to enhance yourself in all ways**
Practical 5: **Neurolinguistic Programming , S.M.A.R.T Goal**
Practical 6: **Effective Communication Model, Rapport Building and Anchor**
Practical 7: **Brain Directives & Linguistic Presuppositions**
Practical 8: **Neurobics**

Syllabus for Semester I, Bachelor of Computer Application

Course Code: 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:

CO1: Understand the origin and development of poetry
CO2: Appreciate the art of poetry in life
CO3: Develop aesthetic sense
CO4: Develop holistic perspective to their personality

Syllabus

Practical 1: **Art of poetry – orientation**
Practical 2: **Forms of poetry – orientation**
Practical 3: **Forms of poetry – recitation**
Practical 4: **Application of poetry – orientation**
Practical 5: **Application of poetry – practical session**
Practical 6: **Poetry and aesthetics**
Practical 7: **Writing poetry – orientation**
Practical 8: **Writing poetry – writing sessions**

Reading material

I. The Art of Poetry

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

II. Understanding and Interpretation of Poetry

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

III. Writing Poetry

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

Syllabus for Semester I, Bachelor of Computer Application

Course Code: 24HS02PR0105-13 **Course: Creative and content writing**
L: 00 Hrs, T: 0 Hr, P: 2 Hrs, Per Week **Total Credits: 01**

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

Course outcomes:
On completion of the course, student will be able to achieve the following:
CO1: Understand and apply fundamental concepts and techniques of creative writing.
CO2: Apply storytelling techniques to create engaging narratives.
CO3: Develop and implement effective SEO and digital content strategies
CO4: Create and refine content using various tools and applying diverse writing styles and formats.
CO5: Utilize digital tools to craft multimedia narratives and create a professional portfolio.

Syllabus
Creative Writing
Practical 1: **Introduction to Creative and Content Writing**
Practical 2: **Character and Story Development**
Practical 3: **Crafting Compelling Narratives**

Content Writing
Practical 4: **SEO and Digital Content Strategies**
Practical 5**: Writing for Media**
Practical 6: **Tools**

Content Creation
Practical 7: **Digital Storytelling**
Practical 8: **Creative Portfolio Launch**

Syllabus for Semester I, Bachelor of Computer Application

Course Code: 24HS02PR0105-14 **Course: Science of life through Bhagwad Gita**

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

Course Objective

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

Course Outcome

CO1: To understand the methodology to correctly interpret and analysis the scripture
CO2: To understand the application of various teaching of the Bhagwad Gita
CO3: Use meditation and breathing techniques for healthy mind and body.

Syllabus

Practical 1: **Introduction to Bhagwad Gita - methodology**
Practical 2: **Real life application of chapter 1-3**
Practical 3: **Real life application of chapter 4-6**
Practical 4: **Real life application of chapter 7-9**
Practical 5: **Real life application of chapter 10-12**
Practical 6: **Real life application of chapter 13-15**
Practical 7: **Real life application of chapter 16-18**
Practical 8: **Meditation and breathing techniques**

Syllabus for Semester I, Bachelor of Computer Application

Course Code: 24HS02PR0105-15 **Course:** ***Sanskrit Sambhashan- Spoken Sanskrit***

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

Course objectives:

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

Course outcome

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

CO1: Enhanced writing skills in Sanskrit

CO2: Enhanced speaking skills in Sanskrit

CO3: Enhanced listening skills in Sanskrit

CO4: Enhanced writing skills in Sanskrit

Syllabus:

संस्कृतसम्भाषणशिबिरस्य पाठ्यक्रमः

प्रथमं दिनम्

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

द्वितीयं दिनम्

- गीतम्।
- पुनस्स्मारणम्।
- शब्देषु लिङ्गभेदज्ञापनम् - यथा -सः सुधाखण्डः, सा कुञ्चिका, 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।
- ऐक्यमत्रः।

तृतीयं 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 - दद्मः। 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।
- ऐक्यमत्रः।

चतुर्थं दिनम्

- गीतम्।
- पुनःस्मारणम्।
- च
- अतः
- एव
- इति
- अस्मि
- यदि -तर्हि
- यथा - तथा
- तः - पर्यन्तम् (वाक्यपत्रस्य उपयोगेन वाक्यानि वाचनीयानि।)
- अद्य आरभ्य
- कृते (वाक्यपत्रस्य उपयोगः करणीयः)
- क्तवतुप्रत्ययान्तानाम् अभ्यासः
  गतवान् - पठितवान् - लिखितवान् (ए.व. पुंलिङ्गे)।
  गतवती - पठितवती - लिखितवती (ए.व. स्त्रीलिङ्गे)।
  गतवन्तः - पठितवन्तः - लिखितवन्तः (ब.व. पुंलिङ्गे)।
  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।
- ऐक्यमत्यः।

पञ्चमं दिनम्

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

षष्ठं दिनम्

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

सप्तमं दिनम्

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

दशमं दिनम्

- गीतम्।
- पुनःस्मारणम्।
- 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 objectives:

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

Course outcome

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

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

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

CO3: Develop communication skills

- कीर्तन परंपरेचा इतिहास आणि अखिल भारतातील कीर्तन परंपरांचा परिचय
- चार महिन्यात वीस संतचरित्रांचा परिचय अधिक त्याविषयी प्रवचन
- वीस संतांचा वाङ्मयीन परिचय
- प्रमुख पाच कीर्तन पद्धतींचे मांडणी तंत्र.
- पूर्वरंग – उत्तररंग सहित कीर्तनप्रक्रियेतील सर्व महत्वाचे टप्पे.
- कीर्तनासाठी आवश्यक असणारी कंठ संगीतात्मक माहिती
- टाळ, मृदंग, वीणा, तबला, पेटी या वाद्यांची ओळख.
- प्रवचनांसाठी अभ्यासग्रंथांचे मार्गदर्शन.
- वकृत्व 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 Objective:

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

Syllabus:

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

Pattern of Classes: 2 Days and 1 Night Camp

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

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

Syllabus for Semester I, Bachelor of Computer Application

Course Code: 24HS04PR0102-2 **Course Name: Introduction to Defense Forces & Obstacle Training**

L: 0 Hrs. T: 0 Hrs. P: 2 Hrs. Per Week **Total Credits: 01**

Course Objective:

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

Syllabus:

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

Pattern of Classes: 2 Days and 1 Night Camp

Course Outcome:

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

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

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 Objective:

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

Syllabus:

1. **Mental Awareness**
    - Importance of Self Defense
    - Types of Self Defense
    - Rules of Self Defense
2. **Physical Session**
    - Various Self Defense Techniques
    - Different Situational Defense Techniques
3. **Improvise Weapon**
    - Knowledge and practice of different equipment's which can be used for self defense
4. **Martial Arts**
    - Introduction of Indian Martial Arts
    - Demonstration of Indian Martial Arts
    - Training of Indian Martial Arts (Lathi Kathi)

Pattern of Classes: Training/Classes at Campus

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

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

Syllabus 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 Objective:

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

Syllabus:

Unit I

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

Practical I

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

Unit II

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

Practical II

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

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 **Course: Object Oriented Programming**

L: 3 Hrs, P: 0 Hr, Per Week **Total Credits: 3**

Course Objectives

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

Course Outcomes:

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

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

Syllabus

Unit I:

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

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

Unit II:

Concept of overloading: Constructor Overloading, Function Overloading.

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

Lambda Expressions Introduction, Block, Passing Lambda expression as Argument

Unit III:

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

Unit IV:

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

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

Unit V:

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

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

Unit VI:

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

Text Books

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

Reference Books

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

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 Objectives

1. To develop ability of students to implement basic concepts and techniques of object oriented programming paradigm like encapsulation, inheritance, polymorphism, exception handling.
2. Develop solution to problems using collection classes, generics, streams, multithreading.

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 **Course: Computer Architecture and Organization**

L: 3 Hrs, P: 0Hr, Per Week **Total Credits: 3**

Course Outcomes:

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

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

SYLLABUS

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

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

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

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

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

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

Text Books

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

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

B. Educational information:

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

C. Payment Details:

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

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

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

6. Arrow Functions and Template Literals
    a. Write the code to find Fibonacci series of n numbers using Arrow functions in ES6.
    b. Write the code for generating HTML templates for a grocery item using template literals in ES6.

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

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 Objectives

1. To introduce the fundamentals of quantum computing to students
2. To introduce basic programming aspects of quantum computing to students

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 Pre-requisite :Set Theory.

Course Objective:

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

Course Outcomes

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

1. 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 (H0) and alternative hypothesis (H1), 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. Spiegal , 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

Course Objectives:

The computational Mathematics Lab course will consist of experiments demonstrating the principles of Mathematics relevant to the study of Science and Engineering. Students will show that they have learnt Laboratory skills that will enable them to properly acquire and analyze the data in the lab and draw valid conclusions. On successful completion of the course students shall be able to:

Proposed Course Outcomes:

By using open source software Students will be able to

CO1: To use mathematical software as an advance calculator.

CO2: Create and manipulate 2D Graphs and use these skills to effectively visualize and interpret data

CO3: Plots 3D graphs in SageMath, and use these skills to effectively visualize and interpret data.

CO4 Find higher order derivatives and its interpretation with the help of Sagemath.

CO5: Use partial derivatives and gradients for optimizing multivariable functions.

CO6: 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.

CO7: Understand how matrices are used to solve system of equations and in cryptographic algorithms.

CO8 : 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**

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

Objectives of the Course:

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

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

1. Understand fundamental skills, basic principle and practices of 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	50

	Yoga Activities – 10 Marks	
		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 Objective

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

Course Outcomes

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

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

SYLLABUS

UNIT-I

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

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

UNIT-II

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

UNIT-III

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

UNIT-IV

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

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

UNIT-V

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

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

Text Books

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

Reference Books

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

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 Objectives

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

Course Outcomes

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

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

SYLLABUS

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

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

Syllabus for Semester III, Bachelor of Computer Application

Course Code: 24CS18PR0303 **Course: Software Lab**

L: 0 Hrs, P: 2 Hr, Per Week **Total Credits: 1**

Course Objectives

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

Course Outcomes

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

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

SYLLABUS

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

Text Books

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

Reference Books

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

Syllabus for Semester III, Bachelor of Computer Application

Course Code: 24CS18PR0304 **Course: Project based Learning**

L: 0 Hrs, P: 4 Hr, Per Week **Total Credits: 2**

Course Objectives

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

Course Outcomes

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

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

SYLLABUS

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

Text Books

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

Reference Books

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

Syllabus for Semester III, Bachelor of Computer Application

Course Code: 24CS18TH0305 **Course: Principles of Management**

L: 02 Hrs P: 00 Hr, Per Week **Total Credits: 02**

Course Objective

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

Course Outcomes

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

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

SYLLABUS

Unit 1: Introduction to Management

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

Unit 2: Planning and Decision Making

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

Unit 3: Leading and Motivation

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

Unit 4: Controlling and Coordination

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

Text Books

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

Reference Books:

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

Syllabus for Semester III, Bachelor of Computer Application

Course Code: 24HS03TH0305 Course: Discrete Mathematics & Graph Theory

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

Course Objective:

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

Course Outcomes

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

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

Syllabus

Module 1: (6 Lectures)

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

Module 2(9 Lectures)

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

Module 3(9 Lectures)

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

Module 4: (8 Lectures)

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

Module 5: (7 Lectures)

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

Text Books:

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

Reference Books:

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

Syllabus for Semester III, Bachelor of Computer Application

Course Code: 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:

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

Unit 1: Environmental Pollution I

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

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

Unit 2: Environmental Pollution II

Soil pollution and solid waste: Soil pollutants, hazardous wastes and their sources; Impact on human health.
Introduction, types of e-wastes, environmental impact, e-waste recycling, e-waste management rules.
Noise pollution: Definition of noise; Unit of measurement of noise pollution; Sources of noise pollution; Noise standards; adverse impacts of noise on human health, recent advances in noise pollution control and benefits.
Thermal and Radioactive pollution: Sources and impact on human health and ecosystems.

Unit 3: Environmental Sustainability

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

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

Unit 4: Environmental laws and regulation

Introduction to environmental laws and regulation: Constitutional provisions- Article 48A, Article 51A (g) and other derived environmental rights; Introduction to environmental legislations on the forest, wildlife and pollution control.
Environmental management system: ISO 14001
Environmental audit and impact assessment; Environmental risk assessment Pollution control and management.

Text Books:

1. Environmental Pollution and its control Techniques by Dr. S.S. Dara.

S. Chand Publications.

2. M Afshar Alam, Sapna Jain, Hena Parveen, Green Computing Approach Towards Sustainable Development, Wiley Interscience Publications.
3. Dr. Rajshree Khare, A Textbook of Engineering Chemistry (AICTE), S.K. Kataria & amp; Sons.

Reference Books:

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

Syllabus for Semester 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 Objectives

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

Course Outcomes

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

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

Syllabus

Unit - I

Introduction to Database Management Systems:

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

Unit - II

SQL, Intermediate SQL and Relational Database Design:

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

Intermediate SQL: Joins, Views.

Unit - III

Relational Database Design: Functional Dependency, Normalization.

File Organization, Indexing and Hashing

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

Unit - IV

Query Processing and Optimization:

Query Processing: Overview, Selection Operation, Join Operation.

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

Unit - V

Concurrency Control and Database Recovery:

Concept of Transaction, Serializability, locking protocols.

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

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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 **Course: Introduction to Database Management Systems Lab**

L:0 Hrs P: 2 Hr, Per Week **Total Credits: 1**

Course Objective

This course will help student to give a good formal foundation on the relational model of data, to present SQL, procedural interfaces to SQL comprehensively and to introduce the concepts and techniques relating to query processing by SQL Implementations.

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/DDL commands.

Syllabus

Minimum 8 practicals and assignments based on the theory syllabus.

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

Course Code: 24CS18TH0402 **Course: Introduction to Operating Systems**

L: 3 Hrs, P: 0 Hr, Per Week **Total Credits: 3**

Course Objectives

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

Course Outcomes

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

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

Syllabus

Unit - I

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

Unit - II

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

Unit - III

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

Unit - IV

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

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

Unit - V

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

Text Books:

1. Operating System Concepts: *Siliberschatz 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 OF SEMESTER - IV, MCA (MASTER OF COMPUTER APPLICATIONS)

Course Code: 24CS18PR0402 **Course: Introduction to Operating Systems Lab**

L: 0 Hrs, P: 2 Hr, Per Week **Total Credits: 1**

Course Objective

The objective of the course is to know the basics of operating systems, Introduction of the Linux operating system and to learn OS concepts in Linux.

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

Course Code: 24CS18TH0403 **Course: Introduction to Computer Networks**

L: 3 Hrs, P: 0 Hr, Per Week **Total Credits : 3**

Course Objectives

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

Course Outcomes

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

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

Syllabus

UNIT-I

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

UNIT-II

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

UNIT-III

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

UNIT-IV

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

UNIT-V

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

Text Books

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

Reference Books

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

SYLLABUS OF SEMESTER - IV, BCA (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 Objective

The objective of this lab is to provide students with hands-on experience in basic networking concepts, device configuration, and protocol analysis. Through simulation tools and command-line utilities.

Course Outcomes

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

1. Identify and describe the functions of various networking devices and topologies.
2. Use network utilities and commands to troubleshoot and verify connectivity.
3. Analyze network traffic and application-layer protocols using tools like Wireshark.

Syllabus

Minimum 8 Practicals based on theory syllabus.

Syllabus for Semester IV, Bachelor of Computer Application

Course Code: 24CS18TH0404 **Course: Theory of Computation**

L: 3 Hrs P: 0 Hr, Per Week **Total Credits: 03**

Course Objectives

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

Course Outcomes

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

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

Syllabus

Unit -I
Finite Automata

Informal picture of Finite automation model (FA), Deterministic Finite Automata, Definition and Notations of DFA, How a DFA processes Strings and Languages, Non-deterministic finite Automation, 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, Greibachnormal form, Reduction of CFG's, Elimination of ϵ- Productions, Unit Productions and Left Recursion, Useless Symbols, closure and decision properties of CFLs.

Unit – IV

Push Down Automata

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

Unit - V

Turing Machines & Undecidability

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

Text Books:

1. Hopcroft Ulman, Introduction to Automata Theory, Languages and Computations, Pearson Education Asia, 2nd Edition, ISBN: 9788131720479.
2. Michael Sipser, Introduction to the Theory of Computation, CENGAGE Learning, 3 rd Edition ISBBN13:978-81-315-2529-6
3. Dr. O. G. Kakde, "Theory of Computation", University Science Press

Reference Books:

1. John C. Martin, Introduction to Language and Theory of Computation, TMH, 3 rd Edition, ISBN: 978-0-07-066048-9.
2. K.L.P. Mishra and Chandrasekaran, "Theory of Computer Science (Automata, Languages and Computation)", PHI, 3rd Edition
3. DanielI. 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.