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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

B. Tech. (COMPUTER SCIENCE & ENGINEERING)

Published By

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ISO 9001 : 2015 CERTIFIED ORGANISATION

About the Department

The Department of Computer Science & Engineering was established in 2002, is well-equipped with state-of-the-art infrastructure. The state of art infrastructure includes latest configuration desktops organized in four different laboratories.

The department hosts computers, laptops and lab with internet facility. The 24X7 network managed with Cyberoam UTM firewall, and CISCO router offers intranet and internet connectivity. The computer laboratories have high-end servers of IBM and WIPRO along with industry-standard software, viz., Oracle, NetSim, Wireshark, AIX, Robotics Platform, IOT Kit and MSDN. The department promotes high-end computing through Open Source technologies and hosts NVIDIA DGX DL Workstation.

The Department has a distinction of consistently achieving above 95% results in the final year. Students are encouraged to appear in GATE, CAT, GRE and other competitive examinations which have resulted in increasing number of students clearing these exams.

Students teams of CSE have emerged winners at the Grand Finale of 2018, 2019, 2020 and 2022 editions of Smart India Hackthoan and have been excelling at the world renowned prestigious International Collegiate Programming Contest, ACM ICPC Asia West Regional Contents since 2015.

Departmental Vision

To continually improve the education environment, in order to develop graduates with strong academic and technical background needed to achieve distinction in the discipline. The excellence is expected in various domains like workforce, higher studies or lifelong learning. To strengthen links between industry through partnership and collaborative development works.

Department Mission

To develop strong foundation of theory and practices of computer science amongst the students to enable them to develop into knowledgeable, responsible professionals, lifelong learners and implement the latest computing technologies for the betterment of the society.

Program Education Objectives

1. To be able to comprehend, understand and analyze Computer Science Engineering problems related to real life which can be better resolved by artificial intelligence and machine learning.
2. To impart exhaustive knowledge of Computer Science Engineering, AI and Machine Learning to cater the industrial needs and excel in innovation and management fields by prediction analysis.
3. To promote collaborative learning and spirit of team work through multidisciplinary AI based projects and diverse professional ethics.
4. To inculcate a conviction to believe in self, impart professional and ethical attitude and nurture to be an effective team member, infuse leadership qualities, and build proficiency in soft skills and the abilities to relate engineering with the social, political and technical issues as per the current scenario.

Programme Outcomes (POs)

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 modelling 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 multidisciplinary 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 multidisciplinary environments.
12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and lifelong learning in the broadest context of technological change.

Programme Specific Outcomes (PSOs)

1. **Foundation of Computer System :** Ability to understand fundamental concepts of computer science & engineering, operating system, networking & data organization systems, hardware & software aspects of computing,
2. **Software development Ability :** Ability to understand the software development life cycle. Possess professional skills and knowledge of software design process. Familiarity and algorithmic competence with a broad range of programming languages and open source platforms.
3. **Research Ability :** Ability to apply knowledge base to identify research gaps in various domains, model real world problems, solve computational tasks, to provide solution for betterment of society with innovative ideas.

Teaching Scheme for Bachelor of Technology
B. Tech. (Computer Science Engineering)

(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	CHT1001	Chemistry of Smart Materials	2	0	0	2	50	50	100	2 Hrs.
2.	BSC	CHP1001	Chemistry of Smart Materials Lab	0	0	2	1	50	-	50	-
3.	BSC	MAT1002	Calculus	3	0	0	3	50	50	100	3 Hrs.
4.	ESC	CST1001	Digital Electronics	3	0	0	3	50	50	100	3 Hrs.
5.	ESC	CSP1001	Digital Electronics Lab	0	0	2	1	50	-	50	-
6.	ESC	CST1002	Programming for problem solving	3	0	0	3	50	50	100	3 Hrs.
7.	ESC	CSP1002	Programming for problem solving Lab	0	0	2	1	50	-	50	-
8.	VSEC	CST1003	Computer Workshop – I	1	0	0	1	50	-	50	-
9.	VSEC	CSP1003	Computer Workshop – I Lab	0	0	2	1	50	-	50	-
10.	IKS	HUT1001	Foundational Literature of Indian Civilization	2	0	0	2	50	50	100	2 Hrs.
11.	CCA	PET1001	Sports-Yoga-Recreation	1	0	0	1	50	-	50	-
12.	CCA	PEP1001	Sports-Yoga-Recreation Lab	0	0	2	1	50	-	50	-
			TOTAL	**15**	**0**	**10**	**20**			**850**	-

Teaching Scheme for Bachelor of Technology
B. Tech. (Computer Science Engineering)

(Semester - II)

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	PHT2001	Introduction to Quantum Computing	2	1	0	3	50	50	100	3 Hrs.
2.	BSC	PHP2001	Introduction to Quantum Computing Lab	0	0	2	1	50	-	50	-
3.	BSC	MAT2002	Discrete Mathematics	3	0	0	3	50	50	100	3 Hrs.
4.	BSC	MAP2001	Computational Mathematics Lab	0	0	2	1	50	-	50	-
5.	BSC	CHT2007	Bioinformatics	2	0	0	2	50	50	100	2 Hrs.
6.	ESC	CST2001	Object Oriented Programming	3	0	0	3	50	50	100	3 Hrs.
7.	ESC	CSP2001	Object Oriented Programming Lab	0	0	2	1	50	-	50	-
8.	PCC	CST2002	Computer Architecture	2	0	0	2	50	50	100	2 Hrs.
9.	VSEC	CST2003	Computer Workshop – II	1	0	0	1	50	-	50	-
10.	VSEC	CSP2003	Computer Workshop – II Lab	0	0	2	1	50	-	50	-
11.	AEC	HUT2002	English for Professional Communication	2	0	0	2	50	50	100	2 Hrs.
12.	AEC	HUP2002	English for Professional Communication Lab	0	0	2	1	50	-	50	-
13.	CCA	HUP0001	Liberal/Performing Art	0	0	2	1	50	-	50	-
14.	VEC	HUT2004	Foundational Course in Universal Human Values	1	0	0	1	50	-	50	-
			TOTAL	**16**	**1**	**12**	**23**			**1000**	-

Exit option : Award of UG Certificate in Major with 43 credits and an additional 8 credits.			
Exit Courses			
1	Web Designer	On line/offline certification Course	8
2	IT Support Engineer		8
3	Certified Programmer (language learned in Sem-1 and/or Sem-2[C,C++,Java, Python])		8

Teaching Scheme for Bachelor of Technology
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(Semester - III)

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	CST3001	Data Structures	3	1	0	4	50	50	100	3 Hrs.
2.	PCC	CSP3001	Data Structures Lab	0	0	2	1	50	-	50	-
3.	PCC	CST3002	Theory of Computation	3	0	0	3	50	50	100	3 Hrs.
4.	MDM	MAT3002	Probability and Statics	3	0	0	3	50	50	100	3 Hrs.
5.	OE	CST2980	Open Elective-I	2	0	0	2	50	50	100	2 Hrs.
6.	AEC	HUT3001	Business Communication	2	0	0	2	50	50	100	2 Hrs.
7.	EEM	CSP3004	Idea Lab	0	0	4	2	50	-	50	-
8.	VEC	CST3003	Cyber Laws and Ethic in IT	2	0	0	2	50	50	100	2 Hrs.
9.	VSEC	CSP3005	Software Laboratory – I	0	0	4	2	50	-	50	-
			TOTAL	**15**	**1**	**10**	**21**			**750**	

(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	CST4001	Operating Systems	3	0	0	3	50	50	100	3 Hrs.
2.	PCC	CSP4001	Operating Systems Lab	0	0	2	1	50	-	50	--
3.	PCC	CST4002	Design and Analysis of Algorithms	3	0	0	3	50	50	100	3 Hrs.
4.	PCC	CST4003	Software Engineering	3	0	0	3	50	50	100	3 Hrs.
5.	PCC	CSP4003	Software Engineering Lab	0	0	2	1	50	-	50	--
6.	MDM	MAT4001	Linear Algebra	3	0	0	3	50	50	100	3 Hrs.
7.	OE	CST2990	Open Elective-II	3	0	0	3	50	50	100	3 Hrs.
8.	VSEC	CSP4004	Software Laboratory – II	0	0	2	1	50	-	50	--
9.	EEM	HUT4003	Managerial Economics	2	0	0	2	50	50	100	2 Hrs.
10.	VEC	HUT4002	Environmental Education	2	0	0	2	50	50	100	2 Hrs.
11.	CEP	CSP4005	Community Engagement Project	0	0	4	2	50	-	50	--
			TOTAL	**19**	**0**	**10**	**24**			**900**	

Exit option : Award of UG Diploma in Major with 89 credits and an additional 8 credits			
Exit Courses			
1	**Application Development (Android)**	**On line/offline certification Course**	**8**
2	**Certified software Engineer (Devop)**		**8**

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(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	CST5001	Database Management System	3	0	0	3	50	50	100	3 Hrs.
2.	PCC	CSP5001	Database Management System Lab	0	0	2	1	50	-	50	--
3.	PCC	CST5002	Compiler Design	3	0	0	3	50	50	100	3 Hrs.
4.	PCC	CSP5002	Compiler Design Lab	0	0	2	1	50	-	50	--
5.	PCC	CST5003	Artificial Intelligence	3	0	0	3	50	50	100	3 Hrs.
6.	PCC	CSP5003	Artificial Intelligence Lab	0	0	2	1	50	-	50	--
7.	MDM	CST5004	Data Handling and Visualization	3	0	0	3	50	50	100	3 Hrs.
8.	MDM	CSP5004	Data Handling and Visualization Lab	0	0	2	1	50	-	50	--
9.	PEC	CST5005	Program Elective-I	3	0	0	3	50	50	100	3 Hrs.
10.	OE	CST3980	Open elective-III	3	0	0	3	50	50	100	3 Hrs.
			TOTAL	**18**	**0**	**08**	**22**			**800**	

(Semester - VI)

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	CST6001	Machine Learning	3	0	0	3	50	50	100	3 Hrs.
2.	PCC	CSP6001	Machine Learning Lab	0	0	2	1	50	-	50	--
3.	PCC	CST6002	Computer Network	3	0	0	3	50	50	100	3 Hrs.
4.	PEC	CSP6002	Computer Network Lab	0	0	2	1	50	-	50	--
5.	PCC	CST6003	Design Pattern	3	0	0	3	50	50	100	3 Hrs.
6.	PEC	CST6004	Program Elective –II	3	0	0	3	50	50	100	3 Hrs.
7.	PEC	CST6005	Program Elective –III	3	0	0	3	50	50	100	3 Hrs.
8.	PEC	CSP6005	Program Elective -III Lab	0	0	2	1	50	-	50	--
9.	MDM	CST6006	Customer Relationship Management	2	0	0	2	50	50	100	2 Hrs.
10.	VSEC	CSP6007	Mini Project	0	0	4	2	25	25	50	--
			TOTAL	**17**	**0**	**10**	**22**			**800**	

Exit option : Award of UG Degree in Major with 132 credits and an additional 8 credits			
Exit Courses			
1	Certified Network Engineer (CCNA,CISCO)	On line/offline certification Course	8
2	Certified Database Engineer (Oracle, DB2)		8
3	Certified Cloud Engineer (AWS, AZURE)		8

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(Semester - VII)

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	CST7001	Cloud Computing	3	0	0	3	50	50	100	3 Hrs.
2.	PCC	CSP7001	Cloud Computing Lab	0	0	2	1	50	-	50	--
3.	PEC	CST7002	Program Elective-IV	3	0	0	3	50	50	100	3 Hrs.
4.	PEC	CSP7002	Program Elective-IV Lab	0	0	2	1	50	-	50	--
5.	PCC	CST7003	Deep Learning	3	0	0	3	50	50	100	3 Hrs.
6.	PCC	CSP7003	Deep Learning Lab	0	0	2	1	50	-	50	--
7.	MDM	CST7004	Financial Data Analysis	2	0	0	2	50	50	100	2 Hrs.
8.	CEP	CSP7005	Major Project-1	0	0	8	4	50	50	100	--
			TOTAL	**11**	**0**	**14**	**18**			**650**	

(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.	PEC	CST8001	Program Elective-V	3	0	0	3	50	50	100	3 Hrs.
2.	PEC	CST8002	Program Elective-VI	3	0	0	3	50	50	100	3 Hrs.
3.	CEP	CSP8003	Major Project-2	0	0	12	6	50	50	100	--
			OR								
1.	INTR	CSP8006	Industry Internship/Research Internship/TBI	0	0	24	12	200	100	300	

Teaching Scheme for Bachelor of Technology
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Electives Basket

Micro Specialization	Elective-I	Elective-II	Elective-III	Elective -IV	Elective-V	Elective -VI
AI/ML	Internet of Things	Image Processing	Natural Language Processing	Generative Adversarial Network	Reinforcement Learning	Robotics & Intelligent Systems
Distributed and Cloud Systems	Distributed Systems	Data Warehousing & Mining	Big Data Analytics	Blockchain and Distributed Ledger Technology	Smart Contract Essentials	Design and Development of Blockchain Applications
Security	Network Security	Intrusion Detection and Prevention System,	Basics of Ethical Hacking	Vulnerability Assessment and Penetration Testing	Cyber security:Risk Management	Cyber and Digital Forensics
General	System Design	Robotics Process Automation	Software Testing	Information Retrieval	Bioinspired Intelligent Systems	Social Network Analytics

Open Electives Basket

List of Open Electives		
Sr. No.	**Course Code**	**Course Name**
Open Elective-I	CST2980	Object Oriented Programming
Open Elective-II	CST2990	Web Development
Open Elective -III	CST3980	Cloud Computing

Syllabus for Semester - I

B. Tech. Computer Science & Engineering

Course Code : CHT1001 **Course : Chemistry of Smart Materials**

L: 2 Hrs. 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

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 - I

B. Tech. Computer Science & Engineering

Course Code : CHP1001 **Course : Chemistry of Smart Materials Lab**

L: 0 Hrs. 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's Law.

[6] To study chemical kinetics of peroxydi sulphate 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

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.
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 RealWorld Problems, Wiley Inter science

Syllabus for Semester - I

B. Tech. Computer Science & Engineering

Course Code : MAT1002 **Course : Calculus**

L: 3 Hrs. 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.

Textbooks/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. Computer Science & Engineering

Course Code : CST1001 **Course : Digital Electronics**

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

Course Objectives

The objective of this course is to familiarize the prospective engineers with:

1. Logic functions using Boolean algebraic theorems and techniques
2. Conventional combinational and sequential circuits including conversions of flip-flops.
3. The exploration of the semiconductor memories and programmable logic devices.
4. The basic concept of microprocessor with addressing mode and instruction set for programming.

Syllabus

UNIT - I : Basics of Digital Electronics

Motivation for Digital Systems : Logic and Boolean algebra, Number Systems. Logic Gates & Truth Tables, Demorgan's law, Minimization of combinational circuits using Karnaugh maps up to five variable. Map manipulation-essential prime implicants, non-essential prime implicants.

UNIT - II : Combinational Circuit Design

Design procedure: Multiplexers, Demultiplexer, Encoders, Decoders, Code Converters, Adders, Subtractor (Half, Full), BCD Adder/ Subtractor, ripple and carry look-ahead addition booth's Algorithm, bit-pair recoding, Integer Division- restoring and non-restoring division

UNIT - III : Sequential circuit Design-I

Storage elements, Flip-flops and latches: D, T, J/K, S/R flip-flops. Master Slave Conversion of one of type of F/F to another Sequential circuit. Analysis –Input equations, state table, and analysis with J-K Flip flops. Sequential circuit Design, Design procedure, designing with D & J-K Flip flop.

UNIT - IV : Sequential circuit Design-II

Counters, asynchronous and synchronous design using state and excitation tables. Registers & Shift registers., Mealey & Moore Machines

UNIT-V : Memory & Programmable logic Devices

Semiconductor RAM memories, Static and Dynamic Memories, ROM, higher order memory design, multi-module memories, Memory interleaving, , Secondary storage – Magnetic disk, Optical disk, PLA, PAL.

UNIT - VI : Fundamental of Microprocessor

Introduction to µp 8085, Addressing modes, Instruction set, Programming of µp 8085.

Course Outcomes

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

1. Outline binary arithmetic operations and optimize Boolean functions using Karnaugh map (k-map) method.
2. Apply combinational circuits for realization of basic building blocks of conventional digital circuits.
3. Design sequential blocks like flip flops, counters, registers, simple finite state machine and similar circuits.
4. Describe the memory elements and combinational digital circuits implementation with programmable logic devices.
5. Use addressing modes and instruction set of target microprocessors for writing efficient assembly language programs.

Text Books

1. Morris Mano; Digital Logic Design; Fourth edition, McGraw Hill
2. R.P.Jain; Modern Digital Electronic; Fourth edition; Tata McGraw-Hill.
3. V.J.Vibhute; 8-Bit Microprocessor & Microcontrollers; fifth edition.

Reference Books

1. A. Anand Kumar; Fundamental of Digital Electronics; Second Edition, PHI
2. A.P.Godse; Digital circuit & design; Technical Publications; 2009.
3. Ramesh Gaonkar; 8 bit Microprocessor; CBS Publishers; 2011.

Syllabus for Semester - I

B. Tech. Computer Science & Engineering

Course Code : CSP1001 **Course : Digital Electronics Lab**

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

Course Outcome

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

1. Use logic gates for designing digital circuits
2. Implement combinational circuits using VHDL
3. Implement sequential circuits using VHDL
4. Apply the knowledge gained for their project work based on the hardware digital circuits

Practical based on above theory syllabus

Syllabus for Semester - I

B. Tech. Computer Science & Engineering

Course Code : CST1002 **Course : Programming for Problem Solving**

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

Course Outcomes

On successful completion of course student will learn:

1. Develop C programs from the algorithm for simple arithmetic and logical problems.
2. Design programs using conditional branching, iteration and recursion.
3. Formulate algorithm/programs using arrays, pointers, structures and I/O operations.
4. Design programs using matrix manipulation along searching & sorting problems.

UNIT - I : Introduction to Programming

Introduction to components of a computer system (disks, memory, processor, where a program is stored and executed, operating system, compilers etc.)Idea of Algorithm: Steps to solve logical and numerical problems. Representation of Algorithm: Flowchart /Pseudo code with examples. Arithmetic expressions and precedence

UNIT - II : C Programming Language

Introduction to C language: Keywords, Constant, Variable, Data types, Operators, Types of Statements,

Pre-processor Directives, Decision Control Statement-if, if-else, nested if-else statement, switch case, Loops and Writing and evaluation of conditionals and consequent branching.

UNIT - III : Arrays and Basic Algorithms

Arrays: 1-D, 2-D, Character arrays and Strings. Searching, Basic Sorting Algorithms (Bubble, Insertion and Selection), Finding roots of equations, notion of order of complexity through example programs (no formal definition required)

UNIT - IV : Functions and Recursion

User defined and Library Functions, Parameter passing in functions, call by value, passing arrays to functions: idea of call by reference. Recursion: As a different way of solving problems. Example programs, such as Finding Factorial, Fibonacci series, Ackerman function etc. Quick sort or Merge sort.

UNIT - V : Pointers and Structures

Structures, Defining structures, Array of Structures, Introduction to pointers, Defining pointers, Pointer arithmetic, pointer operators, Use of Pointers in self-referential structures, notion of linked list (no implementation)

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

Reference Books

1. Programming with C: Byron Gottfried, Schaums Outline Series.
2. Let Us C: Yashwant Kanetkar, BPB Publication

Syllabus for Semester - I

B. Tech. Computer Science & Engineering

Course Code : CSP1002 **Course : Programming for Problem Solving Lab**

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

Course Outcomes

On successful completion of course student will be able to:

1. Create C programs using loops and decision making statements to solve and execute the given problem.
2. Develop programs and functions one dimensional and two dimensional arrays.
3. Apply the concept of pointers, structures to develop programs.
4. Implement files in C to store the data for the given problem.

Practical based on above theory Syllabus

Syllabus for Semester - I

B. Tech. Computer Science & Engineering

Course Code : CST1003 **Course : Computer Workshop - I**

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

Course Objectives

1. Understand the definition and principles of UI/UX in order to design with intention.
2. Achieve an understanding of the life-cycle of application design-the process, purpose, and tools.
3. Learn the basics of HCI (human-computer interaction) and the psychology behind user decision-making.
4. Explore UI/UX tools to interpret requirements of modern applications.
5. Elaborate design decisions through presentations of assignments.

Unit - 1

UI/UX Overview : Introduction to UI/UX, Principles of UI/UX, UI Components, Design Thinking, Interaction Design, Usability.

Unit - 2

UI Programming : Basic of HTML5, Elements of HTML5, Background of CSS, Bootstrap CSS, Fundamentals of JavaScript, HTML DOM Manipulations.

Unit - 3

UX Programming : Figma Basics, How to identify user needs, Wireframe and Prototype, Digital Storytelling.

Course Outcomes

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

1. Understand basics of UI/UX
2. Design and develop web pages using HTML, CSS and JavaScript
3. Infer the significance of Wireframing and build prototypes.

Text Books

1. UI/UX design for designer and developers: by Nathan Clark
2. Web Design: A Beginner's Guide Second Edition by Wendy Willard
3. User story mapping by Jeff Patton, O'Reilly Publication

Syllabus for Semester - I

B. Tech. Computer Science & Engineering

Course Code : CSP1003 **Course : Computer Workshop - I Lab**

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

Course Objectives

1. Understand the definition and principles of UI/UX in order to design with intention.
2. Achieve an understanding of the life-cycle of application design—the process, purpose, and tools.
3. Learn the basics of HCI (human-computer interaction) and the psychology behind user decision-making.
4. Explore UI/UX tools to interpret requirements of modern applications.
5. Elaborate design decisions through presentations of assignments.

Syllabus

Practical based on Theory Syllabus

Course Outcomes

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

1. Design and develop static web pages using HTML and CSS
2. Develop dynamic web pages using JavaScript
3. Create high-fidelity designs and prototypes in Figma

Syllabus for Semester - I

B. Tech. Computer Science & Engineering

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

L: 2 Hrs. 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:

CO1: Understand the Indian knowledge system and its scientific approach

CO2: Get introduced to the Vedic corpus and recognize the multi-faceted nature of the knowledge contained in the Vedic corpus

CO3: Understand the salient features of the philosophical systems of the Vedic and non-Vedic schools

CO4: 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 - I

B. Tech. Computer Science & Engineering

Course Code : PET1001 **Course : Sport - Yoga - Recreation**

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

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:

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: 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 - I

B. Tech. Computer Science & Engineering

Course Code : PEP1001 **Course : Sport - Yoga - Recreation Lab**

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

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

5. To impart the students with basic concepts of Sports, Yoga and Recreational activities for health and wellness.
6. To familiarize the students with health-related Exercise and evaluate their Health-related Fitness.
7. To make Overall growth & development with team spirit, social values and leadership qualities among students through various sports, games and Yogic activities.
8. 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. Computer Science & Engineering

Course Code : PHT2001 **Course : Introduction to Quantum Computing**

L: 2 Hrs. 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 - II

B. Tech. Computer Science & Engineering

Course Code : PHP2001 **Course : Introduction to Quantum Computing Lab**

L: 0 Hrs. T: 0 Hrs. P: 2 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 - II

B. Tech. Computer Science & Engineering

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

L: 3 Hrs. 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 l 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. Computer Science & Engineering

Course Code : MAP2001 **Course : Computational Mathematics Lab**

L: 0 Hrs. 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.

Mapping of Course outcomes (COs) with 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 - II

B. Tech. Computer Science & Engineering

Course Code : CHT2007 **Course : Bioinformatics**

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

Course Outcomes

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

CO1 : Explain the functioning of various metabolic processes in the human body.

CO2 : Acknowledge the importance of metabolic simulations in drug discovery,

CO3 : Explain the functioning of various types of the drugs for therapeutic applications.

CO4 : Use knowledge of bioinformatics for basic formulation of drug design

Unit - I : Introduction to Biomolecules Carbohydrates

Introduction and classification Amino Acid: Chemistry properties and metabolism.

Proteins: primary, Secondary, tertiary and quaternary structure,

Lipids: Chemistry, Metabolism of fatty acids, Phospholipids, Cholesterol regulation of metabolism. Nucleic Acid: Chemistry of DNA and RNA,

Vitamins: Structure and functions of some vitamins.

Unit - II : Introduction to bioinformatics

Introduction, Biological data: Sequence, gene expression, pathways and molecular interaction: Data bases: Sequence, Gene bank, Dogmass- central and peripheral, The standard genetic code, applications.

Unit - III : Drug and Data Bases

Drug and Data bases: Introduction, classification of drugs, Drug Solubility/permeability, Drug Likeness Introduction to metabolic engineering and systems biology, role of metabolic simulations in drug discovery,

Unit - IV : Computer Aided Drug Design

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

Text Books

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

Reference Books

1. Bioinformatics: Sequence and Genome Analysis, Mount. D. W, CSHL Press, New York 2nd Edition 2004.
2. Introduction to Bioinformatics by Arthur M. Lesk University of Cambridge, Published in the United States by Oxford University Press Inc., New York
3. Introduction to Computational Biology: Maps, Sequences and Genomes, Waterman, M., Chapman and Hall, 1995.
4. Abraham, Donald (Ed). Burger's medicinal chemistry and drug discovery. Publisher: John Wiley & Sons, Inc. 2003. ISBN: 0471270903
5. Schlick, T. Molecular modelling and simulation: an interdisciplinary guide. Publisher: Springer. 2002. ISBN: 0-387-95404-X
6. Leach, Andrew. Molecular Modelling: Principles and Applications. Publisher: Prentice Hall. 2001. ISBN: 0582239338.
7. Jensen, Jan H. Molecular Modeling Basics. Publisher: CRC Press. 2010. ISBN: 978- 1420075267
8. Hinchliffe Alan. Molecular modelling for beginners. Publisher: John Wiley and Sons Ltd. 2008. ISBN: 978 0470513149

E- Text book

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

Syllabus for Semester - II

B. Tech. Computer Science & Engineering

Course Code : CST2001 **Course : Object Oriented Programming**

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

Course Objectives

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

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 control of members of a class, instantiating a class, constructor.

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, 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, generic class with two type parameter, bounded generics.

Collection classes: Arraylist, LinkedList, TreeSet, HashMap, Iterator, ListIterator, 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.

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, streams to develop solution to the given problem.
4. Analyze characteristics and need of design pattern in software design process.

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. Paul Deitel, Harvey Deitel; Java 9 for Programmers; Pearson
2. Herbert Schildt and Dale Skrien; Java Fundamentals A Comprehensive Introduction; Tata McGraw- Hill Education Private Ltd 2013.

Syllabus for Semester - II

B. Tech. Computer Science & Engineering

Course Code : CSP2001 **Course : Object Oriented Programming Lab**

L: 0 Hrs. T: 0 Hrs. P: 2 Hrs. 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. Develop the solutions using basic features of Object Oriented Programming.
2. Design efficient and reusable solutions using inheritance and exception handling techniques.
3. Create and use type-safe object through generics and collection classes

Syllabus

Experiments based on above Syllabus.

Syllabus for Semester - II

B. Tech. Computer Science & Engineering

Course Code : CST2002 **Course : Computer Architecture**

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

Course Objectives

The objective of this course is to familiarize the prospective engineers with:

1. Concepts of computer architecture by developing understanding of various functional units, components of computers and working of all the modules.
2. Design principles of modern computers including memory, bus system, input/output operation, interrupt handling mechanism and parallelization.

Syllabus

UNIT - I

Basic Structure of Computers

Functional units of computer, basic operational concepts- Instruction, processor and memory, operating steps, address, Big- and Little-endian assignments, Instructions set architecture of a CPU- Instruction Formats, Instruction sequencing, addressing modes, and instruction set classification, subroutine & parameter passing, expanding opcode, RISC and CISC.

UNIT - II

Basic Processing Unit and Data Representation

Basic Concepts- Instruction execution, Bus architecture- One bus and Multi-bus, Execution of a Complete Instruction, sequencing of control signals, Hardwired control, Micro-programmed Control. Floating point numbers-representation, guard bits and rounding.

UNIT - III

Memory & Input/output

Cache memory, Cache size vs. block size, mapping functions, replacement algorithms, Cache read/write policy, Virtual Memory, I/O mapped I/O and memories mapped I/O, interrupt and interrupt handling mechanisms, vectored interrupts, synchronous vs. asynchronous data transfer, Bus Arbitration, Direct Memory Access

UNIT - IV

Pipelining

Basic concepts of pipelining, throughput and speedup, Introduction of Parallel Computing: SISD, MISD, SIMD, MIMD

Course Outcomes

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

1. Demonstrate the understanding about the functional units of a digital computer system.
2. Execute complete instruction on different types of bus architectures with control signal generation.
3. Analyse memory, multiprocessor and multicore architectures and their implications in parallel computing.

Text Books

1. V. C. Hamacher, Z. G. Vranesic and S. G. Zaky; Computer Organisation; 5th edition; Tata McGraw Hill, 2002.
2. W. Stallings; Computer Organization & Architecture; PHI publication; 2001.
3. J. P. Hayes; Computer Architecture & Organization; 3rd edition; McGraw-Hill; 1998.
4. Reference Books
5. M Mano; Computer System and Architecture; PHI publication; 1993.
6. A. S. Tanenbaum; Structured Computer Organization; Prentice Hall of India Ltd.

Syllabus for Semester - II

B. Tech. Computer Science & Engineering

Course Code : CST2003 **Course : Computer Workshop-II**

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

Course Objective

The objective of this course is to familiarize the students with an important web framework for developing user interfaces. It aims for developing high end web applications by the use of ReactJS features.

Course Contents

UNIT - I : Introduction to React

React JS Introduction, Advantages of React JS, Introduction to JSX, Difference between JS and JSX.

UNIT - II : Components in React

React Components overview, Types of components, Controlled, Split Up, Composable, Reusable, Component Declarations and Styling Components

State and it significance, Read state and set state, Passing data to component using props, Validating props using prop Types, Supplying default values to props using default Props

UNIT - III : Routing with react router

Introduction to React Router, Routing in single page applications, Browser Router and Hash Router components Configuring route with Route component.

Course Outcomes

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

1. Implement the fundamentals of React with Java Script and JSX
2. Understand Templating concept along with different types of components, props and state in ReactJS
3. Implement Router with React Router.

Text Books

1. Pure React- a step by step guide - Dave Ceddia
2. Road to learn react - Robin Wieruch
3. React in Action 1st Edition - Mark Tielens Thomas

Syllabus for Semester - II

B. Tech. Computer Science & Engineering

Course Code : CSP2003 **Course : Computer Workshop-II Lab**

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

Course Objective

The objective of this course is to familiarize the students with an important web framework for developing user interfaces. It aims for developing high end web applications by the use of ReactJS features.

Syllabus

Practical based on Theory Syllabus

Course Outcomes

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

1. Understanding the fundamentals of ReactJS including components, props, state.
2. Design and implement complex applications by composing smaller, reusable components together.
3. Building Web Applications to create dynamic and interactive web applications using React and other related technologies like JSX and ES6.
4. Implement React Router to handle client-side routing and create single-page applications.

Syllabus for Semester - II

B. Tech. Computer Science & Engineering

Course Code : HUT2002 **Course : English for Professional Communication**

L: 2 Hrs. 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 - II

B. Tech. Computer Science & Engineering

Course Code : HUT2002 **Course : English for Professional Communication Lab**

L: 0 Hrs. 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/II

B. Tech. Computer Science & Engineering

Course Code : HUP0001-1 **Course : Fundamentals of Indian Classical Dance : Bharatnatayam**

L: 0 Hrs. 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/II

B. Tech. Computer Science & Engineering

Course Code : HUP0001-2 **Course : Fundamentals of Indian Classical Dance: Kathak**

L: 0 Hrs. 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/II

B. Tech. Computer Science & Engineering

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

L: 0 Hrs. 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/II

B. Tech. Computer Science & Engineering

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

L: 0 Hrs. 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/II

B. Tech. Computer Science & Engineering

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

L: 0 Hrs. 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/II

B. Tech. Computer Science & Engineering

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

L: 0 Hrs. 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/II

B. Tech. Computer Science & Engineering

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

L: 0 Hrs. 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/II

B. Tech. Computer Science & Engineering

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

L: 0 Hrs. 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/II

B. Tech. Computer Science & Engineering

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

L: 0 Hrs. 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 - II

B. Tech. Computer Science & Engineering

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

L: 0 Hrs. 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 - II

B. Tech. Computer Science & Engineering

Course Code : HUT2004 **Course : Foundation course in Universal Human Values**

L: 1 Hrs. 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 III, B. Tech. (Computer Science and Engineering)

Course Code: CST3001 **Course: Data Structures**

L: 3 Hrs, T: 1 Hr, P: 0 Hr, Per Week **Total Credits: 04**

Course Objectives

1. To impart to students the basic concepts of data structures and algorithms.
2. To familiarize students on different searching and sorting techniques.
3. To prepare students to use linear (stacks, queues, linked lists) and non-linear (trees, graphs) data structures.
4. To enable students to devise algorithms for solving real-world problems.

SYLLABUS

UNIT-I: Data Structures and Algorithm Basics

Introduction: basic terminologies, elementary data organizations, data structure operations; abstract data types (ADT) and their characteristics.

Algorithms: definition, characteristics, analysis of an algorithm, asymptotic notations, time and space tradeoffs.

Array ADT: definition, operations and representations – row-major and column-major.

UNIT-II: Stacks and Queues

Stack ADT: allowable operations, algorithms and their complexity analysis, applications of stacks – expression conversion and evaluation (algorithmic analysis), multiple stacks.

Queue ADT: allowable operations, algorithms and their complexity analysis for simple queue and circular queue, introduction to double-ended queues and priority queues.

UNIT-III: Linked Lists

Singly Linked Lists: representation in memory, algorithms of several operations: traversing, searching, insertion, deletion, reversal, ordering, etc. Linked representation of stacks and queues, header node linked lists.

Doubly and Circular Linked Lists: operations and algorithmic analysis.

UNIT-IV: Sorting, Searching and Hashing

Sorting: Sorting: different approaches to sorting, properties of different sorting algorithms (insertion, Shell, quick, merge, heap, counting), performance analysis and comparison.

Searching: necessity of a robust search mechanism, searching linear lists (linear search, binary search) and complexity analysis of search methods.

Hashing: hash functions and hash tables, closed and open hashing, randomization methods (division method, mid-square method, folding), collision resolution techniques.

UNIT-V: Trees

Trees: basic tree terminologies, binary tree and operations, binary search tree [BST] and operations with time analysis of algorithms, threaded binary trees.

Self-balancing Search Trees: tree rotations, AVL tree and operations, B+-tree: definitions, characteristics, and operations (introductory).

UNIT-VI: Graphs

Representation and Access: basic terminologies, representation of graphs, graph traversals: depth first search (DFS) and Breadth first search (BFS).

Path Finding Algorithms: Dijkstra's Single Source Shortest Path (SSSP) algorithm, and Warshall-Floyd's All Sources Shortest Path (ASSP) algorithm.

Spanning Trees: Introduction, minimum cost spanning trees, Prim's Method and Kruskal's Method for MSTs.

Course Outcomes:

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

1. Analyze the efficiency of algorithms through time and space complexities.
2. Implement different linear data structures (viz., stack, queue and linked list).
3. Apply different searching, sorting and hashing methods for efficient search.
4. Realize different non-linear data structures (trees and graphs).

Textbooks and References

1. Ellis Horowitz, Sartaj Sahni and Susan Anderson-Freed; Fundamentals of Data Structures in C; Second Edition; Universities Press; 2008.
2. Mark Allen Weiss; Data Structures and Algorithm Analysis in C; Second Edition; Pearson Education; 2002.
3. G. A. V. Pai; Data Structures and Algorithms: Concepts: Techniques and Application; First Edition; McGraw Hill; 2008.
4. Thomas Cormen, Charles Leiserson, Ronald Rivest and Clifford Stein, Introduction to Algorithms, Third Edition; Prentice Hall of India; 2009.
5. A. K. Sharma; Data Structures using C; Second Edition; Pearson Education; 2013.

Syllabus for Semester III, B. Tech. (Computer Science and Engineering)

Course Code: CSP3001 **Course: Data Structures Lab**

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

Course Objectives:

1. To enable students to employ different searching and sorting methods.
2. To prepare students to identify and apply linear (stacks, queues, linked lists) and non-linear (trees, graphs) data structures in solving problems.
3. To encourage students to design and execute tree-based algorithms for solving real-world problems.

SYLLABUS

Experiments based on CST3001 Syllabus in C | C++.

Course Outcomes:

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

1. Realize different linear data structures.
2. Apply specific methods of searching and sorting to solve a problem.
3. Implement binary search trees and AVL trees.
4. Implement algorithms for graph traversal, shortest paths and spanning trees.

Reference Books

1. K R. Venugopal and Sudeep. R Prasad; Mastering C; Second Edition; McGraw Hill; 2015
2. Ellis Horowitz, Sartaj Sahni and Susan Anderson-Freed; Fundamentals of Data Structures in C; Second Edition; Universities Press; 2008.
3. Mark Allen Weiss; Data Structures and Algorithm Analysis in C; Second Edition; Pearson Education; 2002.

Syllabus for Semester III, B. Tech. (Computer Science & Engineering)

Course Code:	**CST3002**	**Course:**	**Theory of Computation**
L: 3 Hrs, T: 0 Hr, P: 0 Hr, Per Week		**Total Credits:**	**03**

Course Objectives

1. To provide the comprehensive insight into theory of computation by understanding grammar, languages and other elements of language design
2. To develop capabilities to design various computing models and identify their applications in diverse areas
3. To introduce students to the mathematical foundations of computation including automata theory; the theory of formal languages and grammars; the notions of algorithm, decidability, complexity, and computability

Syllabus

Unit I

Basics of Sets and Relation, Fundamentals of formal languages and grammars, grammar to language, language to grammar, Chomsky hierarchy of languages, Countability and Diagonalization, Pigeon-hole principle.

Unit II

Finite automata, Deterministic finite automata (DFA), Designing DFA, Nondeterministic finite automata (NFA), NFA with Epsilon Transitions, NFA to DFA, Minimization of finite automata, Finite Automata with output-Moore and Mealy machine

Unit III

Regular expressions and Regular languages, regular expression to finite automata, DFA to regular expression, Regular grammars and equivalence with finite automata, properties of regular languages, pumping lemma for regular languages, Context-free grammars (CFG) and language (CFL), parse trees, ambiguity in CFG, Reduction of CFGs, Chomsky and Greibach normal forms.

Unit IV

Push Down Automata, Deterministic and non-deterministic pushdown automata, Designing of Push down automata for language. Language acceptance by two methods: Empty stack and Final State, Equivalence of PDA and CFG

Unit V

Turing machines, Basic model for Turing machines (TM), Designing of Turing machine for languages and computable function, language acceptance by Turing machine, Turing recognizable (recursively enumerable) and Turing-decidable (recursive) languages, unrestricted grammars and equivalence with Turing machines.

Unit VI

Decidability and undecidability, Church-Turing thesis, Variants of Turing machine, Universal Turing machine, Undecidable problems about languages, Recursive Function Theory, Post correspondence problem.

Course Outcomes:

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

1. Analyze the formal relationships among machines, languages and grammars.
2. Design and optimize finite automata for given regular language.
3. Design Push Down Automata, Turing Machine for given languages.
4. Apply computability, decidability, recursive function theory for problem solving

Text Books

- John E. Hopcroft, Rajeev Motwani and Jeffrey D. Ullman, Introduction to Automata Theory, Languages, and Computation, Pearson Education Asia.

Reference Books

1. Harry R. Lewis and Christos H. Papadimitriou, Elements of the Theory Computation, Pearson Education Asia.
2. Dexter C. Kozen, Automata and Computability, Undergraduate Texts in Computer Science, Springer.
3. Michael Sipser, Introduction to the Theory of Computation, PWS Publishing.
4. John Martin, Introduction to Languages and The Theory of Computation, Tata McGraw Hill.

Syllabus for Bachelor of Technology (Computer Science & Engineering)
Semester III

Course Code: MAT 3002 **Course Name: Probability and statistics**

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

Course Pre-requisite : Basics of Probability and Statistics**.**

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 and Information technology.

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. To analyze and interpret stochastic models, including calculating probabilities, transition probabilities, and steady-state probabilities within stochastic systems.
3. 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.
4. 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.
5. To apply MLE to various statistical models, such as linear regression, exponential distribution, etc. They should understand how to formulate likelihood functions and derive estimators for unknown parameters.

Syllabus

Module 1 (8 hours)
Probability spaces, conditional probability, independence; Discrete random variables, Binomial distribution, Poisson distribution, Normal distribution. Relation between binomial, Poisson and Normal distributions.

Module 2: (8 Lectures)
Joint probability function, Introduction to stochastic process, random walk, stationary and auto regressive process, transition probability Matrix, Discrete time Markov chain.

Module 3: (**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, Multiple regression and correlation.

Module 4: (8 Lectures)
Sampling Distributions, Point and Interval Estimations, Testing of Hypothesis for single mean and proportion.

Module 5: (7 Lectures):
Testing of Hypothesis for difference of mean and proportion, Test for ratio of variances - Chi-square test for goodness of fit and independence of attributes, maximum likelihood estimation

Text 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.

Reference Books:

1. Maurtis Kaptein, Statistics for data science, An introduction to probability, statistics and Data Analysis, Springer 2022.
2. Jay L Devore, Probability and Statistics for Engineering and sciences, 8th edition, Cenage learning.

Syllabus for Semester III, B. Tech. (Computer Science & Engineering)

Course Code:	**CST2980**	**Course:**	Object Oriented Programming
L: 2 Hrs, T: 0 Hr, P: 0 Hr, Per Week		**Total Credits:**	**02**

Course Objectives

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

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 control of members of a class, instantiating a class, constructor.

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

Unit III Concept of inheritance, methods of derivation, use of super keyword and final keyword in inheritance, 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, generic class with two type parameter, bounded generics. Collection classes: Arraylist, LinkedList, TreeSet, HashMap, Iterator, ListIterator, 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.

Course Outcomes:

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

1.Comprehend the principles of object-oriented programming, encompassing classes, objects, and methods.

2.te efficient programs by integrating the principles of Inheritance, polymorphism, and exception handling

3.Apply the concept of generics, collections, streams to devise solutions for specified problems.

4.Analyze the characteristics and need of design patterns within the software design process.

Text Books

1. Herbert Schildt; JAVA The Complete Reference; Ninth Edition, Tata McGraw- Hill Publishing Company Limited.
2. Kathy Sierra & Bert Bates; Head First Java; 3rd Edition, O'Reilly Media, Inc.
3. Design Patterns By Erich Gamma, Pearson Education

Reference Books

1. Paul Deitel, Harvey Deitel; Java 9 for Programmers; Pearson
2. Herbert Schildt and Dale Skrien; Java Fundamentals A Comprehensive Introduction; Tata McGrawHill Education Private Ltd 2013
3. Eric Freeman, Elisabeth Robson; Head First Design Patterns, 2nd Edition, O'Reilly Media, Inc.

Syllabus for Semester III, B. Tech - Computer Science & Engineering

Course Code: HUT3001 **Course: Business Communication**
L: 2 Hrs, T: 0 Hr, P: 0 Hrs, Per Week **Total Credits: 2**

Course Objective
The course aims to develop the skills of students to proficiently craft compelling business documents and employ strategic verbal communication techniques. By honing these skills, students will gain the ability to convey ideas persuasively and interact confidently in diverse business contexts.

Course Outcomes
On successful completion of the course the students will be able to achieve the following:
CO1: Understand the fundamentals of business communication.
CO2: Apply tools and techniques to create effective workplace correspondence.
CO3: Analyse and apply visual design principles to create business documents.
CO4: Understand and evaluate information to draft reports.
CO5: Apply and evaluate strategies for effective communication for employment.

Syllabus:

UNIT 1: Fundamentals of Business Communication

(6 Hours)

Definition of communication, Emergence of communication as a key concept in the Corporate and Global world, Types- Internet, Blogs, E-mails, social media, Channels- Formal and Informal: Vertical, Horizontal, Diagonal, Grapevine, Persuasive Communication- Negotiation Skills, PAC concept

UNIT 2: Business Correspondence

(6 Hours)

Planning, Writing, and Completing Business Messages
Personnel Correspondence: Job Application Letter, Letter of Acceptance of Job Offer, Letter of Resignation, Letter of Appointment, Promotion and Termination, Letter of Recommendation
Trade Correspondence: Inquiry, Order, Credit and Status Enquiry, Complaints, Claims, Adjustments, Consumer Grievance Letters

UNIT 3: Visual and Content Creation

(6 Hours)

Visual design principles, Ethics of visual communication, selecting visuals for presenting data, Content Creation: Website, Help file, User Guides, Promotional leaflets and fliers

UNIT 4: Reports

(4 Hours)

Basic formats and types of reports - Feasibility, Progress, Project, Case Study Evaluation, Agenda, Notices, Minutes of Meeting, Organizational announcements, Statement of Purpose.

UNIT 5: Communication for Employment

(4 Hours)

Pre-interview technique- NOISE Analysis, Job Description and Resume, Creating LinkedIn Profile, Effective use of job portals, Business etiquette.

Text Books

1. Sharon Gerson, Steven Gerson, "Technical Communication: Process and Product", 2018, Pearson
2. Courtland L Bovee, John V Thill and Roshan Lal Raina "Business Communication Today", 14th edition Pearson
3. P.D. Chaturvedi and Mukesh Chaturvedi, Fundamentals of Business Communication, Pearson Publications, 2012.

Reference Books

1. Shalini Verma, Business Communication, Vikas Publishing House Pvt. Ltd., 2015.
2. Sanjay Kumar, Pushpa Lata, Communication Skills, 2nd Edition, Oxford Publication, 2018
3. William Strunk Jr. and E.B. White, The Elements of Style, Allyn & Bacon, A Pearson Education Company, 2000

Syllabus for Semester III, B. Tech. (Computer Science & Engineering)

Course Code:	**CSP3004**	**Course:**	**Idea Lab**
L: 0 Hrs, T: 0 Hr, P: 4 Hr, Per Week		**Total Credits:**	**02**

Course Objectives

This course provides students with a unique opportunity to engage, explore, experience, express and excel in innovative thinking. The course will accelerate the development of indigenous solutions by inculcating creative skills, problem-solving skills and entrepreneurship skills in students. The ultimate goal is to help students build his/her creative acumen to address real life challenges.

Course Outcomes:

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

1. Identify a real-world challenge or potential opportunities that demand consideration.
2. Design and propose original ideas or innovative solutions to identified real-world challenge.
3. Build a plan to develop proof of concept (POC)/ prototype/minimum viable product (MVP) for the idea.
4. Critically evaluate the feasibility and viability of proposed idea, considering its impact on various stakeholders.

Execution Plan for the Subject:

- Conduction of lectures/guest lectures to familiarize the students with concepts of principles of design thinking, innovative and business oriented solution building.
- Students will identify the potential areas or real-world problems that require innovative solution.
- Students will contribute to the creation and presentation of their solution. The developed solution can be a prototype or an idea or a business plan or a software solution, etc.
- Students will analyze and provide constructive feedback on the ideas and solutions presented by self and peers.

Syllabus for Semester III, B. Tech - Computer Science & Engineering

Course Code: CST3003 **Course: Cyber Law and Ethics**

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

Prerequisites: Basic Knowledge of Internet

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.

1. **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.

2. **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 III, B. Tech. (Computer Science & Engineering)

Course Code:	**CSP3005**			**Course:**	**Software Laboratory - I**
L: 0 Hr,	**T: 0 Hr,**	**P: 4 Hrs,**	**Per Week**	**Total Credits:**	**02**

Course Objectives

1. Introduce students with basic Python programming concepts
2. Students will learn different data structures supported by python and its applications
3. to develop complex real life python applications.

Syllabus

Practical based on the following syllabus:

- Python Execution model and Basic building blocks of Python Programs/Scripts/Modules
- Various keywords, Operators , control and loop constructs used in Python
- User defined Function generation in Python
- Dealing with Python files, Modules and Packages Sci Py, an Open Source Python- based library, which is used in mathematics, scientific computing, Engineering, and technical computing.
- Developing small mathematical applications using packages like Numpy, Matplotlib etc.
- Introduction of with Web scrapping and its need
- Application development to scrape the web with the help of standard libraries like Requests and bs4(Beautiful Soup).

Course Outcomes

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

1. Design Python programs using different data and control structures.
2. Use Python Files, Modules and Packages to handle complex python programs
3. Develop mathematical and scientific applications in python using numpy, scipy libraries
4. Develop small applications for web scrapping using standard libraries

Text Books

1. Learning Python: Poweful object oriented programming, Mark Lutz, O'REILLY publications 5th addition

2. Introduction to Computing & Problem Solving with Python Jeeva Jose and P Sojan Lal Ascher

3. Problem Solving with Algorithms and Data Structures using Python by By Brad Miller andDavid Ranum, 2nd addition

Reference Books

1. Allen Downey ,Jeffrey Elkner ,Chris Meyers,:Learning with Python, Dreamtech Press

2. The Python 3 Standard Library by Example (Developer's Library) by Doug Hellmann, secondedition.

Syllabus for Semester IV, B. Tech. (Computer Science & Engineering)

Course Code:	**CST4001**	**Course:**	**Operating Systems**
L: 3 Hrs, T: 0 Hr, P: 0 Hr, Per Week		**Total Credits:**	**03**

Course Objectives

1. To learn the mechanisms of OS to handle processes and threads and their communication
2. To learn the mechanisms involved in memory management in contemporary OS
3. To gain knowledge on distributed operating system concepts that include architecture, Mutual exclusion algorithms, deadlock detection algorithms and agreement protocols
4. To know the components and management aspects of concurrency management.

Syllabus

Unit I:

Introduction: Concept of Operating Systems, Generations of Operating systems, Types of Operating Systems, OS Services, System Calls, Structure of an OS - Layered, Monolithic, Microkernel Operating Systems, Concept of Virtual Machine, Case study on LINUX and Windows Operating System.

Unit II:

Processes: Different states of a Process, Process State transitions, Process Control Block (PCB), Context switching.

Threads: Various states, Benefits of threads, Types of threads, Concept of multithreads.

Process Scheduling: Foundation and Scheduling objectives, Types of Schedulers, Scheduling criteria: CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time; Scheduling algorithms: Pre-emptive and Non pre-emptive, FCFS, SRTF, Priority, RR, Case study on Process Management in LINUX Operating System.

Unit III:

Inter-process Communication: Critical Section, Race Conditions, Mutual Exclusion, Peterson's solution, Hardware Solutions, Semaphores, Monitors, Message Passing, Classical IPC Problems: Producer-Consumer Problem, Reader-Writer Problem, Dinning Philosopher Problem etc.

Unit IV:
Deadlocks: Necessary and sufficient conditions for Deadlock, Deadlock Prevention, Deadlock Avoidance: Banker's algorithm, Deadlock detection and Recovery.
Unit V:
Memory Management: Basic concept, Logical and Physical address mapping, Memory allocation: Contiguous Memory allocation – Fixed and variable partition, Internal and External fragmentation and Compaction, Paging: Principle of operation – Page allocation, Hardware support for paging, Protection and sharing, Advantages & Disadvantages of paging.

Virtual Memory: Basics of Virtual Memory, Hardware and control structures, Locality of reference, Page fault, Working Set, Dirty page/ Dirty bit, Demand paging; Page Replacement algorithms: First in First Out (FIFO), Least Recently used (LRU), and Optimal.

Unit VI:
File Management: Concept of File, Access methods, File types, File operations, Directory structure, File System structure, Allocation methods, Free-space management.
Disk Management: Disk structure, Disk scheduling - FCFS, SSTF, SCAN, C-SCAN, LOOK, C-LOOK, Disk reliability, Disk formatting, Boot block, Bad blocks, case study on File Systems in LINUX operating System.

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

1. Contrast differing structures for operating systems.
2. Analyze the role of various components (process, page, file systems etc) of operating system.
3. Design solutions for challenges in inter-process communication.
4. Implement resource (CPU, Memory, Disk) management policies.

Text Books
1. Operating System Concepts, 8th Edition by A. Silberschatz, P.Galvin, G. Gagne, Wiley India.
2. Modern Operating Systems, 2nd Edition by Andrew Tanenbaum, PHI.

Reference Books:
1. Operating Systems: Internals and Design Principles, 5th Edition, William Stallings, Prentice Hall of India.
2. Understanding the Linux Kernel, 3rd Edition, Daniel P. Bovet, Marco Cesati, O'Reilly

Syllabus for Semester IV, B. Tech. (Computer Science & Engineering)

Course Code:	**CSP4001**	**Course:**	**Operating Systems Lab**
L: 0 Hrs, T: 0 Hr, P: 2 Hr, Per Week		**Total Credits:**	**01**

Course Objectives

Using C language in Linux environment

1. To develop ability of students to design and implement concepts of operating systems such as system calls, CPU scheduling, process/thread management.

2. To develop the components and management aspects of concurrency management, memory management, and File management.

Syllabus

Experiments based on **CST4001** Syllabus.

Course Outcomes:

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

1. Implement system commands by making use of LINUX system calls.

2. Implement processes and process schedulers.

3. Design solutions to process synchronization and deadlock handling.

4. Implement Memory management and File management solutions.

Syllabus for Semester IV, B. Tech. (Computer Science & Engineering)

Course Code:	**CST4002**	**Course:**	**Design and Analysis of Algorithms**
L: 3 Hrs, T: 0 Hr, P: 0 Hr, Per Week		**Total Credits:**	**03**

Course Objectives

The objective of this course is

- to introduce students to techniques for effective problem solving in computing.
- developing skills to solve real life applications which involving algorithm development.
- making students capable of analyzing different paradigms and their complexities to solve a given problem in efficient way.

Syllabus

Unit I

Mathematical foundations- arithmetic and geometric series, Recurrence relations and their solutions, Principles of designing algorithms and complexity calculation, Asymptotic notations for analysis of algorithms, worst case and average case analysis, amortized analysis and it's applications.

Unit II

Divide and Conquer- basic strategy, Binary Search, Quick sort, Merge sort, Strassen's matrix multiplication, Maximum sub-array problem, Closest pair of points problem, Convex hull problem.

Unit III

Greedy method – basic strategy, fractional knapsack problem, Minimum cost spanning trees, Huffman Coding , activity selection problem ,Find maximum sum possible equal to sum of three stacks, K CentersProblem.

Unit IV

Dynamic Programming - basic strategy, Bellmen ford algorithm, all pairs shortest path, multistage graphs, optimal binary search trees, traveling salesman problem, String Editing, Longest Common Subsequence problem and its variations.

Unit V

Basic Traversal and Search Techniques- breadth first search and depth first search, connected components. Backtracking basic strategy, 8-Queen's problem, graph coloring, Hamiltonian cycles, sum of subset problem, Introduction to Approximation algorithm.

Unit VI

NP-hard and NP-complete problems, basic concepts, non-deterministic algorithms, NP-hard and NP complete, decision and optimization problems, polynomial reduction, graph based problems on NP Principle , vertex cover problem, clique cover problem

Course Outcomes

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

1. Comprehend the foundational principles involved in the design and analysis of algorithms.
2. Identify the algorithmic solution to solve a given problem.
3. Utilize algorithmic techniques to solve real-life and complex computational problems.
4. Evaluate efficiency and complexity of various algorithms using mathematical analysis.

Text Books

1. Thomas H. Cormen et.al; "Introduction to Algorithms"; 3 Edition; Prentice Hall, 2009.
2. Horowitz, Sahani and Rajasekaram; "Computer Algorithms", Silicon Press, 2008.
3. Sridhar S.; "" Design and Analysis of Algorithms, Oxford University Press.
4. Brassard and Bratley; "Fundamentals of Algorithms", 1 Edition; Prentice Hall, 1995.

Reference Books

1. Parag Himanshu Dave, Balchandra Dave, "Design and Analysis of Algorithms" Pearson Education, O'relly publication
2. Richard Johnsonbaugh, "Algorithms", Pearson Publication, 2003.

Syllabus for Semester IV, B.Tech Computer Science and Engineering

CourseCode: CST4003	**Course: Software Engineering**
L:3 Hrs, T: 0 Hr, P: 2 Hr, Per Week	**Total Credits: 3**

Course Objectives

The objective of this course is to familiarize the prospective engineers with:

1. To make students a successful professionals in the field with solid fundamental knowledge of software engineering
2. To prepare students with strong communication and interpersonal skills, as well as professional and ethical principles when functioning as members and leaders of multi-disciplinary teams
3. To teach students how to apply their foundations in software engineering to adapt to readily changing environments using the appropriate theory, principles and processes

Syllabus

Unit 1:

Introduction to Software Engineering, Software engineering principles, Software Myths, Software Engineering- A Layered Technology, Software Process Framework, Requirements Engineering Tasks, Requirement Engineering Process, Eliciting Requirement: Software Requirements Specification.
Software Process Models, The Waterfall Model, Incremental Process Models, Evolutionary Process Models, Specialized Process Models,

Unit 2:

The Unified Process Model, COCOMO Model, Agile Process Models, Agile metrics, Extreme Programming (XP), Scrum. An overview, Requirements Analysis, Analysis Modeling Approaches, Data Modeling, Object-Oriented Analysis, Scenario-Based Modeling, Flow-Oriented Modeling, Class-based Modeling, Behavioral Model. Design Engineering Concepts, Design Model,

Unit 3:

Basic concepts of testing, Testing Life Cycle, Structural Testing, Functional Technique, Static testing, Dynamic testing, Unit Testing, Integration Testing, Validation Testing, System Testing, Debugging. Software Testing, Fundamentals, Black-Box Testing, White-Box Testing, Web Testing, Test case design, building, execution, Automated Testing.

Unit 4:

Software Project management- Plans, Methods and Methodology, The Business Case, Project Success and Failure, Project Evaluation, Cost-benefit evaluation technique, Project Planning-stepwise project Planning, Software Effort Estimation- Albrecht Function Point Analysis, COSMIC Function Point, Cost Estimation, Project Scheduling.

Unit 5:

An overview, Software Quality, A Framework for Product Metrics, Metrics for Analysis & Design Models, Metrics for Source Code, Metrics for Testing & Maintenance. Metrics for process & project - Software measurement, metrics for software quality, metrics for small organization, Managing people in software environment.

Unit 6:

Risk management - Risk strategies, Software risks, Risk identification, Risk refinement, RMMM, Risk Response development & Risk Response Control, Risk Analysis: Agile risk management using Jira, Change Management- Software Configuration Management, SCM Repository, SCM Process, Estimation, Reengineering- Software reengineering, Reverse engineering.

Course Outcomes:

After successful completion of this course, the student should able to:

1. Ability to understand software engineering practices and various models.
2. Ability to understand software development Life Cycle.
3. Ability to understand software testing principles and techniques.
4. Ability to understand various software project management tasks and methods to implement them.

Text books and Reference books:

1. Roger Pressman; Software Engineering-A Practitioner's Approach; Sixth Edition, MaGraw Hill, 2010
2. Project Management by Clifford F. Gray, Erik W. Larson, McGraw Hill
3. Ian Somerville; Software Engineering; Seventh Edition; Pearson Education. 2008.
4. Ethics in Information Technology, George W. Reynalds, 4th Edition, Cengage Leraning Publication
5. David Gustafsan, Software Engineering;Schaum's Series,Tata McGraw Hill,2002
6. Sanjay Mohapatra; Software Project Management, First Edition, Cengage Learning, 2011.
7. Rajib Mall, Software Project Management, 5th Edition, McGrawHill

Syllabus for Semester IV, B.Tech Computer Science and Engineering

Course Code:	**CSP4003**	**Course:**	**Software Engineering Lab**
L: 0 Hrs, T: 0 Hr, P: 2 Hr, Per Week		**Total Credits:**	**01**

Course Objectives

The objective of this Lab is to familiarize the prospective engineers with:

1. To teach students UML modelling tool employed in the software development life cycle.
2. To make students familiar with the hundreds of hierarchical and interrelated engineering requirements necessary for large and/or complex systems.
3. To teach students software testing tools employed in the software testing.
4. To teach students prototyping tool employed in the software industry to develop software prototype.

Course Outcomes: After successful completion of this course, the student should able to:

1. Design Use case and activity diagram for given problem definition.
2. Design Sequence, class and state diagram for given problem definition.
3. Design Component and deployment diagrams for given problem definition.
4. Test cases using white box testing method.
5. Test cases using black box testing method

PRACTICALS BASED ON ABOVE CSP4003 SYLLABUS.

Syllabus for Bachelor of Technology (Computer Science & Engineering)

Semester IV

Course Code: MAT 4001 **Course Name: Linear Algebra**

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

Course Pre-requisite : Basic knowledge of Matrices and MAT 2002 (Discrete Mathematics)

Course Objective:

The objective of this course is to provide a foundational understanding and application of linear algebra concepts relevant to various aspects of computer science and related fields

Course Outcomes

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

1. Check the consistency of system of equations and able to solve systems of linear equations by using Gaussian elimination method.
2. Determine which set is a vector space and able to find the basis elements of vector space.
3. Understand the fundamental concepts of linear transformations including mappings, kernel, image, null space, rank, and linear independence.
4. Find the orthogonal basis elements from given basis elements.
5. To find eigen values, eigen vectors and singular value decomposition of matrix

Syllabus

Module 1 (6 hours)

Row echelon form, Reduced row echelon form of Matrix, rank of matrix, system of Linear Equations.

Module 2: (8 hours)

Vector space, subspace, properties of subspaces, spanning set, Linearly independent and dependent vectors, Basis and dimensions of vector space.

Module 3: (**6 hours)**

Linear Transformation, range space and null space of Linear Transformation, Rank-Nullity Theorem, matrix representation of linear transformation.

Module 4: (8 hours)

Inner Product Spaces, Norm; Orthonormal Sets, Gram Schmidt orthogonalisation process, projections, positive definite matrices, QR decomposition.

Module 5: (8 hours): Eigen values and eigenvectors, diagonalization, spectral theorem of Matrix, Singular value decomposition, Least square method and introduction to PCA.

Text Books:

1. Hoffman and Kunze : Linear Algebra, Prentice Hall of India, New Delhi
2. Gilbert Strang : Linear Algebra And Its Applications (Paperback) , Nelson Engineering (2007)

Reference Books:

1. Seymour Lipschutz et al: Linear Algebra, 3rded:*Schaum series.*
2. V. Krishnamoorthy et al : An introduction to linear algebra , Affiliated East West Press, New Delhi P.G. Bhattacharya, S.K. Jain and S.R.

Syllabus for Semester IV, B. Tech. (Computer Science & Engineering)

Course Code:	**CST2990**	**Course:**	**Web Development (Open Elective)**
L: 3 Hrs, T: 0 Hr, P: 0 Hr, Per Week		**Total Credits: 03**	

Course Objectives

The objective of this course is to impart necessary and practical knowledge of components of full stack web application development and develop skills required to design real-life web based projects by:

- Learning basics of client server paradigm for web development.
- Understanding the front end user interface designing.
- Understanding various front-end and backend frameworks and libraries

Course Outcomes

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

1. Articulate the concepts of end to end web development and its architecture.
2. Design stylized static and dynamic web pages using HTML5 and JavaScript.
3. Design and develop end-to-end applications with Node.js and MongoDB.

Syllabus

UNIT I

Introduction to Full-Stack Web Development and its layers, multitier architecture, Basics of Client server architecture, HTTP Basics, Front-end Web UI development, Server-Side web application, DBMS for Web development

UNIT II

HTML5: common HTML tags, adding images, HTML formatted tables, hyperlinks, HTML form and form elements, styling HTML using CSS: Basics, External CSS, CSS properties, webpage layout.

UNIT III

Static vs. Dynamic web pages, creating dynamic pages using JavaScript, Basic Syntaxes, Alerts, Prompts, Events, dynamically modifying HTML through user input, HTML Form Validation using JavaScript

UNIT IV

JavaScript: Front-end development, client-side code for data binding, jQuery for in-browser manipulation of DOM, CSS-style selectors, finding elements, effects and animation, event listeners, Introduction to React.

UNIT V

Designing the Backend: Introduction to the NO-SQL Databases, Create Documents, Data Types, Query Document, Update Document, Delete Document, CRUD operations on Mongo DB

UNIT VI

Server-side Programming: Introduction to the Node.js and its features, Environment Setup, Node Package Manager, Writing a basic Node.js program, Integration with data base

Text Books:

1. "HTML and CSS: Design and Build Websites" by Jon Duckett, Wiley & Sons, 2011
2. "JavaScript and jQuery: Interactive Front-End Web Development", by Jon Duckett, John Wiley & Sons, 2011.
3. "Learning Node: Moving to the Server-Side", Second Edition, Powers Shelley, O'Reilly, 2016.

Reference Books:

1. "The Complete Reference: HTML & CSS", Thomas Powell, Mc Graw Hill, 2017
2. "JavaScript for Modern Web Development", Alok Ranjan, BPB publication.
3. "Advanced Web Development with React", Mehul Mohan, BPB Publication.

Syllabus for Semester IV, B. Tech. (Computer Science & Engineering)

Course code: CSP4004 Course: Software Laboratory - II

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

Course Objectives

1. The objective of this course is to develop the ability of students to design android applications.
2. Effectively use files and database to store the data.
3. Use location-based services to develop navigation-based applications.

Syllabus

- Layout Manager: Linear, Relative, Table, Frame, Constraint Layout
- UI Widgets: Basic Views, Picker Views, List Views
- Activity, Intent: Implicit and Explicit
- Android Notification and Dialog
- Data Storage: Shared Preference, Internal Storage and External Storage
- SQLite and NoSQL
- Services and Location Based Services

Course Outcomes

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

1. Design basic android applications using UI resources: Activity and View group
2. Develop android applications to enhance user interactivity by using toast, notification, dialogs etc.
3. Apply android persistence with shared preferences and files, store and retrieve data with databases and enhance interactivity with services.

Text Books

1. Beginning Android Programming with Android Studio, 4Ed by J. F. DiMarzio, Wrox publication.
2. Professional Android 4 Application Programming by Reto Meier, Wiley Publication

Reference Books

1. Android Programming for Beginners - Second Edition by John Horton, Packt Publishing Pvt. Ltd.
2. Android Documentation - https://developer.android.com/docs

Syllabus for Semester IV, B. Tech – Computer Science & Engineering

Course Code: HUT4003 **Course: Managerial Economics**
L: 02 Hrs, T: 0 Hr, P: 0 Hrs, Per Week **Total Credits: 02**

Course Outcomes
On successful completion, of course student will able to learn:
CO1: Gain basic knowledge of Economics to take managerial decisions.
CO2: Apply the knowledge of the mechanics of supply and demand to explain working of markets
CO3: To understand the concepts of production, cost, and revenue from a business perspective
CO4: To understand the various market types
CO5: Understand the concepts of macroeconomics for better understanding of the functioning of the economy for taking informed managerial decisions.

Syllabus:

U NIT 1: Int roduct i on t o Manageri al Economi cs :

(4 Hours)

Nature & scope of Managerial Economics: Concepts of Managerial Economics.
Economic theory & Managerial theory. Role & responsibilities of Managerial Economists

U NIT 2:Mi cr o Economi cs: **(6 Hours)**

Demand Analysis: Individual & market, Law of demand. Elasticity of demand its meaning and importance. Price elasticity, Income elasticity & Cross elasticity Using elasticity. in Managerial decisions
Supply Analysis: Supply and Stock, Law of supply, supply function, determinants and elasticity of supply, Equilibrium of Demand and Supply.

U NIT 3: Theory of Product i on, Cost s, and Revenue:

(6 Hours)

Meaning of production, factors of production, laws of variable proportion,
Economies and diseconomies of scale, Cost and Revenue concepts

U NIT 4:Market Syst em:

(6 Hours)

Meaning of Market, Types of market - Perfect Competition Market, Monopoly and Monopolistic market, Oligopoly, Duopoly

U nit 5: Macr oeconomi cs for management (4 Hours)

Concepts and issues: Consumer Price Index, Wholesale Price Index, BOP, Current and Capital account, GDP, GNP, PI, Inflation, Business cycles, Monetary policy

Text Books:

1. Ahuja H.L., (2017) *Managerial Economics, Analysis of managerial Decision making,* S. Chand and company Limited, New Delhi, 9th ed.

2. Dwivedi D.N., (2015). *Managerial Economics*, Vikas publishing house Pvt. Ltd, Nodia, 8th ed.

Refer ence Books

1. Mankiw G., (2008) *Principles of Economics* (Kindle Edition) South Western Cengage Learning, Nodia 6th ed.
2. Salvatore, D., (2007) *Managerial Economics*. London: Oxford University Press, 6th ed.

Syllabus for Semester IV, B. Tech – Computer Science & Engineering

Course Code: HUT4002 **Course: Environment Education**

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

Course Outcomes

On successful completion, of course student will able to do the following:

CO1: Understand and appreciate the historical context of human interactions with the environment.

CO2: Understand the concept of natural resources and their sustainable development

CO3: Develop a critical understanding of the environmental issues of concern

CO4: Understand the concepts of ecosystems, biodiversity and conservation

CO5: Understand broad aspects of environmental management and assessment systems

Syllabus:

UNIT 1: Humans and the Environment

(4 Hours)

Great ancient civilizations and the environment, Indic Knowledge and Culture of sustainability; Middle Ages and Renaissance; Industrial revolution and its impact on the environment; Population growth and natural resource exploitation; Global environmental change; emergence of environmentalism

UNIT 2: Natural Resources and Sustainable Development

(4 Hours)

Definition of resource; Classification of natural resources

Water resources; Soil and mineral resources; Energy resources; Sustainable Development Goals (SDGs)

UNIT 3: Environmental Issues: Local, Regional and Global

(6 Hours)

Environmental issues and scales, Pollution, Land use and Land cover change, Global change, case studies/field visit

UNIT 4: Conservation of Biodiversity and Ecosystems

(6 Hours)

Biodiversity and its distribution – India and the world; Ecosystems and ecosystem services, Threats to biodiversity and ecosystems; Major conservation policies and practises, case studies/field visit

UNIT 5: Environmental Management

(6 Hours)

Introduction to environmental laws and regulation, Concept of Circular Economy, Life cycle analysis; Cost-benefit analysis; Environmental audit and impact assessment; Concept of 3R (Reduce, Recycle and Reuse) and sustainability; Ecolabeling /Ecomark scheme, case studies/field visit.

Books

1. Fisher, Michael H. (2018) An Environmental History of India- From Earliest Times to the Twenty-First Century, Cambridge University Press.

2. Headrick, Daniel R. (2020) Humans versus Nature- A Global Environmental History, Oxford University Press.
3. Simmons, I. G. (2008). Global Environmental History: 10,000 BC to AD 2000. Edinburgh University Press
4. Singh, J.S., Singh, S.P. & Gupta, S.R. 2006. Ecology, Environment and Resource Conservation. Anamaya Publications https://sdgs.un.org/goals
5. Harris, Frances (2012) Global Environmental Issues, 2nd Edition. Wiley- Blackwell.
6. Rajagopalan, R. (2011). Environmental Studies: From Crisis to Cure. India: Oxford University Press.
7. Krishnamurthy, K.V. (2003) Textbook of Biodiversity, Science Publishers, Plymouth, UK
8. Singh, Kartar and Anil Shishodia (2007) 'Environmental Economics: Theory and Applications", Sage,
9. Karpagam. M (2019) Environmental Economics: A textbook, Sterling
10. Jørgensen, Sven Marques, Erik João Carlos and Nielsen, Søren Nors (2016) Integrated Environmental Management, A transdisciplinary Approach. CRC Press.
11. Theodore, M. K. and Theodore, Louis (2021) Introduction to Environmental Management, 2nd Edition. CRC Press.
12. Barrow, C. J. (1999). Environmental management: Principles and practice. Routledge.
13. Tiefenbacher, J (ed.) (2022), Environmental Management - Pollution, Habitat, Ecology, and Sustainability, Intech Open, London. 10.5772/
14. Richard A. Marcantonio, Marc Lame (2022). Environmental Management: Concepts and Practical Skills. Cambridge University Press.
15. N. Mani (2020) Environmental Economics, New NC Century
16. Subhashini Muthukrishnan (2015) Economics of Environment, PHI
17. Rabindra N. Bhattacharya (2001) Environmental Economics: An Indian Perspective, Oxford University press

Syllabus for Semester V, B. Tech. (Computer Science & Engineering)

Course Code:	**CSP4005**	**Course:**	**Community Engagement Project**
L: 0 Hrs, T: 0 Hr, P: 4 Hr, Per Week		**Total Credits:**	**02**

Course Objectives

The objective of Community Engagement Project is to in still a sense of social responsibility amongst the students, empowering them to apply their knowledge and skills to positively impact and contribute to the society.

Course Outcomes:

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

1. Propose a community engagement project tailored to address society needs by devising a strategy or solution to address it.
2. Apply technical knowledge or skills towards execution of the proposed solution.
3. Evaluate the effectiveness of the project in addressing community needs.
4. Demonstrate ethical principles, project management skills, team work and communication skills for project completion within the confines of a deadline.

Execution Plan for the Subject:

- The students will impart their knowledge and skills in the society by identifying the potential needs or identify a society need and address it by building a technical solution.

Syllabus for Semester IV, B. Tech. (Computer Science & Engineering)

Course Code: Exit Course **Course: Application Development (Android)**

Total Credits: 08

Syllabus

Module 1: Introduction to Android Development

- Overview of Android OS and its versions
- Setting up Android Studio and SDK
- Understanding Android app components (Activities, Services, Broadcast Receivers, Content Providers)
- Exploring Android project structure

Module 2: User Interface Design

- Layouts and Views (LinearLayout, RelativeLayout, ConstraintLayout)
- Material Design principles and components
- UI Styling and Themes
- Handling User Input (EditText, Buttons, etc.)
- RecyclerView and Adapters for displaying lists

Module 3: Activities and Fragments

- Activity lifecycle and state management
- Fragment lifecycle and communication with Activities
- ViewPager and TabLayout for swipe navigation

Module 4: Working with Data

- SQLite database operations
- Using Room Persistence Library for database management
- Content Providers for data sharing between apps
- RESTful API integration using Retrofit or Volley

Module 5: Background Tasks and Services

- AsyncTask and Thread management
- IntentService and JobScheduler for background tasks
- Foreground services and notifications

Module 6: Networking and APIs

- HTTP requests with OkHttpClient or HttpURLConnection
- Consuming JSON/XML data from web services
- Authentication mechanisms (OAuth, JWT)

Module 7: Multimedia and Sensors

- Working with Camera API for capturing photos/videos
- Media playback (Audio and Video)
- Using Sensors (GPS, Accelerometer, etc.) and Location Services

Module 8: Advanced Topics

- Dependency Injection with Dagger or Hilt
- MVVM or MVI architecture using LiveData and ViewModel
- Testing with JUnit, Espresso, and Mockito
- Firebase integration for analytics, authentication, and cloud messaging

Module 9: Publishing and Monetization

- App signing and publishing on Google Play Store
- App Store Optimization (ASO) techniques
- Monetization strategies (in-app purchases, ads)

Text Books:

1. Beginning Android Programming with Android Studio, 4Ed by J. F. DiMarzio, Wrox publication.
2. Android User Interface Design: Implementing Material Design for Developers by Ian G. Clifton, Addison-Wesley Professional, 2nd Edition
3. Android Networking: From HTTP to RESTful Web Services by Padmanabhan Rangarajan, Packt Publishing

Syllabus for Semester IV, B. Tech. (Computer Science & Engineering)

Course Code: CST	**Course: Certified software Engineer (Devop)**
Online/offline certification Course	**Total Credits: 08**

Course Objectives

1. To introduce DevOps terminology, definition & concepts.
2. To understand the different Version control tools and concepts of Continuous Integration/ Continuous Testing/ Continuous Deployment)
3. To understand Configuration management
4. Illustrate the benefits and drive the adoption of cloud-based Devops tools to solve real world problems

Syllabus

Unit I

Introduction to Devops: Devops Essentials, Fundamentals of Networking Fundamentals of Linux & Scripting.Software development models and DevOps: DevOps Lifecycle for Business Agility, DevOps, and Continuous Testing. DevOps influence on Architecture: Introducing software architecture, The monolithic scenario, Architecture rules of thumb, The separation of concerns, Handling database migrations, Microservices, and the data tier, DevOps, architecture, and resilience.

Unit II

Version control systems: Knowing about Version control, Introduction, Overview of Version Control Systems, Role of Version Control System, Types of Control Systems and their Supporting Tools, Importance of version control in CICD pipeline. Essentials of GIT in industry, Working with various commands in GIT. Create Github Account, Create Repository.

Unit III

Compile and build using maven & gradle: Introduction, Installation of Maven, POM files, Maven Build lifecycle, build phases (compile build, test, package) Maven Profiles, Maven repositories (local, central, global), Maven plugins, Maven create and

build Artificats, Dependency management, Installation of Gradle, understand build using Gradle. Different tools for build.

Unit IV

Continuous integration using Jenkins: Install & Configure Jenkins, Jenkins Architecture Overview, creating a Jenkins Job, configuring a Jenkins job, Introduction to Plugins, Adding Plugins to Jenkins, commonly used plugins (Git Plugin, Parameter Plugin, HTML Publisher, Copy Artifact and Extended choice parameters). Configuring Jenkins to work with java, Git and Maven, creating a Jenkins Build and Jenkins workspace.

Unit V

Configuration management using ansible: Ansible Introduction, Installation, Ansible master/slave configuration, YAML basics, Ansible modules, Ansible Inventory files, Ansible playbooks, Ansible Roles, adhoc commands in ansible.
Building devops pipelines: Create a new pipeline, modify pipeline.

Unit VI

Continuous testing: Testing Tools and automation: Various types of testing, Automation of testing Pros and cons, tools for Continuous testing.
Continuous management: Understanding of Infrastructure as a code, Infrastructure Platforms, Infrastructure Resources, Compute Resources, Storage Resources, Network Resources, tools for Continuous management.
Continuous deployment: Deployment systems, Deployment tools.

COURSE OUTCOMES:

1. Understand devops essentials and different actions performed through Version control tools like Git.
2. Perform Continuous Integration and Continuous Testing and Continuous Deployment by building and automating test cases.
3. Ability to Perform Automated Continuous Deployment, testing and code deployment tools.
4. Ability to do configuration management and to leverage Cloud-based DevOps tools.

Text Books

1. Joakim Verona. Practical Devops, Second Edition. Ingram short title; 2nd edition (2018). ISBN10: 1788392574 2. Deepak Gaikwad, Viral Thakkar.
2. DevOps Tools from Practitioner's Viewpoint. Wiley publications. ISBN: 9788126579952
3. Mitesh Soni, “DevOps Bootcamp”, Packt Publishing Ltd, 2017.
4. Karl Matthias & Sean P. Kane, “Docker: Up and Running”, 3rd Edition, O'Reilly Publication, 2022.

5. Deepak Gaikwad, Viral Thakkar, “DevOps Tools from Practitioner's Viewpoint”, Wiley,2019.

Reference Books

1. Sanjeev Sharma and Bernie Coyne, “DevOps for Dummies”, 3rd Edition, Wiley Publication,2017.
2. Httermann, Michael, “DevOps for Developers”, 1st Edition, APress Publication, 2012.
3. Joakim Verona, “Practical DevOps”, 2nd Edition Packt publication,2018.
4. Martin Alfke, “Puppet 5 Essentials - Third Edition: A fast-paced guide to automating your infrastructure”, 3rd Revised Edition, Packt Publishing, 2017.