

Pimpri Chinchwad Education Trust's  
**Pimpri Chinchwad College of Engineering**  
SECTOR NO. 26, PRADHIKARAN, NIGDI, PUNE 411044

An Autonomous Institute Approved by AICTE and affiliated to SPPU, Pune

**DEPARTMENT OF APPLIED SCIENCES AND HUMANITIES**  
**Department of Computer Science & Engineering (AI&ML)**



**Curriculum Structure and Syllabus**  
**of**  
**FY B Tech Computer Science & Engineering (AI&ML)**  
**(Course 2023)**

"Knowledge Brings Freedom"



**Effective from Academic Year 2023-24**

## Institute Vision

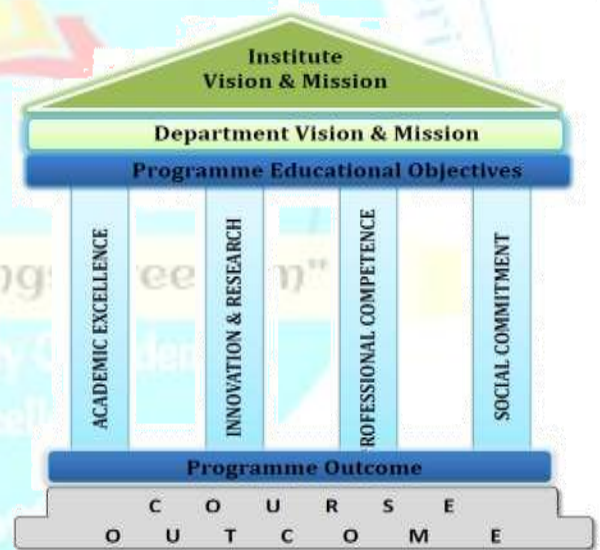
To be one of the top 100 Engineering Institutes of India in coming five years by offering exemplarily Ethical, Sustainable and Value Added Quality Education through a matching ecosystem for building successful careers.

## Institute Mission

1. Serving the needs of the society at large through establishment of a state-of-art Engineering Institute.
2. Imparting right Attitude, Skills, Knowledge for self-sustenance through Quality Education
3. Creating globally competent and Sensible engineers, researchers and entrepreneurs with ability to think and act independently in demanding situations

## Quality Policy

We at PCCOE are committed to impart Value Added Quality Education to satisfy the applicable requirements, needs and expectations of the Students and Stakeholders. We shall strive for academic excellence, professional competence and social commitment in fine blend with innovation and research. We shall achieve this by establishing and strengthening state-of- the-art Engineering and Management Institute through continual improvement in effective implementation of Quality ManagementSystem.



## LIST OF ABBREVIATIONS IN CURRICULUM STRUCTURE

Sr. No	ABBREVIATION	TYPE OF COURSES
1	<b>BSC</b>	Basic Science Course
2	<b>ESC</b>	Engineering Science Course
3	<b>(VSEC)</b>	Vocational and Skill Enhancement Course
4	<b>(AEC)</b>	Ability Enhancement Course
5	<b>PCC</b>	Programme Core Course
6	<b>CC</b>	Co-curricular Courses
7	<b>HSMC</b>	Humanities/ Social Sciences/Management Courses
8	<b>B.Tech</b>	Bachelor of Technology
9	<b>L</b>	Lecture
10	<b>P</b>	Practical
11	<b>T</b>	Tutorial
12	<b>H</b>	Hours
13	<b>CR</b>	Credits
14	<b>CIE</b>	Continuous IE /Examination
15	<b>IE</b>	IE
16	<b>MTE</b>	Mid Term Evaluation
17	<b>ETE</b>	End Term Evaluation
18	<b>TW</b>	Term work
19	<b>OR</b>	Oral
20	<b>PR</b>	Practical
21	<b>LS</b>	Life Skills
22	<b>UHV</b>	Universal Human Values
23	<b>Eng.</b>	English
24	<b>Jap.</b>	Japanese
25	<b>Ger.</b>	German
26	<b>IKS</b>	Indian Knowledge system

# First Year B. Tech Computer Science & Engineering (AI&ML) Semester-I

Course Code	Course Type	Course Name	Teaching Scheme							Evaluation Scheme						
			L	P	T	H	CR			IE	MTE	ETE	TW	PR	OR	Total
							TH	PR/Tut	Total							
BSH21A01	BSC	Linear Algebra & Univariate Calculus (LAUC)	2		1	3	2	1	3	20	30	50	-	-	-	100
BSH21A02	BSC	Engineering Physics	3			3	3		3	20	30	50	-	-	-	100
BSH21A03	BSC	Engineering Physics Laboratory		2		2		1	1				50			50
BCS21B01	ESC	Discrete Mathematics	3	-	-	3	3	-	3	20	30	50	-	-	-	100
BCS21B02	ESC	Computer Organization & Operating Systems	3	-	-	3	3	-	3	20	30	50	-	-	-	100
BCS21B03	ESC	Computer Organization & Operating Systems Laboratory	-	2	-	2	-	1	1	-	-	-	50	-	-	50
BCS21G01	VSEC	C Programming	-	4	-	4	-	2	2	-	-	-	100	-	-	100
BSH21H01 /02/03/04	AEC	AEC(Eng/Ger/Jap/B business story telling)	1	2		3	1	1	2	30		20				50
BSH21K01	CC	Life Skill 1		4		4		2	2				100			100
<b>Total</b>			<b>12</b>	<b>14</b>	<b>1</b>	<b>27</b>	<b>12</b>	<b>8</b>	<b>20</b>							<b>750</b>

## First Year B.Tech Computer Science & Engineering (AI&ML) Semester-II

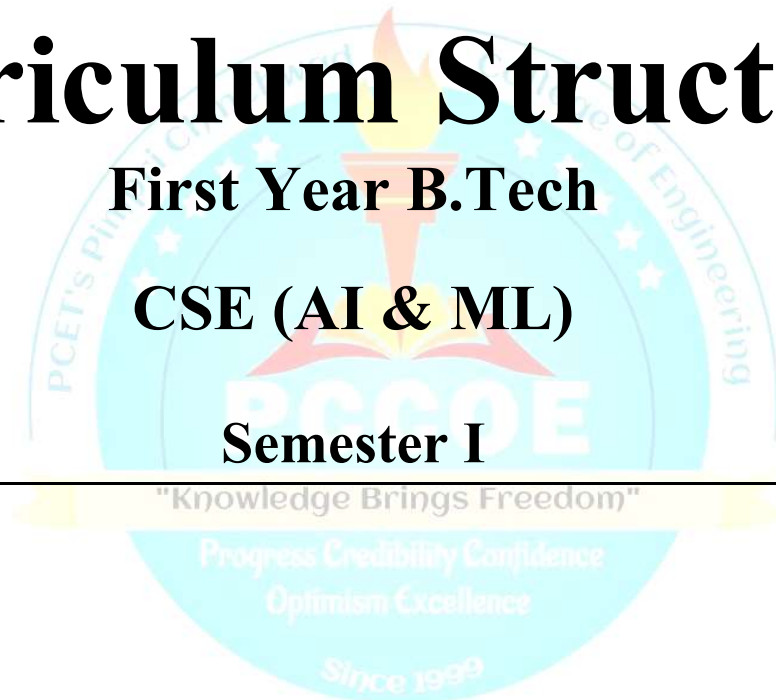
Course Code	Course Type	Course Name	Teaching Scheme							Evaluation Scheme						
			L	P	T	H	CR			IE	MTE	ETE	TW	PR	OR	Total
							TH	PR/TUT	Total							
BSH22A06	BSC	Multivariate Calculus	2	1	1	3	2	1	3	20	30	50	-	-	-	100
BSH22A04	BSC	Engineering Chemistry	3			3	3		3	20	30	50	-	-	-	100
BSH22A05	BSC	Engineering Chemistry Laboratory		2		2		1	1				50	-		50
BCS22B04	ESC	Mathematics for Data Science	3	-	-	3	3	-	3	20	30	50	-	-	-	100
BCS22B05	ESC	Data Science Laboratory	-	4	-	4	-	2	2	-	-	-	50	50	-	100
BCS22C01	PCC	Software Engineering	2	-	-	2	2	-	2	20	-	30	-	-	-	50
BCS22G02	VSEC	Python Programming	-	4	-	4	-	2	2	-	-	-	100	-	-	100
BSH22H05	IKS	Indian Knowledge system	2			2	2		2	30		20				50
BSH22K01	CC	Life Skill 2		4		4		2	2				0			100
<b>Total</b>			<b>13</b>	<b>14</b>	<b>1</b>	<b>27</b>	<b>12</b>	<b>8</b>	<b>20</b>							<b>750</b>

# Curriculum Structure

First Year B.Tech

CSE (AI & ML)

Semester I



<b>Program: B. Tech. CSE (AI &amp; ML)</b>						<b>Semester: I</b>	
<b>Course: Linear Algebra &amp; Univariate Calculus</b>						<b>Code: BSH21A01</b>	
<b>Teaching Scheme</b>				<b>Evaluation Scheme</b>			
<b>Lecture</b>	<b>Practical</b>	<b>Tutorial</b>	<b>Credit</b>	<b>IE</b>	<b>MTE</b>	<b>ETE</b>	<b>Total</b>
<b>2</b>	<b>-</b>	<b>1*</b>	<b>3</b>	<b>20</b>	<b>30</b>	<b>50</b>	<b>100</b>
<b>Prior knowledge:</b> 1.Elementary Mathematics 2. Elementary Calculus is essential							
<b>Course Objectives:</b> This course aims at enabling students, 1. To familiarize with concepts and techniques in Calculus and Matrices. 2. To get acquainted with Mathematical Modeling of physical systems using differential equations. 3. To acquire techniques of advanced level mathematics and its applications that would enhance analytical thinking power.							
<b>Course Outcomes:</b> After learning the course, the students will be able to: 1. Apply the concept of rank to solve Electrical Circuits problems and Find Eigen Values and Eigenvectors. 2. Represent Fourier series for the periodic time domain continuous and discrete function into signal form. 3. Use Successive differentiation & Taylor's and Maclaurin's theorems for expansion of a function in infinite series and evaluate the limits of indeterminate forms with L'Hospital rule. 4. Develop and solve models related to Orthogonal Trajectories, Electrical Circuits and One-dimensional heat flow using differential equations.							
<b>Unit</b>	<b>Description</b>						<b>Duration (Hrs)</b>
<b>I</b>	Matrices: Rank, System of linear equations with applications in Electrical circuits, Linear dependence and independence, Linear transformations, Eigenvalues, Eigen vectors.						<b>8</b>
<b>II</b>	Fourier Series: Definition, Dirichlet's conditions, full range Fourier series, Harmonic analysis, and application to engineering.						<b>7</b>
<b>III</b>	Differential Calculus: L' Hospital rule, Taylor's series, Maclaurin's series, Successive differentiation and Leibnitz theorem.						<b>7</b>
<b>IV</b>	Differential Equations: Exact differential equations, differential equations reducible to Exact form, Applications of Differential Equations: Orthogonal trajectories, Kirchoff's law of Electrical circuits (L-R and R-C circuits), One-dimensional conduction of heat (steady state).						<b>8</b>
	<b>Total</b>						<b>30</b>
	*Tutorial will be conducted in the batches as 1 hr/batch/week						
<b>Sr. No.</b>	<b>List of Tutorials</b>						
1	Rank, System of linear equations,						
2	Applications in Electrical circuits						
3	Linear dependence and independence, Linear transformations						
4	Eigenvalues, Eigen vectors						
5	Full range Fourier series						
6	Full range Fourier series						
7	Harmonic analysis						
8	Application to engineering						
9	L' Hospital rule, Taylor's series						
10	Maclaurin's series, Successive differentiation						
11	Successive differentiation, Leibnitz theorem						
12	Exact differential equations,						
13	Differential equations reducible to Exact						
14	Orthogonal trajectories, Kirchoff's law of Electrical circuits						

15	One-dimensional conduction of heat
<b>Text Books:</b> <ol style="list-style-type: none"><li>1. Higher Engineering Mathematics by B.V. Ramana , 34e, Tata McGraw-Hill.</li><li>2. Linear Algebra &amp; Univariate Calculus by Team Mathematics, PCCoE, Pune, 1e, Techknowledge Publication.</li></ol>	
<b>Reference Books:</b> <ol style="list-style-type: none"><li>1. Advanced Engineering Mathematics by Erwin Kreyszig, 9e, Wiley Eastern Ltd.</li><li>2. Higher Engineering Mathematics by H. K. Dass , 22e, S. Chand Publication, Delhi.</li><li>3. Advanced Engineering Mathematics by S.R.K. Iyengar, Rajendra K. Jain, 4e, Alpha Science International, Ltd.</li><li>4. Advanced Engineering Mathematics, by Peter V. O'Neil, 7e, Thomson Learning.</li><li>5. Advanced Engineering Mathematics by M. D. Greenberg, , 2e, Pearson Education.</li><li>6. Higher Engineering Mathematics by B. S. Grewal, 43e, Khanna Publication, Delhi.</li></ol>	
<b>E-sources:</b> <b>NPTEL Course lectures</b> <b>links:</b> <a href="https://www.youtube.com/watch?v=4QFsiXfgbzM&amp;list=PLbRMhDVUMngeVrxtbBz-n8HvP8KAWBpI5">https://www.youtube.com/watch?v=4QFsiXfgbzM&amp;list=PLbRMhDVUMngeVrxtbBz-n8HvP8KAWBpI5</a>	





<b>Program</b>		<b>B. Tech. CSE (AI &amp; ML)</b>			<b>Semester</b>		<b>I</b>		
<b>Course:</b>		<b>Engineering Physics</b>			<b>Code:</b>		<b>BSH21A02</b>		
<b>Teaching Scheme</b>				<b>Evaluation Scheme</b>					
<b>Lecture</b>	<b>Practical</b>	<b>Tutorial</b>	<b>Credit</b>	<b>IE</b>	<b>MTE</b>	<b>ETE</b>	<b>Total</b>		
3	-	-	3	20	30	50	100		
<b>Prior-knowledge:</b> 1. Wave theory of light, 2. Elasticity, 3. Atom, molecule & nuclei, 4. Current, electricity & magnetism, 5. Electromagnetic Induction									
<b>Course Objectives:</b>									
<ol style="list-style-type: none"> <li>1. To build strong conceptual understanding of Optics, Semiconductor Physics &amp; Quantum Physics</li> <li>2. To explore advances in Physics with introduction of Lasers, Nanotechnology &amp; Superconductivity</li> <li>3. To provide consciousness about the importance of Physics principles in various engineering applications</li> </ol>									
<b>Course Outcomes:</b> After learning the course, students will be able to									
<ol style="list-style-type: none"> <li>1. Interpret intensity variation due to optical phenomena like interference and relate these concepts to various engineering applications</li> <li>2. Apply basics of semiconductor physics to explain the behavior of charge carriers inside a semiconductor</li> <li>3. Illustrate the working principle of laser and their prominent applications</li> <li>4. To distinguish wave behavior of a matter particle for the manipulation of the processes at quantum scale.</li> <li>5. Interpret properties of superconductors &amp; their applications in advanced technologies`</li> <li>6. Summarize properties, preparation methods of nanomaterials &amp; explore their applications in various engineering fields</li> </ol>									
<b>Unit</b>	<b>Description</b>							<b>Duration (Hrs)</b>	
<b>I</b>	<b>Wave Optics</b> Interference: Interference, phase difference & path difference between waves, constructive & destructive interference, phase difference due to reflection at boundaries of optical interfaces, thin film, interference due to thin film of uniform thickness, conditions of maxima and minima, anti-reflection coating as an application of interference Diffraction: Diffraction, Fraunhofer diffraction at a single slit (Qualitative)-condition of maxima and minima, resultant intensity distribution pattern, diffraction grating (Qualitative), introduction to X-Ray diffraction							7	
<b>II</b>	<b>Semiconductor Physics</b> Band Theory of solids, Electrical conductivity of conductors & semiconductors, Hall effect (with derivation), Fermi Dirac probability distribution function, Fermi energy, position of Fermi level in intrinsic semiconductors (Qualitative) & in extrinsic semiconductors, dependence of Fermi level on temperature & doping concentration, energy band diagram of P-N Junction diode, solar cell I-V characteristics.							6	
<b>III</b>	<b>Laser &amp; Fiber Optics</b> Laser: Introduction, interaction of light with matter- absorption, spontaneous emission, stimulated emission, population inversion, metastable state, active system, resonant cavity, characteristics of laser, semiconductor hetero-junction laser, carbon dioxide laser, applications of laser-industrial, defense & medical; introduction to holography Fiber Optics: Propagation of light in optical fibers, acceptance angle, numerical aperture, modes of propagation, types of fibers- step index, graded index, single mode & multi-mode; Losses - attenuation, dispersion							8	

<b>IV</b>	<p><b>Quantum Mechanics</b>            Limitations of classical physics, need of quantum mechanics, wave particle duality of radiation &amp; matter, De Broglie hypothesis, De Broglie wavelength in terms of kinetic &amp; potential energy, concept of wave packet, phase and group velocity, properties of matter waves, Heisenberg's uncertainty principle, wave function &amp; probability interpretation, well behaved wave function, Schrodinger's time independent wave equation, applications of independent wave equation to the problem of (i) particle in rigid box, (ii) particle in a non-rigid box(qualitative), Tunneling effect, examples of tunneling effect, tunnel diode &amp; scanning tunneling microscope (STM)</p>	8
<b>V</b>	<p><b>Magnetism and Superconductivity</b>            Magnetism: Classification of magnetic materials, temperature dependent magnetic transitions (Curie and Neel temperature), magnetic hysteresis loop, magneto-resistance, giant magneto-resistance (GMR), application of magnetic materials in magneto caloric effect, adiabatic demagnetization.            Superconductivity: Introduction, critical temperature, properties of superconductors-zero electrical resistance, persistent current, Meissner effect, critical magnetic field, BCS theory, type I and II superconductors, low T<sub>c</sub> and high T<sub>c</sub> superconductors, Josephson effect, DC-SQUID-construction, working and applications, applications - superconducting magnets, maglev trains</p>	8
<b>VI</b>	<p><b>Introduction to Nanoscience</b>            Introduction, surface to volume ratio, quantum confinement, properties of nanomaterials- optical, electrical, mechanical, magnetic; methods of preparation of nanomaterials- bottom-up and top-down approaches, physical methods- high energy ball milling, physical vapor deposition; chemical method - colloidal route for synthesis of gold nanoparticle , aerogels- properties and applications, applications of nanomaterials in medical, energy, automobile, space, defense; introduction to quantum computing.</p>	8
<b>Total</b>		<b>45</b>
<b>Textbooks:</b>		
<ol style="list-style-type: none"> <li>1. A textbook of Engineering Physics-Dr. M.N. Avadhanulu, Dr. P.G. Kshirsagar- Revised edition 2015, S. Chand &amp; Company Pvt. Ltd</li> <li>2. Engineering Physics-R.K. Gaur, S. L Gupta, -Eighth revised edition 2012, Dhanpatrai Publications (P) Ltd</li> <li>3. Nanotechnology -Principles &amp; Practices - Sulabha K. Kulkarni -Third edition -Capital Publishing Company.</li> </ol>		
<b>Reference Books:</b>		
<ol style="list-style-type: none"> <li>1. Lasers &amp; nonlinear Optics-B. B. Laud-Third edition, New Age International (P)Ltd. Publishers.</li> <li>2. Fundamentals of Optics- Francis A. Jenkins, Harvey E. White, Fourth edition, McGraw Hill Education (India) Pvt. Ltd.</li> <li>3. Fundamentals of Physics- Resnick &amp; Halliday (John Wiley &amp; sons)</li> <li>4. An introduction to Laser's theory and applications – Dr. M. N. Avadhanulu, Dr. P.S. Hemne– Revised edition 2017-S. Chand &amp; Company Pvt. Ltd</li> <li>5. Introduction to Quantum Mechanics. - David J. Griffiths, Darrell F. Schroeter, Third edition, Cambridge University Press.</li> <li>6. Introduction to solid states Physics - Charles Kittel, Eighth Edition, Wiley India Pvt Ltd.</li> <li>7. Nano: The Essentials. -T. Pradeep, First edition 2007, McGraw Hill Education.</li> </ol>		

<b>Program:</b>		<b>B. Tech. CSE (AI &amp; ML)</b>			<b>Semester: I</b>		
<b>Course:</b>		<b>Engineering Physics Laboratory</b>			<b>Code: BSH21A03</b>		
<b>Teaching Scheme</b>					<b>Evaluation Scheme</b>		
<b>Lecture</b>	<b>Practical</b>	<b>Tutorial</b>	<b>Credit</b>	<b>TW</b>	<b>OR</b>	<b>PR</b>	<b>Total</b>
-	1	-	1	50	-	-	50
<b>Prior knowledge:</b> 1. Wave theory of light 2. Elasticity, 3. Atom, molecule & nuclei, 4. Current, electricity & magnetism, 5. Electromagnetic Induction							
<b>Course Objectives:</b>							
<ol style="list-style-type: none"> <li>To provide better understanding of concepts, principles of Physics by giving hands on experience</li> <li>To develop an insight in scientific experimental methodologies</li> </ol>							
<b>Course Outcomes:</b> After learning the course, students will be able to							
<ol style="list-style-type: none"> <li>Develop an ability to handle measuring instruments and understand uncertainty and errors involved in various measurements</li> <li>Apply the knowledge of Physics to learn various experimental methodologies - by performing experiments related to optics, sound, semiconductors, magnetism &amp; Laser</li> </ol>							
<b>Units</b>	<b>Description (Any 10 experiments from following list)</b>						
1	To determine the radius of curvature of Plano-convex lens using Newton's rings.						
2	To determine unknown wavelength by using plane diffraction grating.						
3	To verify Malus Law of polarization of light.						
4	To determine refractive indices and identification of types of crystal using double refraction.						
5	To determine the number of lines on grating surface using Laser.						
6	To study IV characteristics of solar cell and determine fill factor.						
7	To determine band gap of given semiconductor.						
8	To determine Hall coefficient and charge carrier density.						
9	To determine Magnetic susceptibility of given material by Quinke's Tube Experiment.						
10	To determine compressibility of given liquid using Ultrasonic Interferometer.						
11	To Determine specific rotation of a solution with Laurent's Half Shade Polari meter						
12	To Determine electrical resistivity of given semiconductor using four probe method						
<b>Textbooks:</b>							
<ol style="list-style-type: none"> <li>A textbook of Engineering Physics-Dr. M.N. Avadhanulu, Dr. P.G. Kshirsagar- Revised edition 2015, S. Chand &amp; Company Pvt. Ltd.</li> <li>Engineering Physics-R. K. Gaur, S. L Gupta, -Eighth revised edition 2012, Dhanpatrai Publications(P) Ltd.</li> </ol>							

**Reference Books:**

1. Lasers & nonlinear Optics-B. B. Laud-Third edition, New Age International (P) Ltd. Publishers.
2. Fundamentals of Optics- Francis A. Jenkins, Harvey E. White, Fourth edition, McGraw Hill Education (India) Pvt. Ltd.
3. Fundamentals of Physics- Resnick & Halliday (John Wiley & sons)
4. An introduction to Laser's theory and applications – Dr. M. N. Avdhanulu, Dr. P.S. Hemne– Revised edition 2017-S. Chand & Company Pvt. Ltd.
5. Introduction to solid states Physics - Charles Kittel, Eighth Edition, Wiley India Pvt Ltd.



<b>Program:</b>	<b>B. Tech. CSE (AI &amp; ML)</b>			<b>Semester:</b>	<b>I</b>		
<b>Course:</b>	<b>Discrete Mathematics</b>			<b>Code:</b>	<b>BCS21B01</b>		
<b>Teaching Scheme</b>				<b>Evaluation Scheme</b>			
<b>Lecture</b>	<b>Tutorial</b>	<b>Credit</b>	<b>Hrs</b>	<b>IE</b>	<b>MTE</b>	<b>ETE</b>	<b>Total</b>
3	-	3	3	20	30	50	100

**Prior Knowledge:** Linear Algebra and Univariate Calculus is essential.

**Course Objectives:**

1. To learn the mathematical formulation of problems by using set, function and relations.
2. To learn logic and proof techniques to reason the solutions mathematically.
3. To interpret set theory, graph theory, and algebraic structures.
4. To learn the formal proof techniques in the formulation of problems.
5. To learn probability theory and various distributions.

**Course Outcomes:**

After learning the course, students will be able to:

1. Use fundamental discrete structures and perform various set operations.
2. Solve the problems logically using discrete objects like functions and relations.
3. Use propositional logic to formulate the problems mathematically.
4. Use graph and Tree techniques in problem-solving.
5. Identify and apply the basic techniques in counting.
6. Apply probability theory and by analyzing the various types of probability distribution.

<b>Unit</b>	<b>Description</b>	<b>Duration (Hrs)</b>
<b>I</b>	<p><b>Mathematical Reasoning and Set theory</b>  <b>Fundamentals of logic:</b> Propositions, Truth Tables, Logical Connectivity, Propositional logic and its applications  <b>Set Theory:</b> Introduction, Set Representation, Types of Sets, Set Operations, Laws of set theory, Introduction to Structured sets: group, rings.  <b>Mathematical Induction:</b> Introduction, proof technique, Case Study on Verification for the correctness of computer program using principle of mathematical induction</p>	<b>8</b>
<b>II</b>	<p><b>Relations and Functions:</b>  <b>Relation:</b> Relation Definition, Properties of Binary Relations, Closure of Relations, Warshall's Algorithm, Equivalence Relations and Equivalence Classes, Partitions, Partial Ordering Relations, Hasse Diagrams and Lattices, Chains and Anti-chains.  <b>Function:</b> Function Definition, Composition of Functions, Injective, Surjective and Bijective Function, Inverse of a Function</p>	<b>7</b>
<b>III</b>	<p><b>Graphs and Trees:</b>  <b>Graph theory:</b> Basic Terminology, Types of Graphs, Paths and Circuits, Hamiltonian and Euler Paths and Circuits, Isomorphic Graphs, Planar Graph, Dijkstra's Shortest Path Algorithm.  <b>Trees:</b> Trees, Rooted Trees, Prefix Codes, Huffman Algorithm for Optimal Tree, Spanning</p>	<b>8</b>

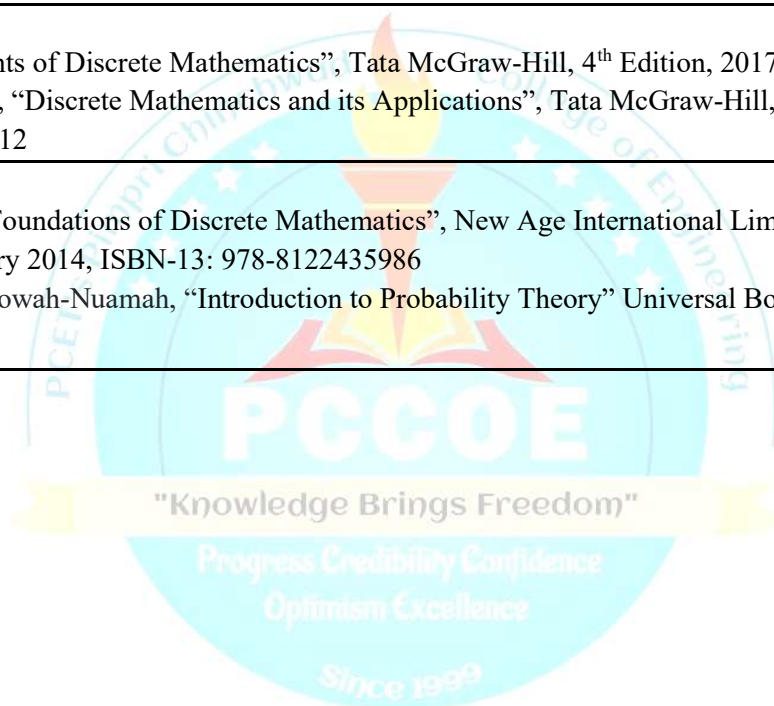
	Trees, Minimum Spanning Trees, Kruskal's and Prim's Algorithm.	
IV	<b>Counting:</b> Introduction, Basic counting principles, principle of inclusion and exclusion, pigeonhole principle, permutations, combinations, permutations and combinations with repetitions, binomial theorem.	7
V	<b>Probability:</b> The axioms of probability, discrete probability, Random variables, discrete random variable, conditional probability, independent events, Bayes' rule, Bernoulli trials, probability mass function, continuous random variable, probability density function.	7
VI	<b>Probability Distribution</b> - Cumulative distribution function, properties of cumulative distribution function. Two-dimensional random variables and their distribution functions, Marginal probability function, Independent random variables. Probability distributions: Gaussian distribution, Binomial Distribution, Poisson Distribution.	8
<b>Total</b>		<b>45</b>

**Textbooks:**

1. C. L. Liu, "Elements of Discrete Mathematics", Tata McGraw-Hill, 4<sup>th</sup> Edition, 2017, ISBN 978- 1259006395.
2. Kenneth H. Rosen, "Discrete Mathematics and its Applications", Tata McGraw-Hill, 8th Edition, 2018, ISBN 978- 1259676512

**Reference Books:**

1. Dr. K. D. Joshi, "Foundations of Discrete Mathematics", New Age International Limited Publishers, 2<sup>nd</sup> Edition, January 2014, ISBN-13: 978-8122435986
2. Nicholas N.N., Nsowah-Nuamah, "Introduction to Probability Theory" Universal Book Stall.



<b>Program:</b>	B.Tech. CSE (AI & ML)			<b>Semester:</b>	I		
<b>Course:</b>	Computer Organization and Operating Systems			<b>Code:</b>	BCS21B02		
<b>Teaching Scheme</b>				<b>Evaluation Scheme</b>			
<b>Lecture</b>	<b>Tutorial</b>	<b>Credit</b>	<b>Hours</b>	<b>IE</b>	<b>MTE</b>	<b>ETE</b>	<b>Total</b>
3	-	3	3	20	30	50	100
<b>Prior Knowledge:</b> computer fundamentals is essential.							
<b>Course Objectives:</b>							
<ol style="list-style-type: none"> <li>1. To get acquainted with the basic concept of computer organization &amp; operating systems.</li> <li>2. To learn and understand data structures used in the design of operating systems.</li> <li>3. To understand the functions of operating systems.</li> <li>4. To learn process management and inter-process communication</li> <li>5. To learn memory management and I/O management.</li> </ol>							
<b>Course Outcomes:</b>							
<ol style="list-style-type: none"> <li>1. After learning the course, the students will be able to:</li> <li>2. Describe the basic concepts of Computer Organization.</li> <li>3. Demonstrate the organization structure of the central processing unit.</li> <li>4. Explain the concepts of I/O subsystems.</li> <li>5. Comprehend the internal components of operating systems.</li> <li>6. Illustrate the concept of process synchronization.</li> <li>7. Compare various CPU scheduling, disk scheduling and page replacement policies.</li> </ol>							
<b>Unit</b>	<b>Description</b>						<b>Duration (Hrs)</b>
<b>I</b>	<b>Basic Functional units of Computers:</b> Functional units, basic Operational concepts, Bus structures, ALU and Control unit, <b>Data Representation:</b> Signed number representation, fixed and floating-point Representations, addition, and subtraction of signed numbers, signed operand multiplication, booth's algorithm.						<b>7</b>
<b>II</b>	<b>Central Processing Unit organization:</b> Introduction, General Register Organization, Instruction formats, Addressing modes, CISC and RISC, Data path in a CPU, Instruction cycle.						<b>7</b>
<b>III</b>	<b>Input/output Subsystem:</b> I/O peripherals - Input devices, output devices, I/O ports, Serial port, Parallel port, PCI bus, Secondary storage devices, <b>Memory Subsystem:</b> Memory hierarchy, Cache memory.						<b>8</b>
<b>IV</b>	<b>Introduction to OS:</b> Operating system functions, Different types of O.S <b>Process Management:</b> Process states, Process control block, Threads, system calls. <b>Scheduling algorithms:</b> FCFS, SJF, RR, and Priority.						<b>8</b>
<b>V</b>	<b>Process Synchronization:</b> Introduction, Need, Inter Process Communication, producer-consumer problem, <b>Deadlock:</b> Introduction, Deadlock Prevention, Deadlock Avoidance.						<b>7</b>
<b>VI</b>	<b>Memory Management:</b> Introduction, Memory Allocation Strategies, Swapping, Paging, Segmentation, Virtual Memory, Page Replacement, <b>Disk management:</b> Introduction, disk scheduling policies: FIFO, SSTF, SCAN.						<b>8</b>
<b>Total</b>							<b>45</b>

**Text Books:**

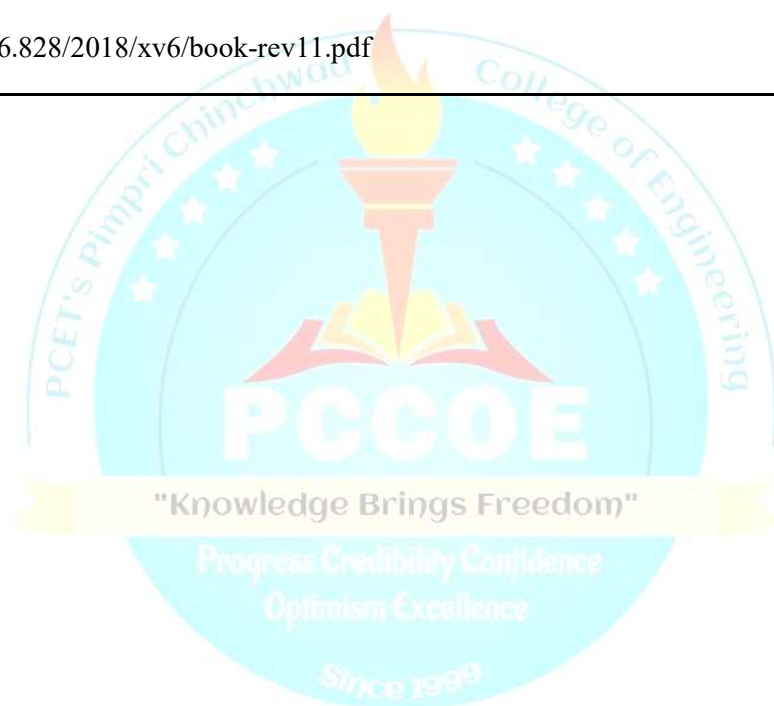
1. W. Stallings, "Computer Organization & Architecture: Designing for performance", Pearson Education/Prentice Hall of India, 10th Edition, 2016, ISBN-10: 0-13-410161-8 | ISBN-13: 978-0-13-410161-3.
2. Silberschatz A., Galvin P., Gagne G., "Operating System Concepts", John Wiley and Sons, 9th Edition, 978-1-118-06333-0.

**Reference Books:**

- 1) Achyut S. Godbole, Atul Kahate, "Operating Systems", McGraw Hill, 3rd Edition, ISBN-10: 0-07-059113-X | ISBN-13: 978-0-07-059113-4.
- 2) Dhamdhare D., "Systems Programming and Operating Systems", McGraw Hill, ISBN: 0-07-463579-4.
- 3) Stallings W., "Operating Systems", 6th Edition, Prentice Hall, ISBN: 978-81-317-2528-3.
- 4) Andrew S. Tanenbaum, "Modern Operating Systems", Prentice Hall of India Publication, 3rd Edition. ISBN: 978-81-203-3904-0.

**Web references:**

<https://pdos.csail.mit.edu/6.828/2018/xv6/book-rev11.pdf>





<b>Program:</b>	<b>B. Tech. CSE (AI &amp; ML)</b>			<b>Semester:</b>	<b>I</b>		
<b>Course:</b>	<b>Computer Organization &amp; Operating Systems lab</b>			<b>Code:</b>	<b>BCS21B03</b>		
<b>Teaching Scheme</b>				<b>Evaluation Scheme</b>			
<b>Practical</b>	<b>Tutorial</b>	<b>Credit</b>	<b>Hours</b>	<b>TW</b>	<b>PR</b>	<b>OR</b>	<b>Total</b>
<b>2</b>	<b>-</b>	<b>1</b>	<b>2</b>	<b>50</b>	<b>-</b>	<b>-</b>	<b>50</b>
<b>Course Objectives:</b> <ol style="list-style-type: none"> <li>1 To comprehend the basic functional units &amp; input-output system of computer organization.</li> <li>2 To learn the implementation of process management and its scheduling.</li> <li>3 To understand the concepts and implementation of memory management policies.</li> <li>4 To analyze and apply various page replacement policies used for paging.</li> </ol>							
<b>Course Outcomes:</b> After learning the course, students will be able to: <ol style="list-style-type: none"> <li>1. Comprehend functional units and input-output systems of CPU organization.</li> <li>2. Demonstrate basic Linux commands &amp; system calls to be used for Shell programming.</li> <li>3. Implement the various process management policies of CPU scheduling</li> <li>4. Demonstrate the concept of memory management and its allocation policies.</li> <li>5. Develop page replacement policies used for paging.</li> <li>6. Implement interprocess communication by simulating suitable approaches of process synchronization</li> </ol>							
<b>Guidelines for Students:</b> <ol style="list-style-type: none"> <li>1. The laboratory assignments should be submitted by students in the form of a journal.</li> <li>2. Each assignment write-up should have a title, objectives, outcomes, Theory- Concept in brief, dataset used, data description, conclusion, and assessor's signature.</li> <li>3. Program codes with sample output of all performed assignments should be submitted.</li> </ol>							
<b>Guidelines for Laboratory /TW Assessment:</b> <ol style="list-style-type: none"> <li>1. Continuous assessment of laboratory work is done based on the overall performance and laboratory performance of the students.</li> <li>2. Each laboratory assignment assessment should assign grade/marks based on parameters with appropriate weightage.</li> <li>3. Suggested parameters for overall assessment as well as each laboratory assignment assessment include- timely completion, performance, innovation, efficiency, punctuality, and neatness.</li> </ol>							
<b>Guidelines for Laboratory Conduction</b> <p>The suggested list of assignments is given below. Instructors can frame suitable assignments.</p> <p>All practical assignments are compulsory from Group A, any 5 from Group B.</p>							
<b>Assignment No.</b>	<b>Suggested List of Assignments</b>						
<b>GROUP A – Assignments based on Computer Organization and Basics of Operating Systems</b>							
1	<ol style="list-style-type: none"> <li>a. To study peripherals of a computer and its functions.</li> <li>b. To study and comprehend the CPU organization &amp; input- output system of computers.</li> </ol>						

2	To write a C program for the given problem statements to showcase the conversion between various number systems. a. Decimal to Binary and Binary to Decimal b. Decimal to Octal and Octal to Decimal c. Binary to Hexadecimal and Hexadecimal to Binary
3	To write a C program to implement Booth's algorithm for signed multiplication.
4	a. To study various system calls & demonstrate those with Linux commands: ls, cat, man, cd, touch, cp, mv, rmdir, mkdir, rm, chmod, pwd. b. Demonstration of the OS booting process. (LINUX)
5	Write a Shell program for the given problem statements: To find the factorial of a number. To check if the given year is leap year or not To check if the given number is even or odd.
6	To study and demonstrate the File / directory related system calls / library functions (read, write, open, close, lseek, opendir, readdir, closedir etc.)
<b>GROUP B – Assignments based on Operating Systems</b>	
7	To write a C program for implementation of scheduling algorithms - FCFS, SJF, Priority, Round Robin.
8	To write a C program to implement the Inter – Process Communication (IPC) technique.
9	To write a C program to implement the producer – consumer problem using semaphores.
10	To Write a C program to implement any memory allocation technique.
11	To write a C program for the implementation of the FIFO page replacement algorithm.
12	To write a C program for the implementation of the LRU page replacement algorithm.
13	To write a C program for implementation of SSTF disk scheduling algorithms.
14	To write a C program for implementation of FIFO disk scheduling algorithms.

**Text Books:**

1. W. Stallings , “Computer Organization & Architecture: Designing for Performance”, 10<sup>th</sup> Edition, 2016, Pearson Education/ Prentice Hall of India, ISBN-10: 0-13-410161-8 | ISBN-13: 978-0-13-410161-3 2.
2. Silberschatz A., Galvin P., Gagne G., “Operating System Concepts”, 9th Edition, John Wiley and Sons.

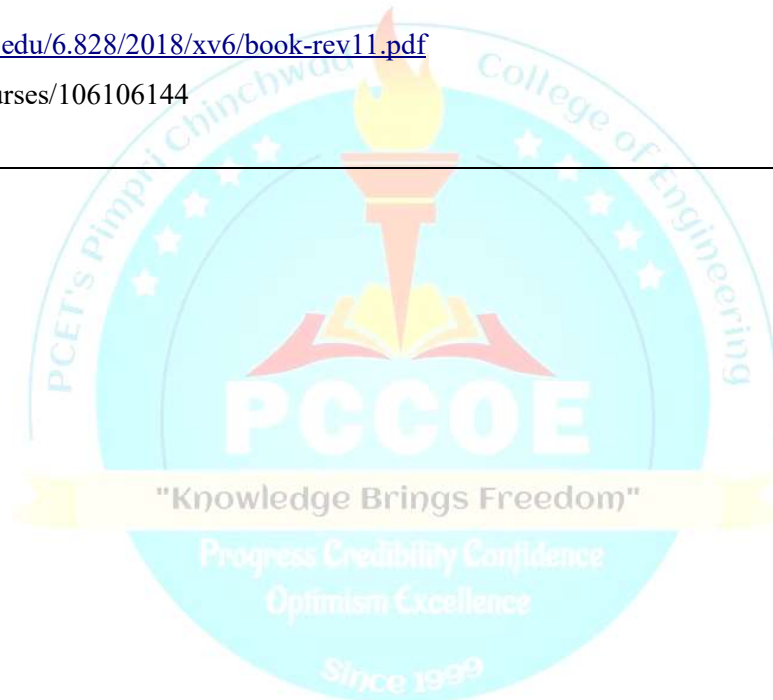
**Reference:**

1. Dhamdhare D., "Systems Programming and Operating Systems", McGraw Hill, ISBN 0 -07 -463579 – 4
2. Achyut S. Godbole, Atul Kahate; “Operating Systems”, 3rd Edition, McGraw Hill 2
3. Stallings W., "Operating Systems", 6th Edition, Prentice Hall, ISBN-978-81-317-2528-3.
4. Andrew S. Tanenbaum, “Modern Operating Systems”, Prentice Hall of India Publication, 3rd Edition. ISBN: 978-81-203-3904-0

**Web References**

<https://pdos.csail.mit.edu/6.828/2018/xv6/book-rev11.pdf>

<https://nptel.ac.in/courses/106106144>



<b>Program:</b>	<b>B. Tech. CSE (AI &amp; ML)</b>			<b>Semester:</b>	<b>I</b>		
<b>Course:</b>	<b>C Programming</b>			<b>Code:</b>	<b>BCS21G01</b>		
<b>Teaching Scheme</b>				<b>Evaluation Scheme</b>			
<b>Practical</b>	<b>Tutorial</b>	<b>Credit</b>	<b>Hrs</b>	<b>TW</b>	<b>PR</b>	<b>OR</b>	<b>Total</b>
<b>4</b>	<b>-</b>	<b>2</b>	<b>4</b>	<b>100</b>	<b>-</b>	<b>-</b>	<b>100</b>
<b>Course Objectives:</b>							
<ol style="list-style-type: none"> <li>1. To get acquainted with basics of C programming such as data types, variables, and operators.</li> <li>2. To learn decision controls and iterations using C programming constructs.</li> <li>3. To impart the concepts like array, string, pointers, functions, user defined data types and file handling.</li> <li>4. To develop a simple application using the C language.</li> </ol>							
<b>Course Outcomes:</b> After learning the course, students will be able to:							
<ol style="list-style-type: none"> <li>1. Develop a C program using basic elements like data types, variables and operators.</li> <li>2. Write the conditional blocks and loops in C programs using suitable constructs.</li> <li>3. Use C programming elements such as array, string, pointers, functions, user defined data types and file handling libraries.</li> <li>4. Develop an application based on real life examples using 'C' construct.</li> </ol>							
<b>Guidelines for Students:</b>							
<ol style="list-style-type: none"> <li>1. The laboratory assignments are to be submitted by students in the form of a journal.</li> <li>2. Each assignment write-up should have a title, objectives, outcomes, Theory- Concept in brief, dataset used, data description, conclusion, and assessor's signature.</li> <li>3. Program codes with sample output of all performed assignments should be submitted.</li> </ol>							
<b>Guidelines for Laboratory /TW Assessment:</b>							
<ol style="list-style-type: none"> <li>1. Continuous assessment of laboratory work is done based on the overall performance and laboratory performance of the students.</li> <li>2. Each laboratory assignment assessment should assign grade/marks based on parameters with appropriate weightage.</li> <li>3. Suggested parameters for overall assessment as well as each laboratory assignment assessment include- timely completion, performance, innovation, efficiency, punctuality, and neatness.</li> </ol>							
<b>Guidelines for Laboratory Conduction</b>							
<ol style="list-style-type: none"> <li>1. The suggested list of assignments is given below. Instructors can frame suitable assignments.</li> <li>2. All assignments are mandatory.</li> <li>3. In addition to these, instructors are supposed to assign one real life application in the form of a mini-project based on the concepts learned.</li> </ol>							
<b>Assignment No.</b>	<b>Suggested List of Assignments</b>						
1	Write a C program that uses relational operators to compare the temperatures of two cities to determine which one is hotter, colder, or if they have the same temperature.						
2	Consider you have created a website in which you are accepting details of users where you have to take password from the user. Write a C program to accept password from user with following condition: <ol style="list-style-type: none"> <li>1. Minimum characters 6 and maximum are 12.</li> <li>2. At least one digit and one character. At least one special symbol (@, \$, #).</li> </ol>						

3	Write a C program to 1. Check if the given number is even or odd. 2. Check if the given number is prime or not. 3. Check if the given number is palindrome or not. 4. Print fibonacci series up to n.
4	Write a C program using a while loop to simulate a dice rolling game. In this game, the player rolls a six-sided dice and accumulates points based on the roll until they choose to stop or roll a 1. The goal is to score as many points as possible without rolling a 1.
5	Write a C program to generate a simple calculator that demonstrates the use of decision control structures: switch statement.
6	Write a C program to manage a student's grades using an array. In this program, allow the user to enter the grades of five subjects for a student and then calculate the average grade.
7	Write a C program to find the length of a string, concatenate two strings, copy string using string library functions.
8	Write a C program to swap the values of two variables using pointers. In this scenario, imagine you are a teacher, and you want to swap the positions of two students in a class. You have the student names and their seat numbers stored in variables, and you want to swap their seats.
9	Write a C program using functions to simulate a simple banking system. Implement functions for depositing, withdrawing, and checking the account balance.
10	Write a C program that uses a structure to model a real-life example of a book record system. Define a structure to represent a book with attributes like title, author, and year of publication. Perform operations like adding a new book, displaying book details, and searching for a book by title.
11	Write a C program to perform file operations like create, open, read, write and close a file.
12	Design a mini project to implement any game or Smart Text editor or any suitable real time application using C programming constructs.

**Text Books:**

1. Yashavant Kanetkar, "Let Us C", BPB publications, 17th edition, 2020, ISBN-10: 9389845688.
2. Brian W Kernighan, Dennis M Ritchie, "C Programming Language", 2nd Edition, Pearson, 1988, ISBN: 9780133086249.
3. E. Balagurusamy, "Programming in ANSI C", McGraw Hill, 8th Edition, 2019, ISBN-13: 978-9351343202.

**Reference Books:**

1. Herbert Schildt, "C: The Complete Reference", McGraw Hill, 4th Edition, 2000, ISBN-13: 978-0072121247.
2. Maureen Sprankle, "Problem solving and programming concepts", Pearson, 7th Edition, 2011, ISBN-13: 978-0132492645.
3. R. G. Dromey, "How to Solve it by Computer", Prentice-Hall International, 1st Edition, 1982, ISBN-13: 978-0134340012.

**Web References**

1. [https://onlinecourses.nptel.ac.in/noc19\\_cs42/preview](https://onlinecourses.nptel.ac.in/noc19_cs42/preview)
2. <https://www.w3schools.com/c/>



<b>Program: B. Tech. CSE (AI &amp; ML)</b>				<b>Semester: I</b>			
<b>Course: HSMC-English</b>				<b>Code: BSH21H01</b>			
<b>Teaching Scheme</b>				<b>Evaluation Scheme</b>			
<b>Lecture</b>	<b>Practical</b>	<b>Tutorial</b>	<b>Credit</b>	<b>IE</b>	<b>MTE</b>	<b>ETE</b>	<b>Total</b>
<b>1</b>	<b>2</b>	<b>-</b>	<b>2</b>	<b>30</b>	<b>-</b>	<b>20</b>	<b>50</b>
<b>Prior knowledge:</b> 1. Basic Knowledge of English grammar. 2. Basic Vocabulary, Listening and Speaking Skills							
<b>Course Objectives:</b> This course aims at enabling students, 1. To develop basic LSRW skills for effective communication. 2. To develop a sense of confidence among students to present themselves at professional as well as societal level. 3. To enhance the language competence.							
<b>Course Outcomes:</b> After learning the course, the students will be able to 1. Understand the role of effective listening skills, grammar and vocabulary in effective communication. 2. Formulate grammatically correct sentences and Enrich their vocabulary 3. Demonstrate reading skills to comprehend various documents 4. Communicate effectively and enhance their phonetic skills.							
<b>Unit</b>	<b>Description</b>						<b>Duration (Hrs.)</b>
1	<b>Listening Skills:</b> Importance of Listening Skills, Listening and Hearing, Types of Listening: Active / Selective / Passive Listening, Barriers to Listening, Tips to Improve Listening Skills <b>Grammar &amp; Vocabulary:</b> Common Errors in Daily Discourse, Compound and Complex Sentences, Modal Auxiliaries. Processes of Word Formation, One Word Substitutions, Words often Confused, Usage of Business Phrases & Idioms.						3
2	<b>Writing Skills :</b> Elements of Effective Writing, Writing Styles (Formal & Informal), Paragraph Writing (Descriptive, Technical) <b>Professional Writing:</b> Job Application, Leave Application, Enquiry and Complaint Letter. Features of Technical Writing, Report Writing; Progress, Accident Report, Event Report.						4
3	<b>Reading Skills:</b> Importance of Reading, Scanning, Skimming, Reading between the Lines, Reading Comprehension: Factual / Expository / Informative texts, Case Studies, Reading Research Articles <b>Literary Reading:</b> 1 The Story of An Hour by Kate Chopin, 2 The Classical Student by Anton Chekhov 3 A Chameleon by Anton Chekhov.						4
4	<b>Speaking Skills:</b> Basic Sounds-IPA, Word Stress, Intonation, Language Functions (Requesting, Apologizing, Complaining, Complementing, Thanking, etc ) Art of Asking and Responding to Questions <b>Public Speaking:</b> Importance of Public Speaking, Art of Extempore & Presentations, Role Play, Delivering Welcome Speech, Vote of Thanks, Group Discussion.						4
						<b>Total</b>	<b>15</b>

<b>Practical/Lab Sessions</b>		
<b>Lab Session</b>	<b>Activities</b>	<b>Duration (Hrs)</b>
1	Listening 1: Listen to the audio and answer the questions (IELTS)	2
2	Listening 2 : Listen to the audio and Summarize (Ted Talks)	2
3	Grammar: Correct the sentences and understand the business usages.	2
4	Vocabulary: Different ways to improve vocabulary and activities	2
5	Writing Skills 1: Formal writing such as Job Application, Leave Application, Enquiry and Complaint Letter.	2
6	Writing Skills 2: Different Styles of writing and Paragraph Writing (Descriptive, Technical)	2
7	Writing Skills 3: Technical Writing, Report Writing; Progress, Accident Report, Event Report.	2
8	Reading Activity 1: Communication Case Studies	2
9	Reading Activity 2: IELTS based Comprehension Skills	2
10	Reading Activity 3: Research Articles and Technical Documents	2
11	Reading Activity 4: Literary Reading and Discussion	2
12	Speaking Activity 1: IPA Pronunciation and Phonetics Exercises	2
13	Speaking Activity 2: Delivering speeches and Mastering the Art of Public Speaking	2
14	Speaking Activity 3: Preparing and Participating Group Discussions / Elevator Speeches	2
15	Speaking Activity 4: Oral/PPT Presentation with Q&A Session	2
<b>Total</b>		<b>30</b>

**Text Books:** Raymond Murphy, Essential English Grammar in Use, Cambridge University Press; 2015

**Reference Books:**

1. Michael Swan, Practical English Usage, Oxford, 3rd Edition; 2005
2. David F. Beer, Writing and Speaking in the Technology Professions: A Practical Guide, Wiley-IEEE Press; 2nd Edition, 2003
3. Sunita Mishra, C. Muralikrishna, Communication Skills for Engineers, Pearson Education; 2011
4. Clifford Whitcomb, Leslie E. Whitcomb, Effective Interpersonal and Team Communication Skills for Engineers, Wiley-Blackwell; Nil edition, 2013.
5. Krishnaswami, N and Sriraman, T, Creative English for Communication, Macmillan.  
Saran Freeman, Written Communication in English, Orient Longman.



**E Sources -**

1. [https://www.google.com/url?q=https://onlinecourses.nptel.ac.in/noc19\\_hs19/&sa=D&source=editors&ust=1654924489543365&usg=AOvVaw0vW1A1-FXdmtGD4TbPCXo-](https://www.google.com/url?q=https://onlinecourses.nptel.ac.in/noc19_hs19/&sa=D&source=editors&ust=1654924489543365&usg=AOvVaw0vW1A1-FXdmtGD4TbPCXo-)
2. [https://www.google.com/url?q=https://onlinecourses.nptel.ac.in/noc19\\_hs22/&sa=D&source=editors&ust=1654924489545718&usg=AOvVaw1JiV6Z4RihjTKbm8Sd2HDC](https://www.google.com/url?q=https://onlinecourses.nptel.ac.in/noc19_hs22/&sa=D&source=editors&ust=1654924489545718&usg=AOvVaw1JiV6Z4RihjTKbm8Sd2HDC)
3. <https://takeielts.britishcouncil.org/take-ielts/prepare/free-ielts-practice-tests/listening/section-1>



<b>Program: B. Tech. CSE (AI &amp; ML)</b>				<b>Semester: I</b>			
<b>Course: HSMC-German</b>				<b>Code: BSH21H02</b>			
<b>Teaching Scheme</b>				<b>Evaluation Scheme</b>			
<b>Lecture</b>	<b>Practical</b>	<b>Tutorial</b>	<b>Credit</b>	<b>IE</b>	<b>MTE</b>	<b>ETE</b>	<b>Total</b>
<b>1</b>	<b>2</b>	<b>-</b>	<b>2</b>	<b>30</b>	<b>-</b>	<b>20</b>	<b>50</b>
<b>Prior Knowledge:</b> English Language							
<p><b>Course Objectives:</b> This course aims at enabling students,</p> <ol style="list-style-type: none"> <li>1. To get familiar with the basics of German language and develop their interest in the language.</li> <li>2. To get equipped with basic language skills, namely listening, speaking, reading, and writing for the purpose of socializing, providing and obtaining information.</li> <li>3. To develop inter cultural competence and understanding of perceptions, gestures, family, and community dynamics.</li> </ol>							
<p><b>Course Outcomes:</b> After learning the course, the students will be able to,</p> <ol style="list-style-type: none"> <li>1. Demonstrate understanding of simple texts in German</li> <li>2. Apply grammar rules to frame correct sentences in German</li> <li>3. Communicate in a simple manner in German</li> <li>4. Construct simple texts in German</li> </ol>							
<b>Unit</b>	<b>Description</b>						<b>Duration (Hrs.)</b>
1	<p><b>Building Vocabulary, Developing Listening and Reading Skills</b></p> <ul style="list-style-type: none"> <li>● Self-introduction, things of day-to-day use, Hobbies &amp; Free time, Food &amp; Beverages, Clock time &amp; Daily Routine, Living &amp; Working in Germany, Weather and Healthcare</li> <li>● Listen and understand short conversations, announcements, voice mail in German</li> <li>● Read and comprehend from instruction boards, advertisements, simple texts, short messages, letters and emails in German B64:B67</li> </ul>						3
2	<p><b>German Grammar and Sentence Structure</b></p> <ul style="list-style-type: none"> <li>● Personal Pronouns: Singular and Plural</li> <li>● Verbs and Verb-Conjugation: regular, irregular, mixed, separable, modal auxiliaries</li> <li>● Types of Articles: definite, indefinite, negative, possessive</li> <li>● Cases: nominative, accusative, dative</li> <li>● Types of the sentences: declarative, interrogative, imperative</li> <li>● Basic German conjunctions: and, or, but, because</li> </ul>						4
3	<p><b>Speaking Skills</b></p> <ul style="list-style-type: none"> <li>● Spelling and pronunciation</li> <li>● Asking for and giving simple information</li> <li>● Requesting and responding to requests</li> <li>● Learning simple German dialogues and speaking with expression</li> <li>● Role play: Presenting a simple dialogue on given situation</li> </ul>						4

4	<b>Writing Skills</b> <ul style="list-style-type: none"> <li>● Building words and simple sentences</li> <li>● Filling up personal information in very simple forms (e.g. name, address, etc)</li> <li>● Using punctuation marks correctly in given texts</li> <li>● Correcting errors in given draft</li> <li>● Writing simple texts, short messages, letters and emails on given topics</li> </ul>	4
<b>Total</b>		<b>15</b>
<b>Practical/Lab Sessions</b>		
Lab Session	Activities	Duration (Hrs)
1	<b>Vocabulary 1:</b> Exercises to recall and enhance vocabulary	2
2	<b>Listening 1:</b> Listen to the audio and repeat (phonetics)	2
3	<b>Listening 2:</b> Listen to the audio and select the correct option (A1 practice)	2
4	<b>Vocabulary 2:</b> Exercises to recall and enhance vocabulary	2
5	<b>Reading 1:</b> Read short texts and fill up the information in table	2
6	<b>Reading 2:</b> Read short texts and mark true or false (A1 practice)	2
7	<b>Reading 3:</b> Read short texts and answer the questions	2
8	<b>Grammar 1:</b> Solve simple grammar exercises	2
9	<b>Grammar 2:</b> Construct correct sentences by applying grammar rules	2
10	<b>Speaking 1:</b> Spell and pronounce the words correctly (A1 practice)	2
11	<b>Speaking 2:</b> Give your short introduction (A1 practice)	2
12	<b>Speaking 3:</b> Frame simple questions, requests and reply (A1 practice)	2
13	<b>Writing 1:</b> Fill up simple data in forms (A1 practice)	2
14	<b>Writing 2:</b> Correct errors in given draft	2
15	<b>Writing 3:</b> Write simple texts, short messages, emails and letters (A1 practice)	2
<b>Total</b>		<b>30</b>
<b>Text Books:</b>		
Netzwerk A1: Dengler, Rusch, Schmitz, Sieber, Ernst Klett Sprachen, Stuttgart Germany, Goyal Publishers & Distributors, Delhi, 2015		
<b>Reference Books:</b>		
1) Linie 1: Kaufmann, Moritz, Rodi, Rohrmann, Sonntag, Klett-Langenscheidt GmbH, München Germany, Goyal Publishers & Distributors, Delhi, 2018		
2) Tangram aktuell 1: Dallapiazza, Eduard von Jan, Schönherr, Max Hueber Verlag, Ismaning, Germany, Goyal Publishers & Distributors, Delhi, 2005		
<b>E-sources:</b>		
1) NPTEL Course lectures (IIT Madras) link: <a href="https://onlinecourses.nptel.ac.in/noc23_hs98/preview">https://onlinecourses.nptel.ac.in/noc23_hs98/preview</a>		
2) Udey Course lectures link: <a href="https://www.udemy.com/topic/german-language/free/">https://www.udemy.com/topic/german-language/free/</a>		

<b>Program: B. Tech. CSE (AI &amp; ML)</b>				<b>Semester: I</b>			
<b>Course: HSMC-Japanese</b>				<b>Code: BSH21H03</b>			
<b>Teaching Scheme</b>				<b>Evaluation Scheme</b>			
<b>Lecture</b>	<b>Practical</b>	<b>Tutorial</b>	<b>Credit</b>	<b>IE</b>	<b>MTE</b>	<b>ETE</b>	<b>Total</b>
<b>1</b>	<b>2</b>	<b>-</b>	<b>2</b>	<b>30</b>	<b>-</b>	<b>20</b>	<b>50</b>
<b>Prior Knowledge:</b> English/Marathi/Hindi language for learning Japanese language.							
<b>Course Objectives:</b> This course aims at enabling students							
1. To be aware of Japanese scripts (Hiragana, Katakana) and basic Kanjis.							
2. To familiarize themselves with the Japanese language and use basic greetings in day-to-day life.							
3. To develop language skills namely listening, speaking, reading and writing skills for socializing, providing and obtaining information.							
4. To express themselves using basic sentences and develop cross cultural skills and understanding of gestures, family and community, perceptions.							
<b>Course Outcomes:</b> After learning the course, the students will be able to							
1. Understand Japanese scripts through oral and written communication							
2. Explore Japanese culture and etiquettes							
3. Express themselves by using simple sentences and responses to questions							
4. Develop language skills namely speaking, reading and writing skills for providing and obtaining Information.							
<b>Unit</b>	<b>Description</b>						<b>Duration (Hrs.)</b>
1	<b>Introduction: Hiragana Script.</b> <ul style="list-style-type: none"> <li>● Listening: Short video skit on self-introduction.</li> <li>● Speaking: Song of greetings.</li> <li>● Reading: Hiragana words</li> <li>● Writing: Japanese scripts (Hiragana)</li> <li>● Test on Hiragana</li> </ul>						3
2	<b>Katakana script</b> <ul style="list-style-type: none"> <li>● Listening: English words</li> <li>● Speaking: Song on body parts.</li> <li>● Reading: Katakana words</li> <li>● Writing: Locating countries on map, Wordhunt.</li> <li>● Grammar: Test on Katakana.</li> </ul>						4
3	わたしはマイク. ミラーです。 <ul style="list-style-type: none"> <li>● Speaking: Self-introduction</li> <li>● Listening: Conversation based on L-1</li> <li>● Writing: Writing about yourself.</li> <li>● Reading: Lesson reading no.-1</li> <li>● Grammar: Introduction to 1. particles (は、か、も、か)</li> </ul> 2. Verb (です、ではありません)						4

4	<p>これからお世話になります。</p> <ul style="list-style-type: none"> <li>● Speaking:Greetings.</li> <li>● Listening: Conversation based on L-2</li> <li>● Writing: Numbers (0- 100) in Japanese.</li> <li>● Reading: Lesson reading no.2</li> <li>● Grammar:(past,negativeform),</li> <li>● Introduction to 12, questioning words(なん、だれ、どなた).</li> <li>● 2.この、その、あの、どの3.Particleの</li> <li>● Test on grammar</li> </ul>	4
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**Total**      **15**

### Practical/Lab Sessions

Lab Session	Activities	Duration (Hrs)
1	<b>Speaking skill 1:</b> Japanese greetings	2
2	<b>Writing Skill 1:</b> Hiragana script	2
3	<b>Listening Skill 1:</b> Writing 'Hiragana' words	2
4	<b>Reading Skill 1:</b> Reading and recognizing 'Hiragana' words	2
5	<b>Writing Skill 2:</b> World map activity	2
6	<b>Reading Skill 2:</b> Reading 'Katakana' words	2
7	<b>Speaking Skill 2:</b> Self introduction	2
8	<b>Writing Skill 3:</b> Basic sentence formation using grammar.	2
9	<b>Reading Skill 3:</b> Chapter-1 reading	2
10	<b>Listening Skill 3:</b> Conversation in the office.	2
11	<b>Speaking Skill 3:</b> Dialogues between people of different nationality.	2
12	<b>Writing Skill 4:</b> Writing Japanese numbers using 'Hiragana' and 'Kanjis'.	2
13	<b>Reading Skill 4:</b> Chapter-2 reading	2
14	<b>Listening Skill 4:</b> Listening to Days of the week and dates of the month	2
15	<b>Speaking Skill 4:</b> Daily routine using verbs.	2
<b>Total</b>		<b>30</b>

**Textbook:**

1. Minna no Nihongo Part I and II Publication: Goyal Publishers & Distributors Pvt.Ltd. , Author: Tsuruo Yoshiko (Compiled) , Edition: 2018
2. NihongoShoho Publication: JALTAP , Author: JALTAP(With permission of Japan Foundation, Tokyo), Edition: April 2008

**Reference Books:**

- 1.Genki1 Author: Eri Banno,YokoSakane,YutakaOhno,ChikakoShinagawa,and Kyoko Tokashiki. Publication: The Japan Times. Edition: 2011
2. MOMO Author: Japan Foundation, New Delhi, Publication: Goyal Publisher & Distributors (P) Ltd., Edition: October 2007

3. MOMO Japanese work book Japan Foundation, New Delhi, Publication: Goyal Publisher & Distributors (P) Ltd., Edition: October 2007
4. MOMO Japanese workbook Japan Foundation, New Delhi, Publication: Goyal Publisher & Distributors (P) Ltd., Edition: October 2007



<b>Program: B. Tech. CSE (AI &amp; ML)</b>				<b>Semester: I</b>			
<b>Course: HSMC-Business Storytelling</b>				<b>Code: BSH21H04</b>			
<b>Teaching Scheme</b>				<b>Evaluation Scheme</b>			
<b>Lecture</b>	<b>Practical</b>	<b>Tutorial</b>	<b>Credit</b>	<b>IE</b>	<b>MTE</b>	<b>ETE</b>	<b>Total</b>
<b>1</b>	<b>2</b>	<b>-</b>	<b>2</b>	<b>30</b>	<b>-</b>	<b>20</b>	<b>50</b>
<b>Prior Knowledge:</b> Basic competence of English language.							
<p><b>Course Objectives:</b> This course aims at enabling students,</p> <ol style="list-style-type: none"> <li>1. To understand storytelling as one of the tools of influential communication.</li> <li>2. To strengthen their creativity, critical thinking and social skills.</li> <li>3. To use stories to face leadership, management and professional challenges.</li> </ol>							
<p><b>Course Outcomes:</b> After learning the course, the students will be able to</p> <ol style="list-style-type: none"> <li>1. Identify nuances of storytelling method as an influential communication</li> <li>2. Demonstrate the ability to engage and inspire others through the development of narratives, tone and style</li> <li>3. Apply storytelling techniques to communicate effectively in a business context</li> <li>4. Develop stories to build, maintain professional relationships, deliver messages and motivate others toward action.</li> </ol>							
<b>Unit</b>	<b>Description</b>						<b>Duration (Hrs.)</b>
1	<p><b>Concept and Scope:</b> What is a story? A Brief History &amp; Importance of Storytelling, Basics of Storytelling - Entertainment, Engagement, Personalization, Critical Thinking, Observation Skills in Storytelling, Benefits of Storytelling, Storytelling in Engineering, Business Storytelling, Activity: Analysis of Steve Jobs Commencement Speech at Stanford (2005)</p>						3
2	<p><b>Process of Storytelling:</b>Elements of a Story - Context and Relevance, Style and Detailing, Plot, and Characters, The Flow of the Story - Relevance - Action - Result, Know the Purpose - Inspire Action, Educate People, Showcase Values, Build Collaboration, Know your Audience - Educational, Social Background and Age, Developing Narratives: Characteristics of a Narrative, Data Visualization, Presenting a Word Picture, Triggering Emotions of the Audience, Choosing Media - Audio, Written, Oral and Digital Storytelling <b>Activity:</b> Analysis of a Short Story: ‘<b>The Three Hermits by Leo Tolstoy</b>’, <b>The Last Painting by O’ Henry</b></p>						4
3	<p><b>Types of Stories</b> - Customer Story, Origin Story, Event Story, Product Stories, Storytelling Techniques for Presentations, Using Power Words Effectively, Using Narratives to Manage Conflicts, Using a Narrative to Interpret the Past and Shape the Future, Storytelling in Marketing, Story Strategies - Using Anchor Stories <b>Case studies</b> - Brand storytelling -Steve Jobs / Jack Maa - Product Presentation, Lido Anthony "Lee" Iacocca.</p>						4

4	<p><b>Crafting a Story</b>          Crafting a Story from a Picture/an Idea/Situation/Artifacts, Storyline - Beginning / Motive / Struggle / Achievement, Six-word Story - Memoirs to Being with, Detailing of Character and the Context, Delivering a Story – Tone / Emotions / Voice Modulation  <b>Activity</b>-Developing and Delivering Presentation through Storytelling on the Given Situation/Context</p>	4
<b>Total</b>		<b>15</b>
<b>Practical/Lab Sessions</b>		
<b>Lab Session</b>	<b>Activities</b>	<b>Duration (Hrs)</b>
1	Basic of Storytelling: Using Five Senses in storytelling activity and Elements of Storytelling	2
2	Analysis of a Short Story: ‘The Three Hermits by Leo Tolstoy’, and The Last Painting by O’ Henry.	2
3	Character Study: Create a detailed character profile of a fictional character, including their background, motivations, and personality traits. Write a short story or scene that showcases this character in action	2
4	Personal Storytelling: Write and present a short personal story that highlights a challenge you’ve faced and how you overcame it	2
5	Collaborative Storytelling: Partner with another student to create a collaborative story. Take turns writing alternating sections, focusing on maintaining a consistent tone and narrative flow. "Knowledge Brings Freedom"	2
6	Historical Business Story: Research and narrate a significant historical event or moment in a well-known business's journey, focusing on how storytelling played a role in shaping public perception	2
7	Social Impact Story: Develop a story that demonstrates how a business initiative or project positively impacted a community or addressed a social issue	2
8	Customer Success Story: Craft a narrative that showcases a customer's journey with your fictional business	2
9	Change Management Story: Design a narrative that communicates a change initiative within a company, addressing challenges, resistance, and the ultimate benefits of the change	2
10	Investor Pitch Story: Craft a persuasive story for a startup pitch. Highlight the problem, solution, market opportunity, and potential for growth in a captivating way	2
11	Leadership Story: Compose a story that illustrates effective leadership qualities and strategies. Highlight a leader's ability to motivate, inspire, and guide a team toward success	2



12	Cultural Storytelling: Explore how storytelling can bridge cultural gaps in a global business context. Share a story that demonstrates cultural sensitivity and understanding	2
13	Ethical Dilemma Story: Present a complex ethical dilemma faced by a business or individual. Use storytelling to explore various perspectives and potential solutions	2
14	Marketing Campaign Story: Design a storytelling-based marketing campaign for a specific product or service launch, incorporating different media and channels	2
15	Crisis Turnaround Story: Narrate a scenario where a business successfully navigated a crisis through strategic communication and storytelling, ultimately regaining trust and reputation.	2
<b>Total</b>		<b>30</b>

**Text Books:** 1. Kendall Haven, Story Smart, Libraries Unlimited, 2014

**Reference Books:**

1. Kendall Haven, Story Proof, Libraries Unlimited, 2007.
2. Rob Biesenbach, Unleash the Power of Storytelling: Win Hearts, Change Minds, Get Results, Eastlawn Media, 2018.
3. Yiannis Gabriel, Storytelling in Organizations: Facts, Fictions, and Fantasies, Oxford University Press, 2011.

**E-resources:**

1. The Art of Business Storytelling | AmeenHaque | Talks at Google , <https://www.youtube.com/watch?v=77FUr6ZsWjY>
2. Marketing Storytelling - <https://www.referralcandy.com/blog/storytelling-examples/>
3. 5 examples of great storytelling from Jack Ma <https://www.youtube.com/watch?v=3nHOxONWfEs>
4. Six words story - Nicole Kahn <https://www.youtube.com/watch?v=16sY1iLc2d4>
5. Kevin Hart - Telling great stories [https://www.youtube.com/watch?v=vn\\_L4OPU\\_rg](https://www.youtube.com/watch?v=vn_L4OPU_rg)

<b>Program: B. Tech. CSE (AI&amp;ML)</b>				<b>Semester: I</b>			
<b>Course: Life Skills 1</b>				<b>Code: BSH21K01</b>			
<b>Teaching Scheme</b>				<b>Evaluation Scheme</b>			
<b>Lecture</b>	<b>Practical</b>	<b>Tutorial</b>	<b>Credit</b>	<b>TW</b>	<b>Practical</b>	<b>Oral</b>	<b>Total</b>
-	4	-	2	100	-	-	100
<b>Prior Knowledge: -Nil</b>							
<b>Course Objectives:</b> 1. To equip them with essential skills and knowledge that complement their academic education, preparing them to excel not only as engineers but also as well-balanced individuals 2. To develop students' vital life skills that promotes personal growth, resilience, and success in their academic journey and beyond							
<b>Course Outcomes:</b> Students will be able to 1. Understand the true essence of happiness by being harmony with oneself. 2. Explore skills to get along with others to create and maintain healthy relationships. 3. Apply different ways of rational thinking. 4. Develop emotional intelligence.							
<b>Unit</b>	<b>Description</b>						<b>Duration (Hrs.)</b>
1	<b>Happy You, Happy Life!</b> (i) Healthy Mind - Music Therapy, Yoga, Meditation, Happiness and Success. (ii) Self-Awareness - Know your personality, Develop your Self- Esteem, Johari Window, SWOT, Setting goals for yourself (SMART). (iii) Healthy Lifestyle - Nutrition, Significance of Physical Activity in Daily routine.						15
2	<b>Building Relationships</b> (i) People Skills - Networking, Developing Healthy Relationships, Collaboration, Reliability, Respectfulness, Open- Mindedness (ii) Effective Communication in Relationships-My Relationship Web, Relationship Recipe, Active Listening and Conflict Resolution (iii) Embracing Diversity: Respect for Different Perspectives and Cultures.						15
3	<b>The Reflective Engineer</b> (i) Critical Thinking - Fact or Fiction, Convergent & Divergent Thinking(ii) Creative Thinking - Imagination, Formulate and Articulate Ideas(iii) Perspective Thinking – Understanding others view Points, Respecting Others Opinions(iv) Decision Making – Rational, Analytical & Ethical Solutions.						15

4	<p><b>You CAN DO IT...</b></p> <p>(i) Managing Stress - Good Stress , Bad Stress, Anxiety</p> <p>(ii) Managing time - Planning, Prioritization, Delegation, Productivity and Positivity</p> <p>(iii) Managing Emotions – Self- Regulation, Self-Motivation, Empathy, Assertiveness, Anger Management</p> <p>(iv) Handling Peer Pressure- Types of Peer Pressure: Spoken Peer Pressure, Unspoken Peer Pressure, Direct Peer Pressure, Indirect Peer Pressure, Positive Peer Pressure, Negative Peer Pressure.</p>	15
<b>Total</b>		<b>60</b>

### Reference Books

1. The 7 Habits of Highly Effective Teens" by Sean Covey Publisher: Simon & Schuster, 2017
2. How to Win Friends and Influence People" by Dale Carnegie Publisher: Simon & Schuster. 2020
3. Emotional Intelligence: Why It Can Matter More Than IQ" by Daniel Goleman Publisher: Bantam Books, 2021
4. Mindset: The New Psychology of Success" by Carol S. Dweck Publisher: Ballantine Books, 2019
5. The Power of Habit: Why We Do What We Do in Life and Business" by Charles Duhigg Publisher: Random House, 2016

### Weblinks

1. Psychology Today ([www.psychologytoday.com](http://www.psychologytoday.com)): Psychology Today publishes articles and insights from psychologists and mental health experts that can be useful for improving life skills and emotional intelligence.
2. Lifehack ([www.lifehack.org](http://www.lifehack.org)): Lifehack shares practical tips, techniques, and advice on personal development, productivity, and life skills improvement.
3. Coursera ([www.coursera.org](http://www.coursera.org)): Coursera offers online courses on various life skills topics, often provided by universities and experts, to help individuals develop essential skills

"Knowledge Brings Freedom"

Progress Credibility Confidence

Optimism Excellence

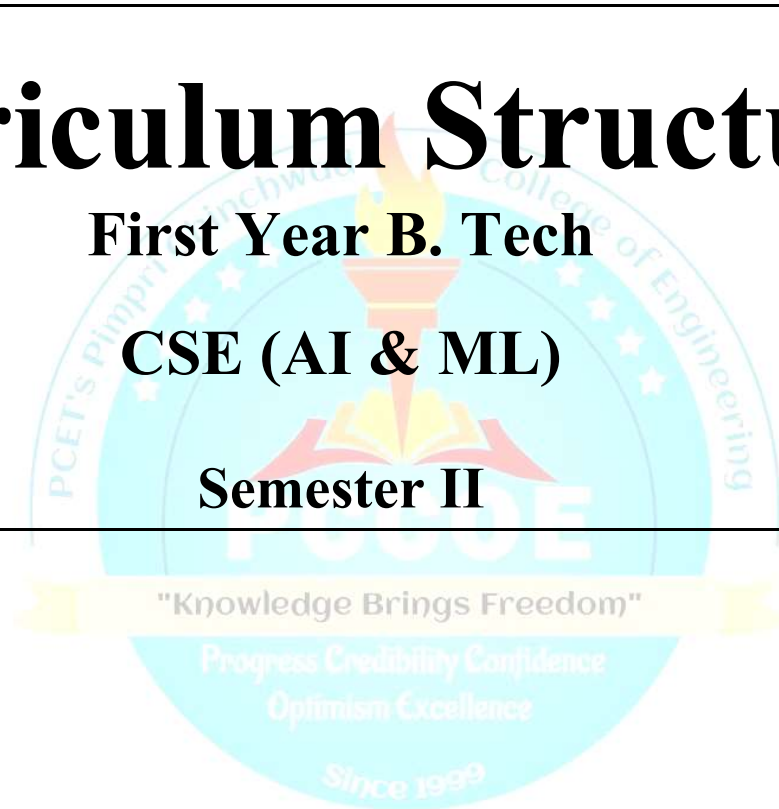
Since 1999

# Curriculum Structure

**First Year B. Tech**

**CSE (AI & ML)**

**Semester II**



<b>Program:</b> B. Tech. CSE (AI&ML)		<b>Semester:</b> II					
<b>Course:</b> Multivariate Calculus		<b>Code:</b> BSH22A06					
<b>Teaching Scheme</b>			<b>Evaluation Scheme</b>				
<b>Lecture</b>	<b>Practical</b>	<b>Tutorial</b>	<b>Credit</b>	<b>IE</b>	<b>MTE</b>	<b>ETE</b>	<b>Total</b>
2	-	1*	3	20	30	50	100
<b>Prerequisite:</b>							
<ol style="list-style-type: none"> <li>Elementary Mathematics.</li> <li>Elementary Calculus</li> </ol>							
<b>Course Objectives:</b>							
<ol style="list-style-type: none"> <li>To strengthen the concepts of multivariable calculus and its application in maxima &amp; minima, error &amp; approximation area, volume</li> <li>To make students acquainted with advanced techniques to evaluate integrals.</li> </ol>							
<b>Course Outcomes:</b> After learning the course, the students will be able to:							
<ol style="list-style-type: none"> <li>Evaluate Partial Differentiation and apply the concept of partial differentiation to find Maxima &amp; Minima and Error &amp; Approximation.</li> <li>Solve for First order and first degree partial differential equations.</li> <li>Understand definite improper integrals like Gamma, Beta function, DUIS.</li> <li>Apply multiple integration techniques to analyze Area, Volume.</li> </ol>							
<b>Unit</b>	<b>Description</b>						<b>Duration (Hrs)</b>
<b>I</b>	<b>Partial Differentiation:</b> Partial derivatives, Composite function, Chain Rule, variable to be treated as constant, total derivatives. Euler's theorem for homogeneous functions. <b>Application of Partial derivatives:</b> Jacobian for explicit function, Errors and Approximations, Maxima and Minima of two variable functions.						<b>9</b>
<b>II</b>	<b>Partial Differential Equation(PDE):</b> Definition of PDE, order and degree of PDE, Formation of PDE, Classification of PDE, Initial and Boundary value problems, Solution of First order Partial differential equations.						<b>6</b>
<b>III</b>	<b>Integral Calculus:</b> Beta and Gamma functions, differentiation under integral sign (DUIS).						<b>6</b>
<b>IV</b>	<b>Multiple Integral:</b> Double integration, conversion into polar form, application of double integration to the area, Triple integration, Dirichlet's theorem, application of triple integration to Volume.						<b>9</b>
	<b>Total</b>						<b>30</b>
	*Tutorial will be conducted in the batches as 1 hr/batch/week						
<b>Sr. No.</b>	<b>List of Tutorials</b>						
1	Partial derivatives basic rules, Mixed partial derivatives & properties ;						
2	Euler's theorem on Homogeneous Functions and deductions;						
3	Examples on variables to be treated as constant, Composite functions;						
4	Definition of Jacobian, Jacobian of explicit functions;						

5	Errors & Approximations, problem solving;	
6	Maxima and minima of functions of two variables;	
7	Partial differential equation formation, classification,	
8	Solution of first order first degree	
9	Beta, Gamma Function & its properties;	
10	Differentiation under integral sign & Problems;	
11	Concept of Double Integration and problem Solving;	
12	Application of double integration to find Area;	
13	Concept of Triple integration and problem Solving;	
14	Dirichelet's theorem and Problems;	
15	Application of triple integration to find Volume;	
<b>Text Books:</b>		
<ol style="list-style-type: none"> <li>Higher Engineering Mathematics by B.V. Ramana (Tata McGraw-Hill).</li> <li>Advanced Engineering Mathematics by Erwin Kreyszig (Wiley Eastern Ltd.)</li> </ol>		
<b>Reference Books:</b>		
<ol style="list-style-type: none"> <li>Higher Engineering Mathematics, 22e, by H. K. Das (S. Chand Publication, Delhi).</li> <li>Advanced Engineering Mathematics, 4e, by S.R.K. Iyengar, Rajendra K. Jain (Alpha Science International, Ltd).</li> <li>Advanced Engineering Mathematics, 7e, by Peter V. O'Neil (Thomson Learning).</li> <li>Advanced Engineering Mathematics, 2e, by M. D. Greenberg (Pearson Education).</li> <li>Higher Engineering Mathematics by B. S. Grewal (Khanna Publication, Delhi).</li> </ol>		

<b>Program:</b>		<b>B. Tech. CSE (AI&amp;ML)</b>		<b>Semester:</b>		<b>II</b>	
<b>Course: Engineering Chemistry</b>				<b>Code: BSH22A04</b>			
<b>Teaching Scheme</b>				<b>Evaluation Scheme</b>			
<b>Lecture</b>	<b>Practical</b>	<b>Tutorial</b>	<b>Credit</b>	<b>IE</b>	<b>MTE</b>	<b>ETE</b>	<b>Total</b>
3	-	-	3	20	30	50	100
<b>Prior knowledge of:</b>							
<ol style="list-style-type: none"> <li>1. Structure of water.</li> <li>2. Volumetric analysis.</li> <li>3. electromagnetic radiations.</li> <li>4. Classification and properties of polymers.</li> <li>5. Fossil and derived fuels.</li> <li>6. Corrosion and its effects.</li> <li>7. Electrochemical series.</li> </ol>							
<b>Course Objectives:</b>							
<ol style="list-style-type: none"> <li>1. To familiarize students with instrumental methods for qualitative and quantitative analysis and explore the importance of green chemistry.</li> <li>2. To lead students to investigate the advancement in engineering materials, batteries and structural elucidation by spectroscopy.</li> <li>3. To build consciousness about the recent development in alternate energy sources and corrosion control.</li> <li>4. To develop experimental skills and thereby forge their conceptual lucidity.</li> </ol>							
<b>Course Outcomes:</b> After learning the course, students will be able to							
<ol style="list-style-type: none"> <li>1. Analyze the water quality, interpret techniques of water purification and compare green over traditional synthesis of polycarbonate.</li> <li>2. Apply basic principles of various electro-analytical techniques for qualitative and quantitative analysis and understand battery technology.</li> <li>3. Apply the principles, instrumentation of UV &amp; IR spectroscopy for structural elucidation.</li> <li>4. Perceive the fuel quality and understand the scope of derived alternate fuels</li> <li>5. Relate the preventive methods of corrosion to real-life problems.</li> <li>6. Interpret the chemical structure, properties and synthesis of various polymers and nanomaterials and their uses.</li> </ol>							
<b>Unit</b>	<b>Description</b>						<b>Duration (Hrs)</b>
I	<b>Water Technology and Green Chemistry:</b> a) Hardness of water, its types, units of hardness and hardness calculation. Chemical analysis of water by determination of hardness by EDTA method. Alkalinity of water and its determination. Numerical on EDTA method and alkalinity. Disadvantages of hard water in boilers. Water softening techniques: Permutit and Ion exchange method. Dissolved oxygen (DO), biological oxygen demand (BOD) and Chemical oxygen demand (COD). b) Introduction of Green Chemistry: Definition, goals, principles and green synthesis of Polycarbonate.						9
II	<b>Instrumental Analysis and battery technology.</b> a) Electrochemistry: fundamentals of an electrochemical cell, EMF of cell, reference and indicator electrodes and Nernst Equation. b) Basic principles, instrumentation and applications of :- i) Conductometry: Introduction, Kohlrausch's law, measurement of conductance and conductometric titrations of strong acid versus strong base, strong acid versus weak base and weak acid versus strong base. ii) pH-metry: theory of buffers and preparation, standardization of pH-meter, titration of weak acid versus strong base, simple and differential plots.						7

	<p>iii) Potentiometry: Introduction, principle and application: potentiometric titration of <math>\text{Fe}^{2+}</math> versus <math>\text{Ce}^{4+}</math> along with simple and differential plots.</p> <p>Battery technology and Fuel Cell: introduction and types of batteries, construction, working and applications of Lithium ion battery, charging and discharging reactions at respective electrodes. <math>\text{H}_2</math>- <math>\text{O}_2</math> fuel cell.</p>	
III	<p><b>Spectroscopic techniques: Ultra Violet and Infrared spectroscopy</b></p> <p>a) UV Spectroscopy: nature of electromagnetic radiation and its characteristics. Interaction of matter with UV radiations leading to different electronic transitions. Beer's &amp; Lambert's law, their derivations and applications. Instrumentation of UV -Visible spectrophotometer. Terms used in UV spectroscopy-chromophore, auxochrome, bathochromic shift (red shift), hypochromic shift (blue shift), hyper chromic and hypochromic effect.</p> <p>b) IR spectroscopy: principle, types of vibrations (stretching and bending), Different regions of IR spectrum such as fundamental group region, finger print region and aromatic region. Applications of IR spectroscopy.</p>	8
IV	<p><b>Fuels and combustion</b></p> <p>a) Fuels: definition, calorific value and its units. Calorific value (CV), gross calorific value (GCV), net calorific value (NCV). Determination of calorific value - Bomb calorimeter, Boy's calorimeter and numerical.</p> <p>i) Solid fuels: coal, proximate and ultimate analysis of coal, numerical based on analysis of coal. ii) Liquid fuels: composition of petroleum, refining of petroleum. Synthesis, properties, advantages and disadvantages of Power alcohol and Biodiesel.</p> <p>iii) Gaseous fuels: Hydrogen gas as a future fuel, production by steam reforming of methane and by electrolysis of water. Challenges in storage and transportation of <math>\text{H}_2</math> gas.</p> <p>b) Combustion: chemical reactions, calculations on air requirement for combustion.</p>	8
V	<p><b>Corrosion and Corrosion control</b></p> <p>a) Corrosion: introduction, types of corrosion, mechanism of atmospheric corrosion and wet corrosion. Galvanic series. Factors affecting corrosion: nature of metal and nature of environment. Different types of corrosion: Pitting corrosion, concentration cell corrosion, stress corrosion and soil corrosion.</p> <p>b) Corrosion control: methods of prevention of corrosion - cathodic and anodic protection, metallic coatings and its types - anodic and cathodic coatings. Method to apply metallic coatings - hot dipping, cladding, electroplating and cementation.</p>	6
VI	<p><b>Chemistry of Polymers and Novel Carbon Compounds</b></p> <p>a) Polymers: definition, classification of polymers on the basis of thermal behavior, properties of polymers: degree of polymerization, crystallinity, <math>T_g</math> &amp; <math>T_m</math> and factors affecting <math>T_g</math>. Polymerization and its types. Advanced polymeric materials: Structure, properties and applications of liquid crystal polymer – Kevlar, conducting polymers - Polyacetylene, electroluminescent polymer – PPV and biodegradable polymers – PHBV.</p> <p>b) Nanomaterials: definition, types of nanomaterials and properties of nanomaterials. Quantum dots: Types, properties and applications of QDs. Structure properties and applications of Graphene and Carbon Nano Tubes (CNTs).</p>	7
<b>Total</b>		<b>45</b>
<p><b>Text Books:</b></p> <ol style="list-style-type: none"> <li>1. Engineering Chemistry by S.S. Dara, S.Chand Publications (2010).</li> <li>2. Engineering Chemistry by B.S. Chauhan, UnivScPress.(2015).</li> <li>3. A TextBook Of Engineering Chemistry by ShashiChawla, DhanpatRai&amp; Co. (2015).</li> <li>4. Spectroscopy of Organic Compounds by P. S. Kalsi, New Age International (2007).</li> <li>5. Nanotechnology: principles and practices by S.K. Kulkarni, Springer (2014).</li> <li>6. Instrumental methods of Chemical Analysis by GurdeepChatwal, Himalaya publishing house (1996).</li> <li>7. Engineering Chemistry by Jain and Jain, DhanpatRai Publishing Co.(2016).</li> </ol>		



8. Engineering Chemistry by Wiley India (2012).
9. Engineering Chemistry by O.G. Palanna, McGraw-Hill Education.
10. Introduction to Nanoscience and Nanotechnology by K. K. Chattopadhyay, A. N. Banerjee. PHI Learning (2009).

**Reference Books:**

1. Hydrogen as a fuel by Ram D. Gupta, C.R.C.Publication (2009).
2. Instrumental Methods of Analysis by H. H. Willard, L. L. Merritt, J. A. Dean, F. A. Settle, 6 th Edition, CBS Publisher.
3. Organic Spectroscopy by William Kemp, 3 rd edition, , John Wiley and Sons, Palgrave publication.
4. Polymer Science by V.R.Gowariker,, New Age International Publication (2015).
5. Nanotechnology by T. Gregory, Springer Verlog New York (1999).
6. Introduction to Nanotechnology by Charles P. Poole, Frank Owens, John Wiley & Sons (2003)
7. Engineering Chemistry by Wiley India Pvt.Ltd,First edition 2011.



<b>Program:</b>		<b>B. Tech. CSE (AI&amp;ML)</b>		<b>Semester:</b>		<b>II</b>	
<b>Course: Engineering Chemistry Laboratory</b>				<b>Code :BSH22A05</b>			
<b>Teaching Scheme</b>				<b>Evaluation Scheme</b>			
<b>Lecture</b>	<b>Practical</b>	<b>Tutorial</b>	<b>Credit</b>	<b>TW</b>	<b>OR</b>	<b>PR</b>	<b>Total</b>
-	2	-	1	50	-	-	50
<b>Course Objective:</b>							
1. To help students to procure conceptual clarity of Engineering Chemistry through laboratory experiments. 2. To develop experimental skills to acquire insight into societal and environmental issues.							
<b>Course outcome:</b> Students will be able to:							
1. Analyze the quality of water for its hardness and alkalinity. 2. Apply various instrumental methods like pH-metry, conductometry, spectroscopy and electrochemical techniques for quantitative and qualitative chemical analysis. 3. Demonstrate the skill for determination of quality of coal by proximate analysis and synthesis of engineering materials. 4. Learn the chromatographic technique for separation of mixture of compounds. 5. Explore mini projects which are relevant to societal and environmental issues to develop research attitude.							
<b>Note: First five experiments are mandatory. A student has to perform either next five experiments or mini project in lieu of experiments.</b>							
<b>I. List of Experiments:</b>							
1. Determination of total hardness (by EDTA method) and alkalinity of given water sample. 2. To determine the dissociation constant of a weak acid (acetic acid) using pH meter. 3. Titration of mixture of strong acid with strong base using Conductivity meter and determine strength of acid. 4. To determine the maximum wavelength of absorption of $\text{KMnO}_4$ , verify Beer's law and find concentration of the unknown sample. 5. Structural elucidation of unknown compounds by applying principles of UV and IR spectroscopy. 6. Proximate analysis of Coal. 7. To determine the electrochemical equivalent (ECE) of Cu. 8. To prepare the Phenol formaldehyde resin. 9. Preparation of biodiesel. 10. Chromatographic separation of ortho- and para nitro-phenol							
<b>II. Topics for Mini project (Student has to choose one of the topics from list given below but not limiting to)</b>							
1. Synthesis of nano-materials. 2. Determination of active ingredients from medicines / concentration of dyes in commercial beverages using UV-Spectrophotometer. 3. Water audit of water samples 4. One-pot synthesis of biologically active compounds. 5. Microwave assisted chemical reactions. 6. Study of corrosion of metals in a medium of different atmospheric conditions 7. Soil analysis of agricultural soil samples.							
<b>Laboratory manual :</b>							
1. Vogel's book of Qualitative Chemical Analysis by J.Mendham, R.C,Denny, J.D.Barnes, M.J.K.Thomas, 6 e, Pearson Education ltd. 2. Applied Chemistry Theory and Practice by O.P.Virman and A.K.Narula, 2e, New age International (P) Ltd.							

<b>Program:</b>	<b>B. Tech. CSE (AI &amp; ML)</b>			<b>Semester:</b>	<b>II</b>		
<b>Course :</b>	<b>Mathematics for Data Science</b>			<b>Code:</b>	<b>BCS22B04</b>		
<b>Teaching Scheme</b>				<b>Evaluation Scheme</b>			
<b>Lecture</b>	<b>Tutorial</b>	<b>Credit</b>	<b>Hours</b>	<b>IE</b>	<b>MTE</b>	<b>ETE</b>	<b>Total</b>
3	-	3	3	20	30	50	100
<b>Prior knowledge of:</b> Mathematics is essential.							
<b>Course Objectives:</b>							
<ol style="list-style-type: none"> <li>To solve numerical problems using the concepts of linear algebra and matrices.</li> <li>To demonstrate the use of mathematical techniques in the field of data science.</li> <li>To explain the theory of statistics for its use in statistical inference.</li> <li>To perform the data preprocessing operations.</li> <li>To demonstrate the use of data visualization and data analytics techniques.</li> </ol>							
<b>Course Outcomes:</b> After learning the course, students will be able to:							
<ol style="list-style-type: none"> <li>Analyze the need of data preprocessing/visualizations operations and apply those to prepare the data</li> <li>Use linear algebra and matrices for problem-solving.</li> <li>Perform statistical analysis to understand the data representation by computing various statistical measures.</li> <li>Apply various hypothesis tests on sample data and provide inferences.</li> <li>Analyze and solve the regression and classification problem for data analysis.</li> <li>Apply the model evaluation techniques using different performance measures.</li> </ol>							
<b>Unit</b>	<b>Description</b>						<b>Duration (Hrs)</b>
<b>I</b>	<p><b>Introduction to Data Science:</b> Data Science Life Cycle, Data Analytics and Types, Key performance indicators of data science projects.</p> <p>Data Preprocessing: Need, preprocessing techniques for: handling redundant data, data transformation, replacing or handling missing data, and handling data inconsistency.</p> <p>Data Visualization: Introduction, need, Data visualization techniques: line plot, scatter plot, histogram, density plot, box plot, bar plot, pie chart, heatmap, etc.</p>						8
<b>II</b>	<p><b>Mathematics for data science: Linear Algebra</b> - Introduction to Linear algebra, Matrices and vectors in data science. Vector – vector space, Column vectors, row vectors, working with vectors. Matrices: types of matrices, Addition of Matrices and their properties, Matrix multiplication and their properties. Linear combination as a matrix-vector product.</p>						8
<b>III</b>	<p><b>Mathematics for data science: Matrices</b> -Transpose of Matrices, properties of Transpose. Determinants; Determinants and their properties, Cramer’s Rule, Inverses. Introduction Minors and Cofactors in a Determinant, Properties of Determinants, Differentiation of a Determinant, Rank of a Matrix, Systems of linear equations, Row reduction, Echelon form and its Properties, Eigenvalues and Eigenvectors.</p>						7
<b>IV</b>	<p><b>Statistics and Inference</b> – Measures of central tendency, Measures of variability: standard deviation, variance, quartiles, Interquartile range. Skewness and Kurtosis. <b>Sampling &amp;</b></p>						8

	<b>Inference</b> - Sampling: Introduction, types of sampling. Hypothesis testing, types of errors, level of significance, test of hypothesis: t-test, z-test, chi-square, ANOVA. Correlation analysis: Pearson’s correlation coefficient.	
V	<b>Regression</b> - Understanding Linear regression. Lines of regression – numerical problems. Performing a linear Regression: Linear function, Fitting the line, residual errors, coefficient of determination. Multiple linear regression. Understanding Logistic regression. Performing a logistic Regression: Logistic function, fitting the curve, understanding the log-odds, R-Squared. Multivariate logistic Regression.	7
VI	<b>Data Analytics and Model Evaluation</b> - Introduction to classification, Naive Bayes classifier. Model Evaluation and Selection: holdout method, random sub-sampling, cross-validation. Model’s parameter tuning and optimization. Performance metrics for evaluation of model, confusion matrix, AUC-ROC analysis. Model building and validations for Naïve Bayes classifier and for logistic regression.	7
<b>Total</b>		<b>45</b>
<b>Text Books:</b>		
<ol style="list-style-type: none"> <li>1. Thomas Nield, “Essential Math for Data Science”, O’Reilly Media Inc., October 2022, ISBN: 9781098102869.</li> <li>2. Data Science and Big Data Analytics, EMC education services, Wiley publication, 2015, ISBN: 9781118876138.</li> </ol>		
<b>Reference Books:</b>		
<ol style="list-style-type: none"> <li>1. Peter Bruce, Andrew Bruce, Peter Gedeck, “Practical Statistics for Data Scientists”, O’Reilly Media, 2nd edition, May 2020, ISBN: 9781492072942.</li> <li>2. Norman Matloff, “Probability and Statistics for Data Science”, CRC Press, 2019, ISBN:9780429687112.</li> </ol>		
<b>Web references:</b>		
<ol style="list-style-type: none"> <li>1. NPTEL Course on “Python for Data Science” :<a href="https://onlinecourses.nptel.ac.in/noc22_cs74/preview">https://onlinecourses.nptel.ac.in/noc22_cs74/preview</a></li> <li>2. NPTEL Course on “Data Science for Engineers” :<a href="https://onlinecourses.nptel.ac.in/noc22_cs72/preview">https://onlinecourses.nptel.ac.in/noc22_cs72/preview</a></li> </ol>		

<b>Program:</b>	<b>B. Tech. CSE (AI &amp; ML)</b>			<b>Semester:</b>	<b>II</b>		
<b>Course:</b>	<b>Data Science Laboratory</b>			<b>Code :</b>	<b>BCS22B05</b>		
<b>Teaching Scheme</b>				<b>Evaluation Scheme</b>			
<b>Practical</b>	<b>Tutorial</b>	<b>Credit</b>	<b>Hours</b>	<b>TW</b>	<b>PR</b>	<b>OR</b>	<b>Total</b>
4	-	2	4	50	50	-	100
<b>Prior Knowledge of Computer Programming &amp; Problem Solving is essential.</b>							
<b>Course Objectives:</b>							
<ol style="list-style-type: none"> <li>1. To write software programs using linear algebra, matrices and using data structures in Python.</li> <li>2. To apply mathematical techniques in the field of data science for analysis of data.</li> <li>3. To use the theory of statistics for data analysis.</li> <li>4. To learn the data preprocessing and data visualization techniques.</li> <li>5. To perform regression analysis and classification tasks for various applications.</li> </ol>							
<b>Course Outcomes:</b> After learning the course, students will be able to:							
<ol style="list-style-type: none"> <li>1. Implement data preprocessing techniques to prepare the data for analysis.</li> <li>2. Implement data visualization techniques to analyze data graphically.</li> <li>3. Perform statistical analysis to understand the data representation by computing statistical measures.</li> <li>4. Write a software program to perform hypothesis tests on sample data.</li> <li>5. Implement the regression techniques for data analysis.</li> <li>6. Develop a classification model and evaluate its performance.</li> </ol>							
<b>Guidelines:</b> The suggested list of assignments is given below. Instructors can frame suitable assignments based on scenarios. Students should perform all assignments compulsorily using Python. As per assignment requirement, an open-source data can be downloaded from the web (Kaggle, github, UCI ML repository, OpenML, Datahub, Data.gov, etc).							
<b>Assignment No.</b>	<b>Suggested List of Assignment</b>						
<b>1.</b>	<p>Write programs using Python language constructs. Suitable 2 assignments will be framed based on topics such as: Data types and data structures in Python– lists, array, dictionary, tuple, etc. Reading data from files. Different types of language constructs: operators, control structures, functions. Python libraries like pandas, NumPy, etc. Suggested list is as follows:</p> <ol style="list-style-type: none"> <li>a) Write a python program to create a list of random numbers in normal distribution and display the frequency of each value</li> <li>b) Write a python program to print the odd and even numbers from a given range taken as per user's input and display the prime numbers from the first 20 odd numbers.</li> <li>c) Write a python program to read any .csv file as per user-provided input and display its content.</li> </ol>						

2.	Write programs using Python language constructs. Suitable 2 assignments will be framed based on topics such as: Data types and data structures in Python– lists, array, dictionary, tuple, etc. Reading data from files. Different types of language constructs: operators, control structures, functions. Python libraries like pandas, NumPy, etc. Suggested list is as follows: a) To reverse the tuple or unpack the tuple into multiple variables or access a specific value from tuple b) To merge two dictionaries or create a dictionary by extracting only key values from any given dictionary
3.	Write programs using Python language constructs and Python libraries like NumPy to perform linear algebra operations. Suitable any 2 assignments can be framed. Suggested list is as follows: a) To perform addition and subtraction of matrices b) To perform multiplication and division of matrices
4.	Write programs using Python language constructs and Python libraries like NumPy to perform linear algebra operations. Suitable any 2 assignments can be framed. Suggested list is as follows: a) To find the transpose of a matrix b) To solve linear systems of equations by implementing matrices and vectors
5.	Perform the following data preprocessing operations using Python and pandas on any open-source dataset. a) Data Preprocessing operations: check for missing values, noisy data, null values, etc. and handle those. b) Data Integration and Data Normalization: Summarize the types of variables by checking the data types (i.e., character, numeric, integer, factor, and logical) of the variables in the data set. If variables are not in the correct data type, apply proper type conversions. Perform data transformations suitably like normalization, standardization, etc. Turn categorical variables into quantitative variables
6.	Create an “Academic performance” dataset of students and perform the following operations using Python. a) Scan all variables for missing values and inconsistencies. If there are missing values and/or inconsistencies, use any of the suitable techniques to deal with them. b) Scan all numeric variables for outliers. If there are outliers, use any of the suitable techniques to deal with them.
7.	Create an “Academic performance” dataset of students and perform the following operations using Python. a) Apply data transformations on suitable variables. The purpose of this transformation should be one of the following reasons: to change the scale for better understanding of the variable, to convert a non-linear relation into a linear one, or to decrease the skewness and convert the distribution into a normal distribution.
8.	Write a program for Data Visualization using IRIS flower dataset or any other suitable public dataset a) Create a histogram for each feature in the dataset to illustrate the feature distributions. Plot each histogram. b) Create a boxplot for each feature in the dataset. All of the boxplots should be combined into a single plot. Compare distributions and identify outliers.

9.	Write a program for Data Visualization to create any 6 types of graphs. Select the right chart for data visualization as per requirements like visualization required for comparisons, identification of relationships, identification of trends over time, part of a whole, understanding the distribution of data values, etc. Create graphs among types such as Line plot, Scatter plot, bar plot, Density plot, pie chart, bubble plot, heat maps, tree map, correlation matrices, dendrograms, etc. Use Pima Indians Diabetes dataset or time series data or any other suitable public dataset.
10.	Write a python program to perform descriptive statistics to compute various statistical measures by using Pandas library. Use IRIS flower dataset or any other suitable public dataset.
11.	Write a program to perform hypothesis testing for a suitable dataset. Select appropriate hypothesis testing strategies such as the student's t-test, z test, chi-square test, ANOVA test, etc.
12.	Write a program to implement linear or logistics regression using any suitable public dataset OR the following scenario of Bigmart Sales Analysis may be considered: Perform prediction for the sales of a store using linear or logistics regression. Sample test data set is available here <a href="https://datahack.analyticsvidhya.com/contest/practice-problem-big-mart-sales-iii/">https://datahack.analyticsvidhya.com/contest/practice-problem-big-mart-sales-iii/</a>
13.	Write a program to perform classification using Naïve Bayes classifier. Calculate the probabilities by implementing the Bayes theorem using Pima Indians Diabetes dataset or any other suitable public dataset. Measure the performance of the classifier for separate test and training data using various metrics.

**Text Books:**

1. Thomas Nield ,” Essential Math for Data Science” - ,Released October 2022 Publisher(s): O'Reilly Media, Inc. ISBN: 9781098102869

**Reference Books:**

1. Peter Bruce, Andrew Bruce, Peter Gedeck, “Practical Statistics for Data Scientists”- · 2020 , ISBN:9781492072898, 1492072893 ,Published:10 April 2020 , Publisher:O'Reilly Media.
2. Norman Matloff, “Probability and Statistics for Data Science” - Norman Matloff · 2019, ISBN:9780429687112, 0429687117 , CRC Press, Published:21 June 2019
3. Chirag Shah, “A Hands-On Introduction To Data Science”, Cambridge University Press,(2020), ISBN : ISBN 978-1-108-47244-9.
4. Wes McKinney, “Python for Data Analysis”, O' Reilly media, ISBN : 978-1-449-31979-3.

<b>Program:</b>	<b>B. Tech. CSE (AI &amp; ML)</b>			<b>Semester:</b>	<b>II</b>		
<b>Course:</b>	<b>Software Engineering</b>			<b>Code:</b>	<b>BCS22C01</b>		
<b>Teaching Scheme:</b>				<b>Evaluation Scheme:</b>			
<b>Lecture</b>	<b>Tutorial</b>	<b>Credit</b>	<b>Hours</b>	<b>IE</b>	<b>MTE</b>	<b>ETE</b>	<b>Total</b>
<b>02</b>	-	02	02	20	-	30	50
<b>Prior Knowledge of Computer Programming and Problem Solving is essential.</b>							
<b>Course Objectives:</b>							
<ol style="list-style-type: none"> <li>1. To learn the principles of Software Engineering</li> <li>2. To learn process models for software project development</li> <li>3. To learn the methods of capturing, specifying, and analyzing software requirements.</li> <li>4. To learn design principles to software project development</li> </ol>							
<b>Course Outcomes:</b> After learning the course, students will be able to:							
<ol style="list-style-type: none"> <li>1. Comprehend the principles of Software Engineering.</li> <li>2. Apply appropriate process models for specific software project development.</li> <li>3. Analyze software requirements</li> <li>4. Apply Design principles to software project development.</li> <li>5. Design the system using UML diagrams.</li> <li>6. Analyze the agile software development process Model</li> </ol>							
<b>Unit</b>	<b>Description</b>						<b>Duration (Hrs)</b>
<b>I</b>	<b>Introduction and Software Process Models:</b> Software Engineering, Myths, Software Process, Software development life cycle, Work Products, Importance of Software Engineering, Standard for Software Process, Waterfall Model, Prototyping Model, Iterative Enhancement Model, Spiral Model, RAD model, 4th Generation models, Formal Methods, Agile Development Case Study: Introduction to Safe Home.						<b>8</b>
<b>II</b>	<b>Software Requirement Specification, Design and Coding:</b> Requirements Engineering- Problem analysis, Establishing the Groundwork-Eliciting Requirements, Requirements Analysis-Requirements Modeling Strategies. Design Concepts, Modularity, Architectural design, Coupling and Cohesion, Top-down and bottom-up design, Software Design Document, Coding styles and documentation						<b>7</b>
<b>III</b>	<b>Agile development:</b> Agile Process- Extreme Programming in agile development, Pair Programming in agile development, Agile software development process Models: SCRUM, Sprint Cycle, Sprint Cycle Stages, SCRUM master, Kanban Boards and Methodology, Comparison of Agile with Conventional process models.						<b>8</b>
<b>IV</b>	<b>Computer Aided Software Engineering and Advanced Topics:</b> Computer Aided Software Engineering (CASE) and its Scope, CASE support in Software Life Cycle, Architecture of CASE Environment, Upper CASE and Lower CASE, Exposure to CASE tools. Software Process Improvement, Component Based Software Engineering, Web Engineering, Reverse Engineering, Software Engineering challenges of Big Data, Mobile Applications						<b>7</b>
<b>Total</b>						<b>30</b>	



**Textbooks:**

1. Roger S Pressman, "Software Engineering – A Practitioner’s Approach", Pearson Education, 7th Edition, 2010.
2. Ian Sommerville, "Software Engineering", 9 th edition, 2010.
3. N.S. Gill, Software Engineering, Khanna Publishing Co., Delhi 2018.
4. Software Engineering (3rd ed.), By K.K Aggarwal & Yogesh Singh, New Age International Publishers, 2007.

**Reference Books:**

1. Carlo Ghezzi, "Fundamentals of Software Engineering", Prentice Hall India, ISBN 10: 0133056996, 2002.
2. Rajib Mall, "Fundamentals of Software Engineering", Prentice Hall India, ISBN 13: 978-8120348981, 2014.
3. Pankaj Jalote, "An Integrated Approach to Software Engineering", Springer, ISBN 13: 9788173192715, 2010.



<b>Program:</b>	<b>B. Tech. CSE (AI &amp; ML)</b>			<b>Semester:</b>	<b>II</b>		
<b>Course:</b>	<b>Python Programming Lab</b>			<b>Code:</b>	<b>BCS22G02</b>		
<b>Teaching Scheme</b>				<b>Evaluation Scheme</b>			
<b>Practical</b>	<b>Tutorial</b>	<b>Credit</b>	<b>Hours</b>	<b>TW</b>	<b>PR</b>	<b>OR</b>	<b>Total</b>
4	--	2	4	100		--	100
<b>Course Objectives:</b>							
<ol style="list-style-type: none"> <li>To write, test, and debug simple python programs.</li> <li>To implement python programs with conditionals and loops.</li> <li>Use functions for structuring python programs.</li> <li>Represent compound data using python lists, tuples, and dictionaries.</li> <li>Read and write data from/to files in Python and use exception handling.</li> <li>To implement various string operations, object oriented concepts, and graphics operations.</li> </ol>							
<b>Course Outcomes:</b> After learning the course, students will be able to:							
<ol style="list-style-type: none"> <li>Develop python programs using various language constructs to solve real time problems.</li> <li>Use decision control statements to implement python programs.</li> <li>Use functions and represent Compound data using lists, tuples, and dictionaries.</li> <li>Perform different file handling and string operations.</li> <li>Perform exception handling and use python libraries.</li> <li>Use python libraries to perform graphics operations.</li> </ol>							
<b>Guidelines for Laboratory Conduction</b>							
<p>Course Instructor is expected to frame a detailed assignment statement referring to a suggested list of assignments</p> <p>Group A and Group B assignments are mandatory.</p> <p>It is recommended to use any suitable IDE to execute and debug python programs (PyCharm, VS code e</p>							
<b>Assignment No.</b>	<b>Suggested List of Assignments</b>						
<b>Group A- Assignments based on Basics of python programming</b>							

<p><b>1</b></p>	<p>Install IDLE /Anaconda (Jupyter notebook)/Visual Studio code.</p> <p>A). Create a list and perform the following methods 1) insert() 2) remove() 3) append() 4) len() 5) pop() 6)clear().</p> <p>B). Create a dictionary and apply the following methods: 1)Print the dictionary items 2) access items 3) useget() 4)change values 5) use len().</p> <p>C). Create a tuple and perform the following methods: 1)Add items 2) len() 3) check for item in tuple 4)Access items</p>
<p><b>2</b></p>	<p>A). Write a python program to print a number that is positive/negative.</p> <p>B). Write a python program to find the largest number among three numbers.</p>
<p><b>3</b></p>	<p>A) Write a program to create a menu with the following options 1. Addition 2. Subtraction 3. Multiplication 4. Division. Accept users input and perform the operation accordingly.</p> <p>B). Write a python program to check whether the given string is palindrome or not.</p> <p>C). Write a python program to find factorial of a given number using functions</p>
<p><b>4</b></p>	<p>A). Write a program to double a given number and add two numbers</p> <p>B). Write a program for map () function to double all the items in the list.</p> <p>C). Write a program to find the sum of the numbers for the elements of the list</p>
<p><b>5</b></p>	<p>A). Demonstrate a python code to implement abnormal termination.</p> <p>B). Demonstrate a python code to print try, except and finally block statements</p>
<p><b>6</b></p>	<p>A). Write a python program to open and write “hello world” into a file.</p> <p>B). Write a python program to write the content “hi python programming” for the existing file.</p>
<p><b>Group B- Assignments based on Advanced Python Programming</b></p>	
<p><b>7</b></p>	<p>A). Write a python program to get python version</p> <p>B). Write a python program to open a file and check what are the access permissions acquired by that file using os module.</p> <p>C). Write a python program to display a particular month of a year using the calendar module.</p> <p>D). Write a python program which accepts the radius of a circle from the user and computes the area (use math module).</p>

8	<p>A). Write a python program to create a package (Engg), subpackage ( years),modules (sem) and create staff and student function to module.</p> <p>B). Write a python program to create a package (college),subpackage (all dept),modules (it,cse) and create admin and cabin function to module.</p>
9	<p>A). Write a python Program to display welcome to PCCOE by using classes and objects.</p> <p>B). Write a program to read 3 subject marks and display pass or failed using class and object</p>
10	<p>A). Using a numpy module create an array and check the following:                      1. Type of array 2. Axes of array 3. Shape of array 4. Type of elements in array</p> <p>B). Using a numpy module create array and check the following:                      1. List with type float 2. 3*4 array with all zeros 3. From tuple 4. Random values</p>
11	<p>A). Write a python program to concatenate the dataframes with two different objects.</p> <p>B). Write a python code to read a csv file using pandas module and print the first and last five lines of a file</p>
12	<p>A) Write a python code to set background color and pic and draw a circle using turtle module.</p> <p>B) Write a python code to perform addition using functions with pdb module.</p>

**Text Books:**

1. Reema Thareja, “Python Programming using Problem Solving Approach”, Oxford publication, 2017, ISBN-13:978-0-19- 948017-3.
2. Allen B. Downey, “Think Python: How to Think like a Computer Scientist”, O’Reilly Publishers, 2nd Edition, 2016, ISBN-978-1-491-93936-9.

**Reference Books:**

1. Paul Deitel and Harvey Deitel, “Python for Programmers”, Pearson Education, 1st Edition, 2021, ISBN-0135231345.
2. G Venkatesh and Madhavan Mukund, “Computational Thinking: A Primer for Programmers and Data Scientists”, Notion Press, 1st Edition, , 2021, ISBN-978-1-68523-481-2.
3. Paul Deitel and Harvey Deitel, “Python for Programmers”, Pearson Education, 1st Edition, 2021, ISBN-0135231345.
4. G Venkatesh and Madhavan Mukund, “Computational Thinking: A Primer for Programmers and Data Scientists”, Notion Press, 1st Edition, , 2021, ISBN-978-1-68523-481-2.
5. John V Guttag, “Introduction to Computation and Programming Using Python: With Applications to Computational Modeling and Understanding Data”, MIT Press, Third Edition, 2021, ISBN-9780262529624.

6. Eric Matthes, “Python Crash Course, A Hands – on Project Based Introduction to Programming”, No Starch Press, 2nd Edition, 2019, ISBN-13:978-1718502703.
7. Martin C. Brown, “Python: The Complete Reference”, Mc-Graw Hill, 4th Edition, 2018, ISBN-13:978-9387572942.

**Web References:**

1. [https://onlinecourses.nptel.ac.in/noc22\\_cs26/preview](https://onlinecourses.nptel.ac.in/noc22_cs26/preview)
2. [https://onlinecourses.nptel.ac.in/noc21\\_cs32/preview](https://onlinecourses.nptel.ac.in/noc21_cs32/preview)
3. <https://www.python.org/>



<b>Program:</b>	<b>B. Tech. CSE (AI &amp; ML)</b>			<b>Semester:</b>	<b>II</b>		
<b>Course:</b>	<b>HSMC - Life Skills 2</b>			<b>Code:</b>	<b>BSH22K02</b>		
<b>Teaching Scheme</b>				<b>Evaluation Scheme</b>			
<b>Lecture</b>	<b>Practical</b>	<b>Tutorial</b>	<b>Credit</b>	<b>IE</b>	<b>TW</b>	<b>ETE</b>	<b>Total</b>
-	4	-	2	-	100	-	100
<b>Prior Knowledge of :</b> No prior knowledge is required							
<b>Course Objectives:</b>							
<ol style="list-style-type: none"> <li>To equip them with essential skills and knowledge that complement their academic education, preparing them to excel not only as engineers but also as well-balanced individuals.</li> <li>To develop students' vital life skills that promotes personal growth, resilience, and success in their academic journey and beyond.</li> </ol>							
<b>Course Outcomes:</b> Students will be able to							
<ol style="list-style-type: none"> <li>Understand the ways to nurture their passion.</li> <li>Develop skills growth mindset to be successful in personal and professional life.</li> <li>Demonstrate adaptability and flexibility for any environment.</li> <li>Apply essential skills for successful and happy life management.</li> </ol>							
<b>Unit</b>	<b>Description</b>						<b>Duration (Hrs)</b>
<b>I</b>	<b>Nurture Your Passion</b> <ul style="list-style-type: none"> <li>Developing Hobbies- Importance, Ways and Benefits</li> <li>Exploring Skills - Singing/Painting/Dancing etc</li> <li>Sports: Basketball, Table tennis, Football and Volleyball</li> <li>Performing Arts: Painting/ Sketching/ Drawing</li> <li>Stage performance</li> <li>Let's Play to Learn - games and play forms possible, like, Puzzles &amp; Brainteasers, quiz.</li> </ul>						<b>15</b>
<b>II</b>	<b>Lead Yourself - Growth Mindset</b> <ul style="list-style-type: none"> <li>Understanding the concept for personal development.</li> <li>Embracing change: Coping with the dynamic nature of life</li> <li>Resilience and perseverance: Overcoming obstacles and setbacks</li> <li>Developing self-leadership skills and taking initiative/responsibilities.</li> </ul>						<b>15</b>
<b>III</b>	<b>Adaptability and Flexibility</b> <ul style="list-style-type: none"> <li>Adaptability in a rapidly changing world</li> <li>Problem-solving and decision-making in dynamic situations. Approaching Problem Differently</li> <li>Embracing uncertainty: Coping with ambiguity and making the most of new opportunities</li> <li>Flexibility in teamwork: Navigating diverse team dynamics effectively.</li> </ul>						<b>15</b>
<b>IV</b>	<b>Life Management</b> <ul style="list-style-type: none"> <li>Financial Literacy-Saving is earning, Value of money</li> <li>Coping up with Virtual Life and Reality</li> <li>Understanding the responsibilities and impact of Global Citizenship</li> <li>Environmental awareness and sustainable practices</li> <li>Social responsibility: Contributing positively to the community.</li> </ul>						<b>15</b>
	<b>Total</b>						<b>60</b>

**Reference Books**

1. "Mindset: The New Psychology of Success" by Carol S. Dweck Publisher: Ballantine Books
2. "The Financial Diet: A Total Beginner's Guide to Getting Good with Money" by Chelsea Fagan and Lauren VerHage
3. "Grit: The Power of Passion and Perseverance" by Angela Duckworth Publisher: Scribner, 2018

**Weblinks**

1. SkillsYouNeed ([www.skillsyouneed.com](http://www.skillsyouneed.com)): This website offers comprehensive information and practical guidance on a wide range of life skills, including communication, time management, problem-solving, and more
2. MindTools ([www.mindtools.com](http://www.mindtools.com)): MindTools provides resources on personal effectiveness, leadership, communication skills, and other essential life skills to enhance professional and personal development
3. TED Talks ([www.ted.com](http://www.ted.com)): TED Talks offer inspiring and informative speeches by experts and thought leaders covering various life skills topics, including resilience, emotional intelligence, and personal growth
4. Verywell Mind ([www.verywellmind.com](http://www.verywellmind.com)): This website covers mental health, emotional well-being, and self-improvement topics that contribute to overall life skills development

