RCOEM

**Shri Ramdeobaba College of
Engineering and Management, Nagpur**

SHRI RAMDEOBABA COLLEGE OF ENGINEERING AND MANAGEMENT, NAGPUR – 440013

An Autonomous College affiliated to
Rashtrasant Tukadoji Maharaj Nagpur University,
Nagpur, Maharashtra (INDIA)

PROGRAMME SCHEME & SYLLABI
2023 – 2024

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B. Tech. (INFORMATION TECHNOLOGY)

About the Department

The department, established in 2001 and accredited by the National Board of Accreditation AICTE, in 2008, 2014 and 2022 respectively, has an excellent infrastructure well-qualified field and experienced faculties with average teaching experience of 17 years. The curriculum is designed so as to cater to Core IT subjects as well as those related to current trends in IT Industries. The department has excellent industry interaction and a strong alumni network which gives inputs in curriculum development, guest lectures, summer/winter training for students. Option of full six months internship is provided in reputed IT industries, for VIII semester students. The laboratories of the department are well equipped with computers of latest configuration and internet facility. Latest software, wireless access point, LCD projectors and separate routers are used in the laboratories for teaching purpose. Department takes pride in excellent placements of the final year students and has the distinction of consistently getting good results in all semesters. The department also coordinates Semicolon Tech Club of RCOEM, under which various technical and co- curricular activities are organized for the benefit of students.

Department Vision

To establish the department as a major source of manpower for the IT sector.

Department Mission

To produce engineering graduates with sound technical knowledge in Information Technology, good communication skills and ability to excel in professional career.

Program Educational Objectives

1. To produce Quality Manpower catering to the requirements of IT Industry with sound fundamentals and core Engineering knowledge along with adequate exposure to Emerging Technologies.

2. To develop graduates possessing abilities to Interpret, Analyze and Design effective solutions while working in a team and capable of adapting to current trends by engaging in Lifelong learning.

3. To imbibe in graduate an understanding of issue related to Environment, Society, Profession and Ethics along with importance of Effective Communication Skills.

Program Outcomes

Engineering Graduates will be able to:

1. **Engineering knowledge :** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

2. **Problem analysis :** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

3. **Design / development of solutions :** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety and the cultural, societal, and environmental considerations.

4. **Conduct investigations of complex problems :** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

5. **Modern Tool usage :** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

6. **The Engineer and Society :** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

7. **Environment and Sustainability :** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

9. **Individual and Team Work :** Function effectively as an individual, and as a member or leader in diverse teams, and in multi-disciplinary settings.

10. **Communication :** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

11. **Project Management and Finance :** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multi-disciplinary environments.

12. **Life-long Learning :** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcomes

ITPSO1: Foundation of Logic development and Mathematical concepts

Demonstrate logic development ability along with mathematical concepts to solve realworld problems.

ITPSO2: Foundations of Computer Systems and Software development

Ability to understand the principles and working of computer systems, Software Engineering principles, Familiarity and practical competence with a broad range of programming languages and open-sourceplatforms relevant to IT Industry.

ITPSO3:   Application of Computing knowledge and Research ability

Ability to work professionally in IT Industry, prepare for higher studies and to develop systems based on cutting edge technologies to solve the real-world problems in IT Industry.

Teaching Scheme for Bachelor of Technology
B. Tech. (Information Technology)
(Semester - I)

Sr. No.	Course Type	Course Code	Course Name	Hours/Week			Credits	Maximum marks			ESE Exam Duration (Hrs.)
				L	T	P		Continuous Assessment	End Sem Exam	Total	
1.	BSC	PHT 1006	Introduction to Quantum Computing	2	1	0	3	50	50	100	03 Hrs
2.	BSC	PHP 1006	Introduction to Quantum Computing Lab	0	0	2	1	50	-	50	-
3.	BSC	MAT1002	Calculus	3	0	0	3	50	50	100	03 Hrs
4.	BSC	MAP1002	Computational Mathematics Lab	0	0	2	1	50	-	50	-
5.	ESC	ITT1001	Fundamentals of Programming	2	1	0	3	50	50	100	03 Hrs
6.	ESC	ITP1001	Fundamentals of Programming Lab	0	0	2	1	50	-	50	-
7.	ESC	ITT1002	Digital Circuits	2	1	0	3	50	50	100	03 Hrs
8.	ESC	ITP1002	Digital Circuits Lab	0	0	2	1	50	-	50	
9.	PCC	ITP1003	IT Workshop Lab	0	0	2	1	50	-	50	-
10.	HSSM -AEC	HUT1002	English for Professional Communication	2	0	0	2	50	50	100	03 Hrs
11.	HSSM -AEC	HUP1002	English for Professional Communication Lab	0	0	2	1	50	-	50	-
12.	HSSM -VEC	HUT1004	Foundational course in Universal Human Value	1	0	0	1	50	-	50	-
13.	CCA	HUP0001/ PEP0001/ CHP0001	Liberal/Performing Art	0	0	2	1	50	-	50	-
			TOTAL	12	3	14	22	650	250	900	

Teaching Scheme for Bachelor of Technology
B. Tech. (Information Technology)
(Semester - II)

Sr. No.	Course Type	Course Code	Course Name	L	T	P	Credits	Continuous Assessment	End Sem Exam	Total	ESE Exam Duration (Hrs.)
1.	BSC	CHT2006	Chemistry of Smart Materials	2	0	0	2	50	50	100	03 Hrs
2.	BSC	CHP2006	Chemistry of Smart Materials Lab	0	0	2	1	50	-	50	-
3.	BSC	MAT2002	Discrete Mathematics	3	0	0	3	50	50	100	03 Hrs
4.	ECS	ITT2001	Object Oriented Programming	3	0	0	3	50	50	100	03 Hrs
5.	ECS	ITP2001	Object Oriented Programming Lab	0	0	2	1	50	-	50	-
6.	PCC	ITT2002	Data Structures	2	1	0	3	50	50	100	03 Hrs
7.	PCC	ITP2002	Data Structures Lab	0	0	2	1	50	-	50	-
8.	VSEC	ITT2003	Creativity, Innovation & Design Thinking	2	0	0	2	50	-	50	-
9.	IKS	HUT2001	Foundational Literature of Indian Civilization	2	0	0	2	50	50	100	02 Hrs
10.	CCA	PET/PEP2001	Sports-Yoga-Recration	1	0	2	2	50	50	100	02 Hrs
			TOTAL	15	1	8	20	500	300	800	

Exit option: Award of UG Certificate in Major with 42 credits and an additional 8 credits.		
Exit Courses		
1 Introduction to Computer Hardware and Networking	Online/offline Certification Course	8

(Semester - III)

Sr. No.	Course Type	Course Code	Course Name	L	T	P	Credits	Continuous Assessment	End Sem Exam	Total	ESE Exam Duration (Hrs.)
1.	PCC	ITT3001	Computer Organization and Architecture	3	0	0	3	50	50	100	03 Hrs
2.	PCC	ITT3002	Design and Analysis of Algorithms	2	1	0	3	50	50	100	03 Hrs
3.	PCC	ITP3002	Design and Analysis of Algorithms Lab	0	0	2	1	50	-	50	-
4.	VSEC	ITT3003	IT Infrastructure Services	1	0	0	1	50	-	50	-
5.	VSEC	ITP3003	IT Infrastructure Services Lab	0	0	2	1	50	-	50	-
6.	MDM	MAT3002	Probability and Statistics	3	0	0	3	50	50	100	03 Hrs
7.	OE	ITT2980	Open Elective -I	2	0	0	2	50	50	100	03 Hrs
8.	HSSM	HUT3001	Business Communication	2	0	0	2	50	50	100	02 Hrs
9.	HSSM	HUT3002	Environmental Education	2	0	0	2	50	50	100	02 Hrs
10.	CEP/FP	ITP3005	Field Project	0	0	4	2	25	25	50	-
			TOTAL	15	1	8	20	475	325	800	

Teaching Scheme for Bachelor of Technology
B. Tech. (Information Technology)
(Semester - IV)

Sr. No.	Course Type	Course Code	Course Name	Hours/Week			Credits	Maximum marks			ESE Exam Duration (Hrs.)
				L	T	P		Continuous Assessment	End Sem Exam	Total	
1.	PCC	ITT4001	Formal Languages and Automata Theory	2	1	0	3	50	50	100	03 Hrs
2.	PCC	ITT4002	Database Management System	2	1	0	3	50	50	100	03 Hrs
3.	PCC	ITP4002	Database Management System Lab	0	0	2	1	50	-	50	-
4.	PCC	ITT4003	Software Engineering	2	1	0	3	50	50	100	03 Hrs
5.	PCC	ITP4003	Software Engineering Lab	0	0	2	1	50	-	50	-
6.	VSEC	ITP4005	Software Tools	0	0	4	2	50	-	50	-
7.	HSSM	ITT4006	Cyber Laws and Ethics	2	0	0	2	50	50	100	02 Hrs
8.	MDM	MAT4001	Linear Algebra	3	0	0	3	50	50	100	03 Hrs
9.	OE	ITT2990	Open Elective -II	3	0	0	3	50	50	100	03 Hrs
10.	HSSM	HUT4003	Managerial Economics (ED/ECO/MGM)	2	0	0	2	50	50	100	02 Hrs
			TOTAL	**16**	**3**	**8**	**23**	**500**	**350**	**850**	

Exit Courses			
1	Web Design & Development	Online/offline Certification Course	8

(Semester - V)

Sr. No.	Course Type	Course Code	Course Name	Hours/Week			Credits	Maximum marks			ESE Exam Duration (Hrs.)
				L	T	P		Continuous Assessment	End Sem Exam	Total	
1.	PCC	ITT5001	Compiler Design	3	0	0	3	50	50	100	03 Hrs
2.	PCC	ITT5002	Operating Systems	3	0	0	3	50	50	100	03 Hrs
3.	PCC	ITP5002	Operating Systems Lab	0	0	2	1	50	-	50	-
4.	PCC	ITT5003	Computer Networks	3	0	0	3	50	50	100	03 Hrs
5.	PCC	ITP5003	Computer Networks Lab	0	0	2	1	50	-	50	-
6.	PEC	ITT5004	Elective -I	3	0	0	3	50	50	100	03 Hrs
7.	MDM	ITT5005	Artificial Intelligence	3	0	0	3	50	50	100	03 Hrs
8.	MDM	ITP5005	Artificial Intelligence Lab	0	0	2	1	50	-	50	-
9.	OE	ITT3980	Open Elective -III	3	0	0	3	50	50	100	02 Hrs
10.	HSSM	HUT5001	Organizational Behaviour	2	0	0	2	50	50	100	02 Hrs
11.	ELC	ITP5007	Project-I	0	0	2	1	75	75	150	-
			TOTAL	**20**	**0**	**8**	**24**	**575**	**425**	**1000**	

Course Code	Elective-I
ITT504-01	Customer Relationship Management
ITT504-02	Product and Project Management

Teaching Scheme for Bachelor of Technology
B. Tech. (Information Technology)
(Semester - VI)

Sr. No.	Course Type	Course Code	Course Name	L	T	P	Credits	Continuous Assessment	End Sem Exam	Total	ESE Exam Duration (Hrs.)
1.	PCC	ITT6001	Cryptography and Network Security	3	0	0	3	50	50	100	03 Hrs
2.	PCC	ITT6002	Internet and Web Programming	2	1	0	3	50	50	100	03 Hrs
3.	PCC	ITP6002	Internet and Web Programming Lab	0	0	2	1	50	-	50	-
4.	PCC	ITT6003	Cloud Computing	3	0	0	3	50	50	100	03 Hrs
5.	PCC	ITP6003	Cloud Computing Lab	0	0	2	1	50	-	50	-
6.	PEC	ITT6004	Elective -II	3	0	0	3	50	50	100	03 Hrs
7.	PEC	ITP6004	Elective -II Lab	0	0	2	1	50	-	50	-
8.	MDM	ITT6005	Machine Learning	2	1	0	3	50	50	100	03 Hrs
9.	MDM	ITP6005	Machine Learning Lab	0	0	2	1	50	-	50	-
10.	ELC	ITP6006	Project -II	0	0	4	2	75	75	150	-
			TOTAL	13	2	12	21	525	325	850	

Course Code	Elective-II
ITT6004-01/ ITP6004-01	Mobile Apps Development
ITT6004-02 /ITP6004-02	Advanced Java Programming

Exit Courses		
1 Software Project Management	Online/offline Certification Course	8

(Semester - VII)

Sr. No.	Course Type	Course Code	Course Name	L	T	P	Credits	Continuous Assessment	End Sem Exam	Total	ESE Exam Duration (Hrs.)
1.	PCC	ITT7001	Software Architecture	3	1	0	4	50	50	100	03 Hrs
2.	PCC	ITT7002	Human Computer Interaction	3	0	0	3	50	50	100	03 Hrs
3.	PEC	ITT7003	Elective -III	3	0	0	3	50	50	100	03 Hrs
4.	PEC	ITP7003	Elective -III Lab	0	0	2	1	50		50	
5.	MDM	ITT7004	Introduction to Deep Learning	3	0	0	3	50	50	100	03 Hrs
6.	MDM	ITP7004	Introduction to Deep Learning Lab	0	0	2	1	50		50	-
7.	RM	ITT7005	Research Methodology	3	0	0	3	50	50	100	03 Hrs
8.	ELC	ITP7006	Project -III	0	0	4	2	75	75	150	-
			TOTAL	15	1	8	20	425	375	750	

Course Code	Elective-III
ITT7003-01/ ITP7003-01	Data Warehouse and Business Intelligence
ITT7003-02/ ITP7003-02	Digital Forensics

Teaching Scheme for Bachelor of Technology
B. Tech. (Information Technology)
(Semester - VIII)

Sr. No.	Course Type	Course Code	Course Name	Hours/Week			Credits	Maximum marks			ESE Exam Duration (Hrs.)
				L	T	P		Continuous Assessment	End Sem Exam	Total	
1.	PCC	ITT8001	Game Programming	3	0	2	3	50	50	100	03 Hrs
2.	PCC	ITP8001	Game Programming Lab	0	0	2	1	50	-	50	-
3.	PEC	ITT8002	Elective -IV	4	0	0	4	50	50	100	03 Hrs
4.	PEC	ITT8003	Elective -V	3	0	2	3	50	50	100	03 Hrs
5.	PEC	ITP8003	Elective -V Lab	0	0	2	1	50		50	-
			TOTAL	**10**	**0**	**8**	**12**	**250**	**150**	**400**	

Course Code	Elective-IV
ITT8002-01	Natural Language Processing
ITT8002-02	Blockchain & Cryptocurrency Technologies

Course Code	Elective-V
ITT8003-01/ ITP8003-01	Information Retrieval
ITT8003-02/ ITP8003-02	Social and Information Networks

OR

Sr. No.	Course Type	Course Code	Course Name	Hours/Week			Credits	Maximum marks			ESE Exam Duration (Hrs.)
				L	T	P		Continuous Assessment	End Sem Exam	Total	
1.	ELC		Full Semester Internship/ Research Internship/TBI	0	0	0	12	200	200	400	-

Teaching Scheme for Bachelor of Technology
B. Tech. (Information Technology)
(Honors Specialization)

Sr. No.	Sem.	Course Code	Course Name	Hours/Week			Credits	Maximum marks			ESE Exam Duration (Hrs.)
				L	T	P		Continuous Assessment	End Sem Exam	Total	
1.	III	ITTH3001-01	Introduction to Web 3 Programming	3	-	-	3	50	50	100	03 Hrs.
		ITTH3001-02	NPTEL Course	-	-	-	3	100	-	100	-
2.	IV	ITTH4001-01	Development of Progressive Web Application	3	-	-	3	50	50	100	03 Hrs.
		ITTH4001-02	NPTEL Course	-	-	-	3	100	-	100	-
3.	V	ITTH5001-02	Cloud Native App Development	4	-	-	4	100	-	100	-
		ITTH5001-02	NPTEL Course	-	-	-	4	100	-	100	-
4.	VI	ITTH6001-01	Introduction to DevOps	4	-	-	4	100	-	100	-
		ITTH6001-02	NPTEL Course	-	-	-	4	100	-	100	-
5.	VII	ITPH7001	Project	-	-	8	4	50	50	100	-
			TOTAL	**14**	**-**	**8**	**18**			**500**	

Teaching Scheme for Bachelor of Technology
B. Tech. (Information Technology)
(Minors Specialization)

Sr. No.	Sem.	Course Code	Course Name	Hours/Week			Credits	Maximum marks			ESE Exam Duration (Hrs.)
				L	T	P		Continuous Assessment	End Sem Exam	Total	
1.	III	ITTM3001-01	Web Designing	2	1	-	3	50	50	100	03 Hrs.
		ITTM3001-02	NPTEL Course	-	-	-	3	100	-	100	-
2.	IV	ITTM4001-01	Advanced Java Programming	2	1	-	3	50	50	100	03 Hrs.
		ITTM4001-02	NPTEL Course	-	-	-	3	100	-	100	-
3.	V	ITTM5001-01	Mobile App Development	3	1	-	4	50	50	100	03 Hrs.
		ITTM5001-02	NPTEL Course	-	-	-	3	100	-	100	-
4.	VI	ITTM6001-01	Amazon Web Services	3	1	-	4	50	50	100	03 Hrs.
		ITTM6001-02	NPTEL Course	-	-	-	3	100	-	100	-
5.	VII	ITTM7001	Project			8	4	50	50	100	-
			TOTAL	**10**	**04**	**8**	**18**			**500**	

Syllabus for Semester - I / II
B. Tech. Department of Information Technology

Course Code : PHT1006   **Course : Introduction to Quantum Computing**

L: 2 Hr., T: 1 Hrs., P : 0 Hrs., Per week   **Total Credits : 3**

Course Objectives

1. To introduce the fundamentals of quantum computing to students

2. The problem-solving approach using finite dimensional mathematics

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.

Module - 1 : Basic Quantum Theory

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

Module - 2 : Complex Vector Spaces

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

Module - 3 : Linear Algebra in Quantum Computing

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

Module - 4 : Classical and Quantum Systems

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

Module - 5 : Quantum representation of systems

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

Module - 6 : Architecture and Algorithms

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

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

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

Text Book

1. Quantum computing for computer scientists, Noson S.Yanofsky, Mirco A.Mannucci, Cambridge University Press 2008.

2. Introduction to Quantum Mechanics, 2nd Edition, David J. Griffiths, Prentice Hall New Jersey 1995.

Reference Books

1. Quantum computing explained, David McMahon, Wiley-interscience, John Wiley & Sons, Inc. Publication 2008.

2. Quantum computation and quantum information, Michael A. Nielsen and Isaac L. Chuang, Cambridge University Press 2010.

Syllabus for Semester - I / II
B. Tech. Department of Information Technology

Course Code : PHP1006   Course : Introduction to Quantum Computing Lab

L: 0 Hr., T: 0 Hrs., P : 1 Hrs., 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. Utilise 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, RCOEM, Nagpur

Syllabus for Semester - I
B. Tech. Department of Information Technology

Course Code : MAT1002   **Course : Calculus**

L: 3 Hr., T: 0 Hrs., P : 0 Hrs., Per week   **Total Credits : 3**

Course Objective

The objective of this course is to familiarize the prospective engineers with techniques in Calculus. It aims 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. Apply the concepts of continuity and differentiability to find Taylor's and Maclaurin series.

2. Understand the methods of partial derivatives and apply these concepts to determine extreme values of the functions of two variables.

3. Demonstrate the basic knowledge of vector differentiation and line integral.

4. Understand proper and improper integrals and use it find area, length, volume and surface of revolution

5. Internalize convergence of sequences and apply it to determine whether infinite series convergent or divergent with appropriate tests.

Syllabus

Module - 1 (8 Lectures)

Differential Calculus: Functions of single variable: Review of limit, continuity and differentiability. Mean value theorems: Rolle's theorem, Lagrange's theorem, Cauchy's theorem, Taylor's theorem, Taylor's and Maclaurin series.

Module - 2 (8 Lectures)

Partial Differentiation: Partial derivatives, Euler's Theorem, chain rule, total derivative, Jacobians, Maxima, Minima for the functions of two variables.

Module - 3 (8 Lectures)

Vector Calculus: Scalar and vector fields, gradient of scalar point function, directional derivatives, divergence and curl of vector point function, Line integral.

Module - 4 (8 Lectures)

Integral Calculus: Fundamental theorem of Integral calculus, mean value theorems, evaluation of definite integrals, applications in area, length, volumes and surface of solids of revolutions, Improper integrals: Beta and Gamma functions.

Module - 5 (8 Lectures)

Infinite series: Sequences, Infinite series of real and complex numbers, Cauchy criterion, tests of convergence, absolute and conditional convergence, uniform convergence, power series, radius of convergence.

Text Books / References

1. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.

2. Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2008.

3. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.

4. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 35th Edition, 2000.

5. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010.

6. P. N. Wartikar and J. N. Wartikar, A text book of Applied Mathematics Volume I & II, Pune Vidhyarthi Griha Prakashan, Pune-411030 (India).

Syllabus for Semester - I
B. Tech. Department of Information Technology

Course Code : MAP1002   **Course : Computational Mathematics Lab**

L: 0 Hr., T: 0 Hrs., P : 2 Hrs., 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:

Course Outcomes

By using open source software SageMath Students will be able to

CO1: Download SageMath and use it as an advance calculator.

CO2: Sketch and analyze function graphs.

CO3: Apply the concepts of differential calculus to find extreme value of continuous functions and analyze solutions of difference equations

CO4: Evaluate improper integrals and its applications to find length, area, volume, centre of gravity and mass.

CO5: Understand and Analysis Data inscription standards.

CO6: Analyze the data to find best fit curve.

List of Experiments

Exp. No.	Name of Experiments	Mapped COs
1	To use SageMath as advanced calculator	CO1
2	2D Plotting with SageMath	CO2
3	3D Plotting with SageMath	CO2
4	Differential Calculus with SageMath	CO3
5	Solution of difference equations in SageMath	CO3
6	To Learn Cryptography by using SageMath	CO5
7	Curve Fitting by using SageMath	CO6
8	Integral Calculus with SageMath	CO4

Syllabus for Semester - I
B. Tech. Department of Information Technology

Course Code : ITT1001   Course : Fundamentals of Programming

L: 2 Hr., T: 1 Hrs., P : 0 Hrs., Per week   Total Credits : 3

Course Outcomes

On successful completion of the course student will 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

Unit - I : Introduction to components of a computer system (disks, memory, processor, where a program is stored and executed, operating system, compilers, etc.). Algorithm and Flowchart for problem-solving with Sequential Logic Structure. Steps to solve logical and numerical problems. Representation of Algorithm, Flowchart / Pseudo code with examples.

Unit - II : Introduction to C language : Keywords, Constant, Variable, Data types, Operators, Types of Statements, Decision Control Statement-if, if-else, nested if-else statement, switch case, Loops and Writing and evaluation of conditionals and consequent branching, Pre- processor Directives.

Unit - III : Concept of functions, User defined and Library Functions, parameter passing and returning type, Recursion, Storage classes. Pointers and Function Arguments, Pointer Arithmetics, and Pointer operators.

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

Unit - V : Structures, Simple structures, Array of Structures, Use of Pointers in referencing structures, the notion of linked list (no implementation), malloc and calloc functions of C.

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.   Programming in ANSI C: E. Balguruswami McGraw Hill.

2.   Programming in C: B. Gottfried, Second Edition, Schaum Outline Series, Tata Mc-Graw Hill Publishers, 1996.

3.   The C Programming Language: B. W. Kernighan and D. M. Ritchie, Second Edition, Pearson, June 2015.

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
B. Tech. Department of Information Technology

Course Code : ITP1001   **Course : Fundamentals of Programming Lab**

L: 0 Hr., T: 0 Hrs., P : 2 Hrs., Per week   **Total Credits : 1**

Course Outcomes

On successful completion of the course student will 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.

Practical No.	Description
1	Program to demonstrate the use of different data types
2 / 3	Program to demonstrate the use of decision control statement
4 / 5	Program to demonstrate the use of Loops
6 / 7	Program to demonstrate the use of functions and Recursion
8 / 9	Program to demonstrate the use of Arrays
10	Program to demonstrate the use of pointers
11	Program to demonstrate the use of Structures
12	Program to demonstrate the use of File Handling

Syllabus for Semester - I
B. Tech. Department of Information Technology

Course Code : ITT1002 **Course : Digital Circuit**

L: 2 Hr., T: 1 Hrs., P : 0 Hrs., Per week **Total Credits : 3**

Course Outcomes

Upon completion of the course, students will be able to

1. Minimize Boolean expressions using various techniques.

2. Design combinational circuits using Multiplexers, De-multiplexer, Encoders, Decoders

3. Use Flip Flop as a basic sequential circuit element.

4. Design different memory circuits using PLA and PAL

5. Design Shift registers and Moore –Mealy circuits

6. Design Counters

Unit - I : Number Systems, Logic and Boolean algebra, Logic Gates & Truth Tables, DE Morgan's law, Digital Logic Family, Karnaugh maps, Quine McCluskey minimization technique.

Unit - II : Code Converters, Multiplexers, Demultiplexers, Encoders, Decoders, Adder, Subtractors. Minimization of combinational circuits.

Unit - III : Flip-flops and latches: D, T, S/R, J/K & J/K Master Slave flip-flops, Excitation table, Conversion of one type of F/F to another.

Unit - IV : Introduction to Memory, ROM, RAM, Array of RAM ICs, Read only PLA, PAL Memory.

Unit - V : Registers, Sequential circuit Analysis-Input equations, state table, analysis, and design, Moore & Mealy Circuits.

Unit - VI : Counters, asynchronous and synchronous design using state and excitation tables.

Text Books

1. Modern Digital Electronic: R. P. Jain, Tata McGraw Hill

2. Digital Logic Design: M. Mano, Pearson

Reference Books

1. Fundamental of Digital Electronics: A. Anand Kumar. PHI

Syllabus for Semester - I
B. Tech. Department of Information Technology

Course Code : ITP1002   **Course : Digital Circuit Lab**

L: 0 Hr., T: 0 Hrs., P : 2 Hrs., Per week   **Total Credits : 1**

Course Outcomes

Upon completion of the course, students will be able to

1.   Verify different Boolean laws.

2.   Design combinational circuits

3.   Design sequential circuits.

4.   Design Counters.

Practical No.	Description
Following practical's will be implemented using Verilog Hardware Description Language (VHDL)	
1	Verification of Truth Table of Logic gates
2	Implementation of Logic Gates using universal gates
3	Verification of various Boolean expressions using logic gates
4	Implementation of multiplexer as function generator
5	Implementation of Decoders
6	Implementation of Code converters
7	Implementation of Adders / Subtractor
8	Implementation of Combinational Circuit
9	Implementation of various Flip Flops
10	Implementation of Counters

Syllabus for Semester - I
B. Tech. Department of Information Technology

Course Code : ITP1003   Course : IT Workshop Lab

L: 0 Hr., T: 0 Hrs., P : 2 Hrs., Per week   Total Credits : 1

Course Outcomes

Upon completion of the course, students will be able to

1.   Use basic functions of MS Excel.

2.   Create a Pivot Table report.

3.   Use macros in MS Excel.

4.   Design static web pages using basic HTML tags.

5.   Apply CSS in HTML pages.

Syllabus

MS Excel : Introduction to MS Excel. Accessing, overview of toolbars, saving spreadsheet files, Using help and resources. Creating a Scheduler: Gridlines, Format Cells, Summation, auto fill, Formatting Text, Calculating CGPA and insert graphs with all options, Create a PivotTable report. Mail merge using an Excel spreadsheet. Design application

HTML : HTML Basics: Intro to HTML Syntax, The HTML, head, title, & body tags, Headings, paragraphs, & lists, The strong & em tags, The doctype, The lang attribute, The meta tag & the Unicode character set.

Links: Absolute & Relative URLs, Using the width, height, & alt attributes, Using horizontal rules.

CSS: Intro to Cascading Style Sheets (CSS), The style tag, Tag selectors, The font size, font- family, color, & line-height properties, Hexadecimal color code.

Practical No.	Description
1	Use of various commands in Excel Menu bar
2	Creating excel data sheet and performing various operations
3	Plotting different types of graphs form a data set
4	Apply various filtering techniques on data set
5	Creating Pivot table
6	Applying macro programming on data sheets
7	Creating simple web page using HTML
8	Creating HTML page using List, Table tags
9	Creating HTML page using image tag and image mapping
10	Creating HTML page using CSS

Text Book

1.   HTML and CSS: the Complete Reference, Tata McGraw-Hill Education

Syllabus for Semester - I / II
B. Tech. Department of Information Technology

Course Code : HUT1002/2002 **Course : English for Professional Communication**

L: 2 Hr., T: 0 Hrs., P : 0 Hrs., 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:

CO1: Demonstrate effective use of word power in written as well as oral communication.

CO2: Understand the techniques of listening and apply the techniques of reading comprehension used in professional communication.

CO3: Apply the principles of functional grammar in everyday as well as professional communication.

CO4: Effectively implement the comprehensive principles of written communication by applying various writing styles.

CO5: Create precise and accurate written communication products.

Unit - 1 : Vocabulary Building

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 - 2 : Listening and Reading Comprehension

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 - 3 : Functional Grammar and Usage

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 - 4 : Writing Skills

4.1   Sentence Structures

4.2   Sentence Types

4.3   Paragraph Writing: Principles, Techniques, and Styles

Unit - 5 : Writing Practices

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 / II
B. Tech. Department of Information Technology

Course Code : HUP1002/2002 **Course : English for Professional Communication Lab**

L: 0 Hr., T: 0 Hrs., P : 2 Hrs., Per week **Total Credits : 1**

Course Objective

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
B. Tech. Department of Information Technology

Course Code : HUT1004   **Course : Foundation course in Universal Human Values**

L: 1 Hr., T: 0 Hrs., P : 0 Hrs., 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:

CO1: Develop a holistic perspective of life

CO2: Better understanding of inter-personal relationships and relationship with society and nature.

CO3: An ability to strengthen self-reflection

Syllabus

Unit - 1 : Aspirations and concerns

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 - 2 : Health

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

Unit - 3 : Relationships and Society

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

1. Text book: 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
B. Tech. Department of Information Technology

Course Code : HUP0001

Course : Liberal/Performing Art

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

Total Credits : 1

Sr. No.	Course Code	Course Name	Sem.	Hours/week	Credits	Max Marks Continuous Evaluation	Department
1)	HUP0001-1	Fundamentals of Indian Classical Dance: Bharatnatayam	I/II	2	1	50	Humanities
2)	HUP0001-2	Fundamentals of Indian Classical Dance: Kathak	I/II	2	1	50	Humanities
3)	HUP0001-3	Introduction to Digital Photography	I/II	2	1	50	Humanities
4)	HUP0001-4	Introduction to Japanese Language and Culture	I/II	2	1	50	Humanities
5)	HUP0001-5	Art of Theatre	I/II	2	1	50	Humanities
6)	HUP0001-6	Introduction to French Language	I/II	2	1	50	Humanities
7)	HUP0001-7	Introduction to Spanish Language	I/II	2	1	50	Humanities
8)	HUP0001-8	Art of Painting	I/II	2	1	50	Humanities
9)	HUP0001-9	Art of Drawing	I/II	2	1	50	Humanities
10)	HUP0001-10	Nature Camp	I/II	2	1	50	Humanities
11)	PEP0001-21	Disaster Management through Adventure Sports	I/II	2	1	50	Physical Education
12)	PEP0001-22	Self-defense Essentials and Basics Knowledge of Defense forces	I/II	2	1	50	Physical Education
13)	CHP0001-31	Art of Indian traditional Cuisine	I/II	2	1	50	Chemistry
14)	CHP0001-32	Remedies by Ayurveda	I/II	2	1	50	Chemistry

Syllabus for Semester - I
B. Tech. Department of Information Technology

Course Code : HUP0001-1　　　　**Course : Fundamentals of Indian**

　　　　　　　　　　　　　　　　　　　Classical Dance: Bharatnatayam

L: 0 Hr., T: 0 Hrs., P : 2 Hrs., Per week　　**Total Credits : 1**

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
B. Tech. Department of Information Technology

Course Code : HUP0001-2　　　　　　　　**Course : Fundamentals of Indian**

Classical Dance: Kathak

L: 0 Hr., T: 0 Hrs., P : 2 Hrs., Per week　　　　**Total Credits : 1**

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
B. Tech. Department of Information Technology

Course Code : HUP0001-3 **Course : Introduction to Digital Photography**

L: 0 Hr., T: 0 Hrs., P : 2 Hrs., Per week **Total Credits : 1**

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
B. Tech. Department of Information Technology

Course Code : HUP0001-4   **Course : Introduction to Japanese Language and Culture**

L: 0 Hr., T: 0 Hrs., P : 2 Hrs., Per week   **Total Credits : 1**

Course Objective

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

Course Outcome

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

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

CO3: Able to write and read the first script in Japanese language.

CO4: Able to frame simple sentences in Japanese in order to handle everyday conversations.

CO5: Able to write in basic Japanese about the topics closely related to the learner.

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 : Writing Skills 1: Reading and writing first script in Japanese

Practical - 5 : Practice sessions

Practical - 6 : Communication Skills 2: framing sentences

Practical - 7 : Practice sessions

Practical - 8 : Writing Skills 2: Write basic Japanese and practice

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
B. Tech. Department of Information Technology

Course Code : HUP0001-5   **Course : Art of Theatre**

L: 0 Hr., T: 0 Hrs., P : 2 Hrs., Per week   **Total Credits : 1**

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

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
B. Tech. Department of Information Technology

Course Code : HUP0001-6   **Course : Introduction to French Language**

L: 0 Hr., T: 0 Hrs., P : 2 Hrs., Per week   **Total Credits : 1**

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
B. Tech. Department of Information Technology

Course Code : HUP0001-7   **Course : Introduction to Spanish Language**

L: 0 Hr., T: 0 Hrs., P : 2 Hrs., Per week   **Total Credits : 1**

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
B. Tech. Department of Information Technology

Course Code : HUP0001-8   **Course : Art of Painting**

L: 0 Hr., T: 0 Hrs., P : 2 Hrs., Per week   **Total Credits : 1**

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
B. Tech. Department of Information Technology

Course Code : HUP0001-9   **Course : Art of Drawing**

L: 0 Hr., T: 0 Hrs., P : 2 Hrs., Per week   **Total Credits : 1**

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
B. Tech. Department of Information Technology

Course Code : HUP0001-10　　　　　　　　　　　**Course : Nature Camp**

L: 0 Hr., T: 0 Hrs., P : 2 Hrs., Per week　　　　　**Total Credits : 1**

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/II
B. Tech. Department of Information Technology

Course Code : PEP0001-21   **Course : Dissaster Management through Adventure Sports**

L: 0 Hr., T: 0 Hrs., P : 2 Hrs., Per week   **Total Credits : 1**

Course Objectives

To enable the student:

1.   To inculcate rational thinking and scientific temper among the students.

2.   To develop critical awareness about the social realities among the students.

3.   To build up confidence, courage and character through adventure sports.

Course Outcomes

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

1.   Understand the meaning and importance of Adventure sports.

2.   Learn the various types of adventure sports, the equipment and resources required to practice disaster Management activities.

3.   Learn the safety measures about different risk and their management.

4.   To apply Disaster management theory to institutional & Societal problems and situations.

Course Content

1.   Basic adventure.

2.   First AID.

3.   Various types of knots.

4.   Shelter making.

5.   Disaster management.

6.   Team building and goal setting.

7.   Realization of fear, risk and their roles and analysing safety Management Plan.

Syllabus for Semester - I
B. Tech. Department of Information Technology

Course Code : PEP0001-22

Course : Self-defense Essentials and

Basics Knowledge of Defense forces

L: 0 Hr., T: 0 Hrs., P : 2 Hrs., Per week

Total Credits : 1

Course Outcomes

On completion of the Course the student will be able to:

1. Understand the meaning, need and fitness requirements to implement self-defense.

2. Learn the basic techniques of selected combative sports.

3. Learn to prepare basic Physical Training for Defense forces.

4. Implement survival techniques during emergencies.

Course Content

• General conditioning and self-defense specific conditioning

• Applications of techniques of combative sports for self-defense.

• Self-defense techniques for specific situations: chain snatching, knife or stick attack, holding from back or front etc.

• Basic Military Knowledge and exposure making students Confident, bold, disciplined and trains them to join Armed Forces.

Syllabus for Semester - I
B. Tech. Department of Information Technology

Course Code : CHP0001-31   **Course : Art of Indian traditional cuisine**

L: 0 Hr., T: 0 Hrs., P : 2 Hrs., Per week   **Total Credits : 1**

Course Outcome

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

CO1: Understand the factors that affect regional eating habits and the unique ingredients found in various states of India

CO2: Get insight to prepare popular dishes from various regions of India.

Module - 1 : Indian Regional foods and snacks - factors effecting eating habits.

Module - 2 : Indian gravies – ingredients, their importance

Module - 3 : Indian Sweets - ingredients, their importance

Module - 4 : Presentation of Indian Meals, Menu Planning, Food Costing

Module - 5 : Food Preservatives and Safety

List of experiments

1) Introduction to cookery : does and don'ts
2) Introduction to Indian cuisine, philosophy and classification.
3) Regional influence on Indian Food- factors affecting eating habits
4) Preparation of Garam masala and or Chat masala with ingredients and their importance
5) Preparation of different gravies such as white, yellow or brown gravies with ingredients and their importance
6) Preparation of Indian sweets like Besan ke laddu with ingredients and their importance
7) Presentation of meal, Menu planning and Food costing
8) Common chemical food preservatives and their safety standards.

Reference Books

[1] Arora, K.,; Theory of cookery; First Edition, Frank Brothers Company (Pub) Pvt. Ltd., 2008 ISBN: 9788184095036, 8184095031

[2] Philip, Thangam . E.,; Modern Cookery: Vol. 1; Sixth Edition, Orient Black Swan., 2008 ISBN: 9788125040446, 8125040447ali

[3] Parvinder S; Quantity Food Production Operations and Indian Cuisine (Oxford Higher Education); First Edition; Oxford University Press, 2011 ISBN 10: 0198068492 ISBN 13: 9780198068495

[4] Singh, Yogesh; A Culinary Tour of India; First Edition I. K. International Publishing House Pvt. Ltd. ISBN 978-93-84588-48-9

[5] Singh Shakesh; Simplifying Indian Cuisine; First Edition, Aman Publications, ISBN81-8204-054-X

[6] Dubey Krishna Gopal; The Indian Cuisine; PHI Learning Pvt. Ltd.ISBN978-81 203-4170-8

Syllabus for Semester - I
B. Tech. Department of Information Technology

Course Code : CHP0001-32   **Course : Introduction to Remedies by Ayurveda**

L: 0 Hr., T: 0 Hrs., P : 2 Hrs., Per week   **Total Credits : 1**

Course Outcome

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

CO1: Know basic principle of Ayurvedic formulations.

CO2: Different types of Natural Remedies.

CO3: Basic idea about their Characterization

Module - 1 : Introduction to Ayurveda

Module - 2 : Different types of Ayurvedic formulations: Churn, Bhasma, Vati, Tailum

Module - 3 : Introduction to Methods of preparation

Module - 4 : Characterization, applications

Practicals based on above syllabus

1. Preparations of some medicinal oils like Bramhi tel, Bramhi Awala, Vatnashak Tel, Bhurngraj Tel etc.

2. Preparation of Churn, like Trifala Churn, Hingastak Churn, Trikut Churn etc.

3. Preparation of some Bhasmas and vati.

Books

1. Chemistry and Pharmacology of Ayurvedic Medicinal Plants by Mukund Sabnis, Chaukhambha Amarbharati Prakashan.

2. Everyday Ayurveda by Shailesh Rathod.

3. A text Book of Rasashastra by Vikas Dhole and Prakash Paranjpe.

4. A text Book of Bhạiajya Kalpana Vij¯nana.

Syllabus for Semester - II
B. Tech. Department of Information Technology

Course Code : CHT2006   **Course : Chemistry of Smart Materials**

L: 2 Hr., T: 0 Hrs., P : 0 Hrs., Per week   **Total Credits : 2**

Course Outcomes

On successful completion of course student will learn:

1. Classify and explain the different types of sensors for various applications.

2. Discuss unique properties of nano-materials to solve challenges in our life and applications in computational world.

3. Discuss how spectroscopic methods are used for qualitative and quantitative analysis.

4. Analyze the utilization of green computing technology for environmental issues

Syllabus

Unit - I : Smart Sensors and Materials

RFID and IONT materials: Synthesis, properties and applications in logistic information, intelligent packaging systems (Graphene oxide, carbon nanotubes (CNTs) and polyaniline). Sensors: Introduction, types of sensors (Piezoelectric and electrochemical), nanomaterials for sensing applications (Strain sensors, gas sensor, biomolecules and volatile organic compounds).

Unit - II : Nanomaterials

Introduction, classification, size dependent properties, surface area, optical and catalytic properties, Synthesis methods of nanomaterials- Top down and bottom-up approach.

Carbon nanomaterials: Types, properties and applications of CNT and graphene. Applications of nano materials.

Unit - III : Characterization techniques and computational tools

Fundamentals of spectroscopy, Electronic Spectroscopy, Nuclear Magnetic Resonance Spectroscopy. Basics of Nuclear magnetic resonance quantum computer Synthesis of drugs, basic soft-wares for bio-chemical assessment of drugs.

Unit - IV : Green Computing and Chemistry

E-wastes- Types, environmental and health risks, segregation and recycling(Hydrometallurgical, pyrometallurgical and direct recycling), Extraction of precious metals from e-wastes, Twelve principles of Green Chemistry. Green Computing, Role of Green Computing in Environment and Research, Green devices and Green data Servers.

Text Books

1. Shikha Agrawal, Engineering Chemistry : Fundamentals and Applications, Cambridge University Press.

2. Dr. Rajshree Khare, A Textbook of Engineering Chemistry(AICTE), S.K. Kataria & Sons.

3. S. S. Dara, A Textbook of Engineering Chemistry, S. Chand Publications.

4. A. K. Das and M. Das, An introduction to nanomaterials and nanoscience, CBS Publishers and Distributors

5. M Afshar Alam, Sapna Jain, Hena Parveen, Green Computing Approach Towards Sustainable Development, Wiley Interscience Publications.

6. Sensor & transducers, D. Patranabis, 2nd edition, PHI

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, Chemistry, Biology and Medicine, Springer-Verlag Berlin Heidelberg.

Syllabus for Semester - II
B. Tech. Department of Information Technology

Course Code : CHP2006 **Course : Chemistry of Smart Materials Lab**

L: 0 Hr., T: 0 Hrs., P : 2 Hrs., Per week **Total Credits : 1**

The Chemistry laboratory course will consist of experiments illustrating the principles of chemistry relevant to the study of science and engineering.

The students will learn to:

1. Apply the fundamental principles of measurement and skills in preparation and handling of hazardous chemicals and interpret the statistical data related to measurements.

2. Estimate the rate constants of reactions and order of the reaction and/or to validate adsorption isotherms.

3. Use of various computational tools for analysis of different spectral properties and bio- activities.

List of Experiments

1. Preparation of different Solutions: Molar solution, Normal solution and percent solution and Determination of concentration.

2. Demonstration of Handling of hazardous chemicals, MSDS (material safety data sheet), waste minimization strategies and chemical waste disposal.

3. Basic statistical analysis of results of neutralization of acid against the base and preparing acceptable graphs using software.

4. Prediction of infrared/NMR spectral and analytical data of organic molecules using Computational Software.

5. Spectroscopic/Colorimetric determine of wavelength of maximum absorption of chemical/biological compound in solution and determination of concentration using Lambert-Beer'sLaw.

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. Molecular docking of drugs using open computational software.

8. Determination of rate of the reaction at room temperature and analysis of experimental data using Computational Software

9. Use of open access software for the interpretation of various parameters of materials including drugs

10. Estimation of Copper from PCB

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. 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.

5. Ashutosh Kar , Advanced Practical Medicinal Chemistry, New Age International Publisher.

Suggested Reference Books

1. David Young, Computational Chemistry: A Practical Guide for Applying Techniques to Real World Problems, Wiley Inter science Publications

Syllabus for Semester - II
B. Tech. Department of Information Technology

Course Code : MAT2002　　　　　　　　**Course : Discrete Mathematics**

L: 3 Hr., T: 0 Hrs., P : 0 Hrs., Per week　　　**Total Credits : 3**

Course Objective

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

Course Outcomes

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

1.　Formulate problems and solve recurrence relations

2.　Apply techniques of number theory to solve problems from linear congruences, coding theory etc. in cryptography.

3.　Internalize logical notations to define and reason about fundamental mathematical concepts and use it derive logical inference.

4.　Apply groups and fields in coding theory.

5.　Understand the Lattice as algebraic structure and use it for pattern recognition and in cryptography.

Syllabus

Module - 1 (9 Lectures)

Combinatorics: Addition and multiplication rule in combinatorics, Linear and Circular permutation, Combination, Binomial Identities, Inclusion and Exclusion Principle, distribution Principle, recurrence relations, generating function, examples using ordinary power series and exponential generating functions.

Module - 2 (8 Lectures)

Modular Arithmetic: Modular Arithmetic, Euclid's Algorithm, primes, Fermat's theorem, Euler's theorem, Diophantine equations, Linear congruences, Chinese Remainder theorem, application to Cryptography.

Module - 3 (7 Lectures)

Mathematical Logic: Statement and notations, connectives, Negation, conjunction, disjunction, conditional & bi-conditional statement. Tautologies, equivalence of formulas, Duality law, Tautological implications, Theory of inference for statement calculus.

Module - 4 (9 Lectures)

Groups and Fields: Group definitions and examples, cyclic group, permutation groups, subgroups and homomorphism, co-sets, Lagrange's theorem and Normal subgroup, Error correcting codes, Hamming codes. Finite field, Galois field.

Module - 5 (7 Lectures)

Lattice theory: Lattices as partially ordered set, Properties of Lattice, Lattices as algebraic system, sub lattices, direct product, homomorphism, some special Lattices.

Text Books

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

2.   Discrete Mathematics: Babu Ram, Pearson Publication.

3.   Combinatorial Mathematics: C. L. Liu & D. P. Mohapatra, 3rd edition, Tata McGraw-hill.

4.   David M Burton, 'Elementary Number Theory' , McGraw Hill, Seventh edition 2014.

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 - II
B. Tech. Department of Information Technology

Course Code : ITT2001   **Course : Object Oriented Programming**

L: 3 Hr., T: 0 Hrs., P : 0 Hrs., Per week   **Total Credits : 3**

Course Outcomes

Upon completion of the course, students will be able to

1. Differentiate between Procedural language and Object-Oriented language

2. Use basic features of object-oriented language to solve real life problems

3. Apply advanced features of object-oriented language to solve real life problems

4. Apply exception handling mechanism

5. Implement various file operations through different stream classes.

6. Demonstrate the significance of Multithreaded Programming, Networking, Applet, and Servlet in real-life applications.

Unit - I : Introduction to Object Oriented Programming

Features of object-oriented programming languages like data encapsulation, inheritance, polymorphism, and late binding

Unit - II : Basic Concept of OOP

Concept of a class, Access control of members of a class, instantiating a class, static and non-static members, overloading a method, Constructors, Garbage Collection, finalize () Method.

Unit - III : Building the classes

Deriving a class from another class, access control of members under derivation, different ways of class derivation, overriding of a method, run time polymorphism, Use of super keyword and final keyword in inheritance, run time polymorphism. Abstract classes and methods, interface, implementation of interface, creating packages, importing packages

Unit - IV

Exceptions, types of exception, use of try-catch block, handling multiple exceptions, using finally, throw and throws clause, user-defined exceptions, Generics, the generic class with two type parameter, bounded generics, Collection classes: Arrays, Vectors, Array list, Linked list, Hash set, Queues, Trees.

Unit - V

Introduction to streams, byte streams, character streams, linked lists, stacks, queues, trees, graphs, hash table, Set, Tree Set, File handling in Java, Serialization.

Unit - VI : Multithreading

Java Thread models, creating thread using runnable interface and extending Thread, thread priorities, Thread Synchronization, Inter-thread communications. Networking, Applet and Servlet.

Text Books

The Complete Reference: Java 2: Herbert Schildt

1.   A programmer's Guide to Java SCJP Certification: A Comprehensive Primer: Khalid A. Mughal and Rolf W. Rasmussen, Third Edition.

2.   Java Fundamentals: A Comprehensive Introduction: Herbert Schildt and Dale Skrien; Tata McGraw- Hill Education Private Ltd., 2013.

3.   Arnold Ken, GoslingJ, "The Java Programming Language" 5edition, MGH, Addison Wesley

4.   Matt Weisfeld, "The Object-Oriented Thought Process", Pearson

Reference Books

1.   Cox Brad, "Object-Oriented Programming: An Evolutionary Approach", Addison–Wesley

2.   Design Patterns by Erich Gamma, Pearson Education

3.   Core JAVA Volume-II Advanced Features: Cay S. Horstmann and Gary Cornell; Eighth Edition; Prentice Hall, Sun Microsystems Press, 2008.

4.   Java Programming: A Practical Approach: C Xavier; Tata McGraw- Hill Education Private Ltd., 2011

Syllabus for Semester - II
B. Tech. Department of Information Technology

Course Code : ITP2001   **Course : Object Oriented Programming Lab**

L: 0 Hr., T: 0 Hrs., P : 2 Hrs., Per week   **Total Credits : 1**

Course Outcomes

Upon completion of the course, students will be able to

1.   Write simple programs in java language for the given problem statement.

2.   Write advanced programs in java language to solve real life problems.

3.   Design optimized and reusable codes for applications.

4.   Implement data structures using object-oriented concepts.

5.   Implement Multithreading and Networking mechanisms to solve real life problems.

Practical No.	Description
1 / 2	Program based on concepts of Class and Object
3 / 4	Programs based on Constructor and Inheritance
5 / 6	Programs based on Exception Handling and Collections
7 / 8	Programs based on Package and Stream
9 / 10	Programs based on Thread and Socket Programming

Syllabus for Semester - II
B. Tech. Department of Information Technology

Course Code : ITT2002   Course : Data Structures

L: 2 Hr., T: 1 Hrs., P : 0 Hrs., Per week   Total Credits : 3

Course Outcomes

Upon completion of the course, students will be able to

1.   Analyze algorithms based on their complexities

2.   Implement real world problems using Arrays

3.   Implement real world problems using Link List

4.   Analyze various searching and sorting algorithms

5.   Use Trees as a data structure

6.   Apply the graph structure for traversals and shortest path problems

Unit - I : Introduction to Algorithms

Algorithm and its features. Analysis of Algorithms, Asymptotic notations, Recursion, Introduction to different programming paradigms

Unit - II : Arrays

Memory Representation, Introduction to Stacks and queues and its implementation using arrays, De-queue and Priorityqueue. Concept and representation of Sparse matrices and basic operations on them.

Unit - III : Linked List

Single and Doubly linked list and basic operations on them. Implementation of stacks and queues using linked lists. Classical Applications of linked list

Unit - IV : Sorting Methods

Internal and External sorting, Bubble sort, Exchange sort, Insertion sort, Selection sort, Quick sort,Heap sort,, Merge sort and Radixsort.

Searching Methods: Sequential, Binary, Indexed search, Hashing techniques and Collision-handling mechanisms

Unit - V : Trees

Purpose, types, definition and terminologies, Memory representation of a binary tree. Tree traversal techniques, Binary search tree, Heap tree and Threaded binary trees. Multi-way trees: B-Trees and B + Trees.

Unit - VI : Graphs and their applications

Purpose, types, definition and terminologies. Implementation in memory. Traversal using Depth-first and Breadth-first search techniques, Minimum CostSpanning Trees: Concept and implementation using Prim's and Kruskal's algorithms and computation of Shortest Pathusing Dijkstra'salgorithm.

Text Books

1. Fundamentals of Data Structures in C: E. Horowitz, S. Sahani and Anderson- Freed, University Press, 2nd Edition.

2. Data Structures and Program Design in C: Robert Kruse, G. L. Tondo and B. Leung, PHI

3. An Introduction to Data Structures with Applications: J. P. Tremblay & P. G. Sorenson, 2 Edition, MGH.

Reference Books

1. Data Structures: P. S. Deshpande, O. G. Kakde 1st Edition, Wiley Dream Tech.

2. Data Structures Using C / C + + : Tanenbaum, 3rd Edition, Pearson.

Syllabus for Semester - II
B. Tech. Department of Information Technology

Course Code : ITP2002   **Course : Data Structures Lab**

L: 0 Hr., T: 0 Hrs., P : 2 Hrs., Per week   **Total Credits : 1**

Course Outcomes

Upon completion of the course, students will be able to

1. Analyze the time and space complexities of a given algorithm.

2. Use linear data structures for solving real world problems.

3. Implement various sorting and searching algorithms.

4. Use non-linear data structures for solving real world problems.

Practical No.	Description
1 / 2	Program based on arrays
3 / 4	Application of Stacks and Queue
5 / 6	Programs based on Link List
7 / 8	Programs based on Graphs
9 / 10	Programs based on Trees

Syllabus for Semester - II
B. Tech. Department of Information Technology

Course Code : ITT2003   **Course : Creativity, Innovation & Design Thinking**

L: 2 Hr., T: 0 Hrs., P : 0 Hrs., Per week   **Total Credits : 2**

Course Outcomes

At the end of this course, students will:

1. Practice the processes and methods of creative problem solving: observation, definition, representation, ideation, evaluation and decision making

2. Develop their creative and innovative thinking skills

3. Create building blocks of innovation

4. Practice and value teaming, communication, and creative problem solving

5. Design using human centered approach

Unit - I : Introduction

Meaning and concept of creativity - Creativity Process- Nature and characteristics of creativity, Factors affecting creativity, Recognizing and avoiding mental blocks, understanding creativity from studying the profiles of most creative personalities.

Unit - II : Pattern Breaking

Thinking preferences. Lateral Thinking, Different techniques of creative problem solving- Brain storming, SCAMPER, Mind Mapping & Simulation, Metaphoric thinking, Outrageous thinking, other (new approaches)

Unit - III : Decision and Evaluation

Focused Thinking Framework, Six Thinking Hats, Systematic logical thinking, Using math concepts, Eight-Dimensional (8D) Approach to Ideation: Uniqueness, Dimensionality, Directionality, Consolidation, Segmentation, Modification, Similarity, Experimentation

Unit - IV : Innovation

Meaning and Importance - Difference with Creativity, Invention and Discovery Process, Building Blocks for Innovation, Nine lessons for Innovation,

Unit - V : Design Thinking

Understanding the design thinking approach, Human centered design, Case Studies on Innovation business ideas like Amazon, Swiggy, Red bus, Flip fart, Ola, Big Basket, methods and techniques — organizational Aspects - Economic Aspects like venture capital, angel investors — Evaluation of Effectiveness of Innovation

Unit - VI : Ethical Considerations

Introduction to intellectual property rights - Patents, Copyrights©, Trademarks®, Trade Secret, Unfair Competition.

Reference Books

1.   The Seven Habits of Highly Effective People, by Stephen R. Covey

2.   Creative Problem Solving for Managers - Tony Proctor - Routledge Taylor & Francis Group

3.   The art of Innovation, by Tom Kelley and the Deep Dive story

Text Book

1.   Design Thinking by Hasso Plattner, Christoph Meinel, Larry Leifer

Course Assignments for continuous assessment of 50 Marks (NO written exam)

•   Brain teasers (aka Puzzle Busters, to be solved individually)

•   Cartoon captions (small teams)

•   Book readings and discussions (small teams)

•   Small teams presentations on innovation: (1) innovative individual, (2) innovative company, (3) innovative movie/game, (4) sustainable innovation, (5) innovation in business, (6) innovation in art, (7) innovation in architecture, (8) innovative nation, (9) innovation in science, and (10) innovation in engineering.

•   Large groups hands-on projects

•   Eight-dimensional (8D) ideation method examples Large teams videos

Syllabus for Semester - II
B. Tech. Department of Information Technology

Course Code : HUT1001/2001   **Course : Foundational Literature of Indian Civilization**

L: 2 Hr., T: 0 Hrs., P : 0 Hrs., 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 - 1 : Overview of Indian Knowledge System

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

Unit - 2 : The Vedic corpus

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

Unit - 3 : Indian Philosophical systems

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 - 4 : Indian wisdom through ages

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
B. Tech. Department of Information Technology

Course Code : PET2001 / PEP2001   **Course : Sports-Yoga-Recreation**

L: 2 Hr., T: 0 Hrs., P : 0 Hrs., Per week   **Total Credits : 2**

Aim of the Course

The course aims at creating awareness about the fundamentals of Physical Education, Sports, Yoga, Recreation and its effectiveness to promote Health and wellness through Healthy Lifestyle.

Course Objectives

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:

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

Course Content

Unit - 1 : Theory: Introduction

- Meaning, Definition and Importance of Health & Wellness
- Dimensions of Health and Wellness
- Factors influencing Health and Wellness
- Physical Fitness, Nutrition, Habits, Age, Gender, Lifestyle, Body Types
- Health & Wellness through Physical Activities, Sports, Games, Yoga and Recreation activities
- Causes of Stress & Stress relief through Exercise and Yoga
- Safety in Sports

Unit - 2 : Practical- Exercises for Health and Wellness

- Warm-Up and Cool Down - General & Specific Exercises
- Physical Fitness Activities
- Stretching Exercises
- General & Specific Exercises for Strength, Speed, Agility, Flexibility, coordinative abilities
- Cardiovascular Exercises
- Assessment of BMI
- Relaxation techniques
- Physical Efficiency Tests

Unit - 3 : Yoga

- Shukshma Vyayam
- Suryanamaskar
- Basic Set of Yogasanas – Sitting, standing, supine and prone position
- Basic Set of Pranayama & Meditation

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 - II
B. Tech. Department of Information Technology

Exit Course   **Offline Certification Course**

Introduction to Computer Hardware and Networking   **8**

Course Outcomes

Upon completion of the course, students will be able to

1. Diagnose and perform computer maintenance

2. Configure computer networks

3. Configure desktop and server systems

4. Diagnose and trouble shoot network faults

5. Configure security policies

Course Content

- Introduction to Operating Systems and Diagnostic Utilities.

- Basic Networking: Introduction to Computer Networks, Elements of Networks, Types, Topologies, communication channels, Connectors, Jacks, Patch Panels, NIC, Network Devices, Address Resolution Protocols, Registration of a domain.

- Installation and Management of Windows and Linux Operating Systems.

- Introduction to wireless technologies.

- Network configuration and Trouble shooting.

- Configuration of local security policies and security tools.