

**SNJB's**  
**Late Sau. Kantabai Bhavarlalji Jain**  
**College of Engineering**

(An Autonomous Institute Affiliated to Savitribai Phule Pune University, Pune)

Shri Neminath Jain Brahmacharyashram (SNJB) (Jain Gurukul)

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**Curriculum Structure and Evaluation Scheme for F.Y. B.**  
**Tech. in Civil Engineering with Multidisciplinary Minor**

To be implemented for 2025-29 Batch

(With Effect from Academic Year 2025-26)

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**Vision of the Institute**

Transform young aspirant learners towards creativity and professionalism for societal growth through quality technical education.

**Mission of the Institute**

1. To transfer the suitable technology, particularly for rural development.
2. To enhance diverse career opportunities among students for building a nation.
3. To acquire the environment of learning to bridge the gap between industry and academics.
4. To share values, ideas, beliefs by encouraging faculties and students for welfare of society.

**The vision of the Civil Engineering Department**

To empower students to get knowledge and excellence in civil engineering and to cultivate a sense of commitment to society.

**Mission of the Civil Engineering Department**

1. To develop outstanding Civil Engineering graduates with Highest ethics.
2. To provide advanced skills of learning which helps to travel the journey from academics to industry.
3. To impart basic knowledge to serve the society.

**Program Outcomes (POs) for an engineering graduate:**

**PO1: Engineering Knowledge:** Apply knowledge of mathematics, natural science, computing, engineering fundamentals and an engineering specialization as specified in WK1 to WK4 respectively to develop to the solution of complex engineering problems.

**PO2: Problem Analysis:** Identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusions with consideration for sustainable development. (WK1 to WK4)

**PO3: Design/Development of Solutions:** Design creative solutions for complex engineering problems and design/develop systems/components/processes to meet identified needs with consideration for the public health and safety, whole-life cost, net zero carbon, culture, society and environment as required. (WK5)



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**P04: Conduct Investigations of Complex Problems:** Conduct investigations of complex engineering problems using research-based knowledge including design of experiments, modelling, analysis & interpretation of data to provide valid conclusions. (WK8).

**P05: Engineering Tool Usage:** Create, select and apply appropriate techniques, resources and modern engineering & IT tools, including prediction and modelling recognizing their limitations to solve complex engineering problems. (WK2 and WK6)

**P06: The Engineer and The World:** Analyze and evaluate societal and environmental aspects while solving complex engineering problems for its impact on sustainability with reference to economy, health, safety, legal framework, culture and environment. (WK1, WK5, and WK7).

**P07: Ethics:** Apply ethical principles and commit to professional ethics, human values, diversity and inclusion; adhere to national & international laws. (WK9)

**P08: Individual and Collaborative Team work:** Function effectively as an individual, and as a member or leader in diverse/multi-disciplinary teams.

**P09: Communication:** Communicate effectively and inclusively within the engineering community and society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations considering cultural, language, and learning differences.

**P010: Project Management and Finance:** Apply knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, and to manage projects and in multidisciplinary environments.

**P011: Life-Long Learning:** Recognize the need for, and have the preparation and ability for i) independent and life-long learning ii) adaptability to new and emerging technologies and iii) critical thinking in the broadest context of technological change. (WK8).



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Curriculum Structure and Evaluation Scheme  
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**Table 1: Abbreviations**

Abbreviation	Meaning
CIE	Continuous Internal Evaluation
MSE	Mid Semester Examination
SEE	Semester End Examination
BSC	Basic Science Courses
ESC	Engineering Science Courses
VSEC/VSC	Vocational and Skill Enhancement Courses
VEC	Value Education Courses
AEC	Ability Enhancement Courses
PCC	Program Core Courses
ELC	Research Methodology
	Computer Engineering Project (CEP)/ Field Project (FP)
	Project
	Internship/ On Job Training (OJT)
IKS	Indian Knowledge System
CC/CCC	Co-Curricular Courses
HOC	Honor Courses
EXT	Exit Courses
AC	Audit Courses
SIP	Student Induction Program
L	Lecture
T	Tutorial
P/PR	Practical
TH	Theory
Lab	Laboratory
TW	Term Work
OR	Oral
CE	Civil Engineering
CS	Computer Engineering
ME	Mechanical Engineering
AD	Artificial Intelligence and Data Science Engineering
ET	Electronics and Telecommunication Engineering

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Curriculum Structure and Evaluation Scheme  
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**Semester – I**

Sr. No	Category	Course Code	Course Name	Teaching Scheme					Evaluation Scheme							
				Hours				Credits	Theory Course				Lab Course			Total Marks
				L	T	P	Total Hours		CIE	MSE	SEE	TH Marks	TW	PR	OR	
1	BSC	25-BSC-1-02	<a href="#">Engineering Chemistry</a>	3	-	-	3	3	20	20	60	100	-	-	-	100
2	BSC	25-BSC-1-03	<a href="#">Linear Algebra And Differential Calculus</a>	3	1	-	4	4	20	20	60	100	-	-	-	100
3	ESC	25-ESC-1-03	<a href="#">Engineering Graphics</a>	3	-	-	3	3	20	20	60	100	-	-	-	100
4	ESC	25-ESC-1-04	<a href="#">Smart Building &amp; Materials</a>	2	-	-	2	2	20	20	60	100	-	-	-	100
5	BSC	25-BSC-1-06	<a href="#">Engineering Chemistry Laboratory</a>	-	-	2	2	1	-	-	-	-	25	-	-	25
6	ESC	25-ESC-1-08	<a href="#">Engineering Graphics Lab</a>	-	-	2	2	1	-	-	-	-	25	-	-	25
7	ESC	25-ESC-1-09	<a href="#">Smart Building &amp; Materials Lab</a>	-	-	2	2	1	-	-	-	-	25	-	-	25
8	VSEC	25-VSC-1-02	<a href="#">TechShop</a>	-	-	4	4	2	-	-	-	-	50	-	-	50
9	CCC		Co-curricular Course -I	-	-	2	2	1	-	-	-	-	50	-	-	50
10	IKS	25-IKS-1-01	<a href="#">Indian Knowledge System</a>	-	2	-	2	2	-	-	-	-	50	-	-	50
11	AEC	25-AEC-1-01	<a href="#">Professional Communication Skills</a>	-	1	-	1	1	-	-	-	-	25	-	-	25
<b>Total</b>				<b>11</b>	<b>4</b>	<b>12</b>	<b>27</b>	<b>21</b>	<b>80</b>	<b>80</b>	<b>240</b>	<b>400</b>	<b>250</b>	<b>-</b>	<b>-</b>	<b>650</b>

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Course Code	Bucket of Co-curricular Course
25-CCC-1-A	<a href="#">Yoga</a>
25-CCC-1-B	<a href="#">Sports</a>
25-CCC-1-C	<a href="#">NSS</a> (National Service Scheme)
25-CCC-1-D	<a href="#">Cultural</a>

**Note:** Students have to select any one course from the above basket.

Induction Program (Mandatory)	3 Weeks Duration
The induction program (as per AICTE guidelines) is to be completed at the start of the first year.	<ul style="list-style-type: none"><li>• SIP Module 1: UHV 1</li><li>• SIP Module 2: Physical Health and Related Activities</li><li>• SIP Module 3: Familiarization of Department/ Branch and Innovation</li><li>• SIP Module 4: Visit to a Local Area</li><li>• SIP Module 5: Lectures by Eminent People</li><li>• SIP Module 6: Proficiency Modules</li><li>• SIP Module 7: Literature / Literary Activities</li><li>• SIP Module 8: Creative Practices</li><li>• SIP Module 9: Extra Curricular Activities</li></ul>



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**Semester – II**

Sr. No	Category	Course Code	Course Name	Teaching Scheme					Evaluation Scheme							
				Hours				Credits	Theory Course				Lab Course			Total Marks
				L	T	P	Total Hours		CIE	MSE	SEE	TH Marks	TW	PR	OR	
1	BSC	25-BSC-1-01	<a href="#">Engineering Physics</a>	3	-	-	3	3	20	20	60	100	-	-	-	100
2	BSC	25-BSC-1-04	<a href="#">Statistics and Integral Calculus</a>	3	-	-	3	3	20	20	60	100	-	-	-	100
3	ESC	25-ESC-1-01	<a href="#">Basic Electrical &amp; Electronics Engineering</a>	3	-	-	3	3	20	20	60	100	-	-	-	100
4	ESC	25-ESC-1-06	<a href="#">Programming and Problem Solving using Python</a>	2	-	-	2	2	20	20	60	100	-	-	-	100
5	PCC	25-PCC-CE-1-01	<a href="#">Engineering Mechanics</a>	2	-	-	2	2	20		30	50	-	-	-	50
6	BSC	25-BSC-1-05	<a href="#">Engineering Physics Laboratory</a>	-	-	2	2	1	-	-	-	-	25	-	-	25
7	ESC	25-ESC-1-05	<a href="#">Basic Electrical and Electronics Engineering Lab</a>	-	-	2	2	1	-	-	-	-	25	-	-	25
8	ESC	25-ESC-1-10	<a href="#">Python Programming Lab</a>	-	-	2	2	1	-	-	-	-	25	-	-	25
9	PCC	25-PCC-CE-1-02	<a href="#">Engineering Mechanics Lab</a>	-	-	2	2	1	-	-	-	-	25	25	-	50
10	VSEC	25-VSC-1-01	<a href="#">TechSkill</a>	-	-	4	4	2	-	-	-	-	50	-	-	50
11	CCC	25-CCC-1-05	<a href="#">Co-curricular Course -II</a>	-	-	4	4	2	-	-	-	-	25	-	-	25
<b>Total</b>				<b>13</b>	<b>-</b>	<b>16</b>	<b>29</b>	<b>21</b>	<b>100</b>	<b>80</b>	<b>270</b>	<b>450</b>	<b>175</b>	<b>25</b>	<b>-</b>	<b>650</b>

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Curriculum Structure and Evaluation Scheme  
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**Level 4.5 Exit Criteria: Mandatory Courses to be completed after first year for obtaining One  
Year UG Certificate in Civil Engineering**

Sr. No	Category	Course Code	Course Name	Teaching Scheme					Evaluation Scheme							
				Hours				Credits	Theory Course				Lab Course			Total Marks
				L	T	P	Total Hours		CIE	MSE	SEE	TH Marks	TW	PR	OR	
1	EXT	25-EXT-1-01	Internship / Fieldwork/OJT	-	-	8	8	4	-	-	-	-	100	-	-	100
2	EXT	25-EXT-1-02	Mini Project	-	-	8	8	4	-	-	-	-	50	-	50	100
<b>Total</b>				-	-	<b>16</b>	<b>16</b>	<b>8</b>	-	-	-	-	<b>150</b>	-	<b>50</b>	<b>200</b>



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# Semester-I



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Curriculum Structure and Evaluation Scheme  
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25-BSC-1-02 : Engineering Chemistry		
<b>Teaching Scheme:</b> Theory: 03 Hours/Week	<b>Credit:</b> 03	<b>Evaluation Scheme:</b> <b>CIE:</b> 20 Marks <b>MSE:</b> 20 Marks <b>SEE :</b> 60 Marks
<b>Prerequisites:</b> Basic Knowledge of water and pollution, Environment, periodic table, Titrations-volumetric analysis, types of reaction, classification and properties of polymers, knowledge of fuels, Oxidation, reduction reactions, strong and weak electrolytes, electromagnetic radiations, electrochemical series and corrosion, Semiconductor		
<b>Companion Course:</b> 25-BSC-1-06: Engineering Chemistry Lab		
<b>Course Objectives:</b> <ul style="list-style-type: none"><li>• To understand technology involved in the analysis of water for improving its quality as a commodity by purification.</li><li>• To build consciousness about the advancement in batteries and acquire the knowledge and importance of electro-analytical techniques for qualitative and quantitative analysis of materials.</li><li>• To understand chemistry of various engineering materials with composition-structure, properties and applications of speciality polymers, nanomaterial, Solders.</li><li>• To enlighten the students with the basic concepts of Environmental Chemistry and the use of Green chemistry for pollution control .</li><li>• To Illustrate the corrosion of metals and its control by using different methods.</li><li>• To study conventional and green fuels with respect to their composition, properties and applications.</li></ul>		



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Curriculum Structure and Evaluation Scheme  
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**Course Outcomes:**

After completion of the course, learners should be able to

COno	Course outcomes	BL
CO1	<b>Apply</b> appropriate technology for determining the purity and qualities of substances.	3
CO2	<b>Employ</b> diverse methods to analyze the molecular composition of liquids, fuels, and Polymers.	3
CO3	<b>Evaluate</b> the challenges posed by hard water and corrosion and explain strategies for mitigation.	4
CO4	<b>Compare</b> fuel composition, water quality, and corrosion prevention techniques.	4
CO5	<b>Analyze</b> fluids and fuels and find suitable purifying methods.	4
CO6	<b>Understand</b> the fundamental concepts of environmental chemistry, and it's real world applications.	3

**Course Contents**

Unit I	Water Technology	7 Hours
<b>Water:</b> Introduction, Hardness of water- Types, Analysis of water hardness (EDTA method) and Numericals, Alkalinity of Water and numericals. Ill effects of hard water-Scale, sludge, priming and foaming, External Treatment of water - Zeolite method, numericals, Purification of water: Reverse osmosis.		
<b>Exemplar/Case Studies-</b> 1) Wastewater treatment 2) Different types of membranes used in water softening		
<b>Mapping of Course Outcomes</b>		<b>CO1,CO2,CO3,CO4,CO5,CO6</b>
Unit II	Battery Technology and Electroanalytical techniques	7 Hours

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<p><b>Batteries:</b> Introduction, Ni-Cd battery, Construction, Uses , recent technologies in Lithium based batteries, Li-cells – LiMnO<sub>2</sub>.</p> <p><b>Electroanalytical techniques: pH metry:</b> Introduction, standardization of pH meter, pH metric titration of strong acid versus strong base with titration curve,</p> <p><b>UV-Visible Spectroscopy:</b> Introduction, interaction of electromagnetic radiation with matter, statement of Beer's law and Lambert's law , Instrumentation and basic principle of single beam spectrophotometer, Recent applications of UV-visible spectroscopy.</p>		
<p><b>Exemplar/Case Studies-</b></p> <p>1) Battery waste recycling</p> <p>2) Current research and advances in fuel cells</p>		
<b>Mapping of Course Outcomes</b>		<b>CO2,CO5</b>
<b>Unit III</b>	<b>Chemistry of Engineering Materials</b>	<b>7 Hours</b>
<p><b>Polymers:</b> Introduction, Glass transition temperature and Melting Temperature, Speciality Polymers: Structure, properties and applications of the following polymers-Conducting Polymer: Polyacetylene Doping of conducting polymer and its type, Biodegradable Polymers: PolyhydroxyButyrate Valerate-PHBV, Electroluminescent polymer</p> <p><b>Nanomaterials:</b> Introduction, definition, properties and general applications of Graphene</p> <p><b>Solders :</b> Eutectic mixtures and soft solders, Advanced Ceramic materials and cermets, applications</p>		
<p><b>Exemplar/Case Studies-</b></p> <p>1) Polymer composites: Fiber reinforced plastic (FRP) and Carbon reinforced polymer composite</p> <p>2) Composition and Applications of woods metal, brass, Bronze, Ti-alloys</p>		
<b>Mapping of Course Outcomes</b>		<b>CO1,CO2</b>
<b>Unit IV</b>	<b>Environmental Chemistry</b>	<b>7 Hours</b>
<p><b>Green Chemistry:</b> Definition, Goals of Green Chemistry, 12 principles of Green Chemistry, Industrial applications of Green Chemistry, Major Uses, Traditional and Green pathways of synthesis of Polycarbonate.</p> <p><b>Chemicals in Agriculture:</b> Pesticides, Insecticides, herbicides, fungicides Examples and uses. Bio Fertilizers Definition, examples and uses, E-Waste Management 6R's.</p>		
<b>Exemplar/Case Studies-</b>		

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Curriculum Structure and Evaluation Scheme  
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1) Bhopal gas Tragedy 2) Hazardous Waste		
<b>Mapping of Course Outcomes</b>		<b>CO3,CO6</b>
<b>Unit V</b>	<b>Corrosion and its Protection</b>	<b>7 Hours</b>
<p><b>Corrosion:</b> Introduction, Types of corrosion – Dry and Wet corrosion, mechanism, nature of oxide films, Pilling-Bedworth's rule, hydrogen evolution and oxygen absorption corrosion, Factors influencing rate of corrosion related to nature of metal and nature of Environment(4 to 5) <b>Methods of corrosion control:</b>  1.cathodic protection: Sacrificial Anodic Protection Method 2.Metallic coatings: Types-Anodic Coating &amp; Cathodic Coating 3.Methods to apply metallic coating Galvanizing and Tinning, Electroplating.</p>		
<p><b>Exemplar/Case Studies:</b>  1) Organic coatings: Paints applications in industry for corrosion protection (AI&amp;DS,Computer,E&amp;TC)  2) Lubricants: Properties- Viscosity index, Flash point, oiliness, cloud point, and applications of lubricants ( Mechanical)  3) Cement: Definition, Classification and properties, Chemical constituent of Portland cement ( Civil).</p>		
<b>Mapping of Course Outcomes</b>		<b>CO2,CO4,CO5</b>
<b>Unit VI</b>	<b>Energy Science</b>	<b>7 Hours</b>
<p><b>Fuel:</b> Introduction, Conventional and Non-conventional Energy Resources, Calorific value (CV), Gross calorific value (GCV) and Net calorific value (NCV), Determination of Calorific value: Bomb calorimeter, Numericals.  Solid fuel: Coal its Types, Proximate analysis of Coal, Disadvantages of fossil fuels, Hydrogen gas as a future fuel, Alternative fuels: Power alcohol, biodiesel.  <b>Solar Cell:</b> Introduction, Importance, Construction &amp; working of Solar PV cell.</p>		
<p><b>Exemplar/Case Studies:</b>  1) Applications of fuel cells in automobile industry ( Mechanical)  2) The Role of Civil Engineering in Energy Infrastructure Development ( Civil).  3) Different soldering techniques for Printed Circuit Boards (EnTC)  4) Electrostatic and Hybrid capacitors (AIDS, Computer)</p>		
<b>Mapping of Course Outcomes</b>		<b>CO1,CO2,CO4,CO5</b>
<b>Learning Resources</b>		

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Curriculum Structure and Evaluation Scheme  
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<b>Text Books:</b>
<b>T1.</b> O. G. Palanna“Engineering Chemistry”, Tata McGraw Hill Education Pvt. Ltd,2014. <b>T2.</b> S. S. Dara, Dr. S. S. Umare“Textbook of Engineering Chemistry” ,S. Chand & Company Ltd,2016
<b>Reference Books :</b>
<b>R1.</b> S.Ramesh et al“Engineering Chemistry”, Wiley India Pvt. Ltd,2012 <b>R2.</b> Shriver and Atkins“Inorganic Chemistry”, Oxford University Press, 5ed, 2010 <b>R3.</b> S. M. Khopkar,Basic“Concept of Analytical Chemistry”, New Age-International Publisher, 2ed, 2008 <b>R4.</b> A. K. De“Environmental Chemistry”, New Age International Publications, 8ed,2018
Additional Resources: (Book, e-Resources) 1. G.Vijaya Pratap, Dr. Manasi Ghamande, Dr Prashant Pangrikar, De. Balaji Rupnar “A Text Book of Environmental Pollution and Management” ,R .K Publication. e-Resources- 1. <a href="https://discovery1.delnet.in/Search/Results?lookfor=Sunita+Rattan&amp;type=AllFields&amp;location_code=&amp;limit=60">https://discovery1.delnet.in/Search/Results?lookfor=Sunita+Rattan&amp;type=AllFields&amp;location_code=&amp;limit=60</a> 2. <a href="https://discovery1.delnet.in/Search/Results?lookfor=O.+G.+Palanna%E2%80%9C&amp;type=AllFields&amp;location_code=&amp;limit=60">https://discovery1.delnet.in/Search/Results?lookfor=O.+G.+Palanna%E2%80%9C&amp;type=AllFields&amp;location_code=&amp;limit=60</a> 3. <a href="https://discovery1.delnet.in/Search/Results?lookfor=S.+S.+Dara%2C+Dr.+S.+S.+Umare&amp;type=AllFields&amp;location_code=&amp;limit=60">https://discovery1.delnet.in/Search/Results?lookfor=S.+S.+Dara%2C+Dr.+S.+S.+Umare&amp;type=AllFields&amp;location_code=&amp;limit=60</a>
MOOC Courses links : 1. <a href="https://archive.nptel.ac.in/courses/105/106/105106119/">https://archive.nptel.ac.in/courses/105/106/105106119/</a> 2. <a href="https://onlinecourses.nptel.ac.in/noc22_ce55/preview">https://onlinecourses.nptel.ac.in/noc22_ce55/preview</a> 3. <a href="https://archive.nptel.ac.in/courses/113/105/113105102/">https://archive.nptel.ac.in/courses/113/105/113105102/</a>



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25-BSC-1-03: Linear Algebra And Differential Calculus		
<b>Teaching Scheme:</b> Theory: 03 Hours/Week. Tutorial: 01 Hours/ Week.	<b>Credit:</b> TH : 4	<b>Evaluation Scheme:</b> <b>CIE</b> : 20 Marks. <b>MSE</b> : 20 Marks. <b>SEE</b> : 60 Marks.
<b>Prerequisites:</b> Basics of Differentiation, Basics of Integration, Maxima and Minima, Determinants and Basics of Matrices.		
<b>Companion Course:</b> ----		
<b>Course Objectives:</b> <ul style="list-style-type: none"> <li>To make the students familiarize with concepts and techniques in differential Calculus, and linear Algebra.</li> <li>The aim is to equip them with the techniques to understand advanced level mathematics and its applications that would enhance analytical thinking power, useful in the discipline</li> </ul>		
<b>Course Outcomes:</b> After completion of the course, learners should be able to		
CO No	CO	BL
C01	<b>Understand</b> the basic Concept.	2
C02	<b>Solve</b> the system of linear equation by using matrix method, ODE ,Partial Diff , find the Expansion of Function	3
C03	<b>Find</b> the Eigenvalue and Eigenvector. $N^{\text{th}}$ order derivatives, series by using Taylor's and McLaren's theorem.	3
C04	<b>Apply</b> theorem in Expansion, Leibnitz, Euler's theorems of Homogeneous Function, Cayley -Hamilton theorem.	3
C05	Analyze the Problems and <b>apply</b> the appropriate concept	3
C06	<b>Apply</b> the concept of Linear algebra, and differential calculus for real life engineering Problems.	3
Course Contents		
Unit I	Linear Algebra- Matrices ,System of linear equations	7 Hours

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Curriculum Structure and Evaluation Scheme  
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Rank of a Matrix, System of Linear Equations, Linear Dependence and Independence, Linear and Orthogonal Transformations, Application to problem in Engineering.		
<b>Exemplar/Case study:</b> Case study on matrices.		
<b>Assignment:</b> Assignment on System of, Linear Equations, Linear and Orthogonal Transformations		
<b>*Mapping of Course Outcomes</b>		<b>C01, C02, C06</b>
<b>Unit II</b>	<b>Linear Algebra- Eigenvalue and Eigenvector</b>	<b>7 Hours</b>
Eigenvalues and EigenVectors, Cayley Hamilton theorem, Diagonalization of a matrix, Reduction of Quadratic forms to Canonical form by Linear and Orthogonal transformation		
<b>Exemplar/Case Studies :</b> Case study on matrices eigenvalues and eigenvector		
<b>Assignment :</b> Assignment on Eigenvalues and EigenVectors, Reduction of Quadratic forms to Canonical form by Linear and Orthogonal transformations		
<b>*Mapping of Course Outcomes</b>		<b>C03, C04, C06</b>
<b>Unit III</b>	<b>Differential Calculus: Expansion And Indeterminate form</b>	<b>7 Hours</b>
Rolle's Theorem, Mean Value Theorems, Taylor's Series and Maclaurin's Series, Expansion of functions using standard expansions, Indeterminate Forms, L' Hospital's Rule, Evaluation of Limits and Applications.		
<b>exemplar/Case Studies :--</b>		
<b>Assignment :</b> Assignment on Mean Value Theorems, Taylor's Series ,Indeterminate Forms,		
<b>*Mapping of Course Outcomes</b>		<b>C01,C03, C04, C05</b>
<b>Unit IV</b>	<b>Ordinary Differential equations and its Application</b>	<b>7 Hours</b>
Exact differential equations, Equations reducible to exact form, Linear differential equations, Equations reducible to linear form, Applications of Differential Equations to Orthogonal Trajectories, Newton's Law of Cooling, Kirchhoff's Law of Electrical Circuits, One dimensional Conduction of Heat		
<b>exemplar/Case Studies: -</b>		
<b>Assignment :</b> Assignment on Differential equation and its Application		
<b>*Mapping of Course Outcomes</b>		<b>C01,C02, C05, C06</b>



SNJB's Late Sau. K. B. Jain College of Engineering, Chandwad  
(An Autonomous Institute Affiliated to Savitribai Phule Pune University, Pune)  
Curriculum Structure and Evaluation Scheme  
To be implemented for 2025-29 Batch

Unit V	Successive Differentiation and Linear Differential Equation	7 Hours
Successive Differentiation, Leibnitz Theorem, DE of nth order with constant coefficients, Complementary Function, Particular Integral, General method, Shot -cut methods, Method of variation of parameters.		
<b>Example/Case Studies:</b> -		
<b>Assignment:</b> Assignment on Linear Differential Equation & Successive Differentiation.		
<b>*Mapping of Course Outcomes</b>		<b>C01,C02, C04, C05</b>
Unit VI	Partial Differentiations and its Applications	7 Hours
Introduction to Partial Derivatives, Euler's Theorem on Homogeneous functions, Partial derivative of Composite Function, Total Derivative, Its applications Maxima and Minima of functions of two variables, Lagrange's method of undetermined multipliers.		
<b>exemplar/Case Studies:</b> -		
<b>Assignment :</b> Assignment on Partial Differential equation and its Application		
<b>*Mapping of Course Outcomes</b>		<b>C01,C02, C04, C05, C06</b>
Learning Resources		
<b>Text Books</b>		
<b>T1.</b> .B. V. Ramana, "Higher Engineering Mathematics", (Tata McGraw Hill) (2017, 29 <sup>th</sup> edition) <b>T2.</b> B. S. Grewal, "Higher Engineering Mathematics ", (Khanna Publication, Delhi(2014. 2 <sup>nd</sup> edition )		
<b>Reference Books :</b>		
<b>R1.</b> Erwin Kreyszig, " Advanced Engineering Mathematics", (Wiley Eastern Ltd.), (2014, 9 <sup>th</sup> edition ) <b>R2.</b> M. D. Greenberg, "Advanced Engineering Mathematics", (Pearson Education), (2014. 2 <sup>nd</sup> edition) <b>R3.</b> Peter V. O'Neil, " Advanced Engineering Mathematics ", (Thomson Learning), (2013,7 <sup>th</sup> edition)		
<b>Additional Resources: (Books, e-Resources)</b> <a href="https://discovery1.delnet.in/Search/Results?lookfor=B.+V.+Ramana&amp;type=Author&amp;location_code=&amp;limit=60">https://discovery1.delnet.in/Search/Results?lookfor=B.+V.+Ramana&amp;type=Author&amp;location_code=&amp;limit=60</a> <b>2.</b> <a href="https://discovery1.delnet.in/Search/Results?lookfor=B.+S.+Grewal&amp;type=Author&amp;location_code=&amp;limit=60">https://discovery1.delnet.in/Search/Results?lookfor=B.+S.+Grewal&amp;type=Author&amp;location_code=&amp;limit=60</a> <b>3.</b> <a href="https://discovery1.delnet.in/Search/Results?lookfor=Erwin+Kreyszig&amp;type=Author&amp;location_code=&amp;limit=60">https://discovery1.delnet.in/Search/Results?lookfor=Erwin+Kreyszig&amp;type=Author&amp;location_code=&amp;limit=60</a> <b>4.</b> <a href="https://discovery1.delnet.in/Search/Results?lookfor=M.+D.+Greenberg+&amp;type=Author&amp;location_code=&amp;limit=60">https://discovery1.delnet.in/Search/Results?lookfor=M.+D.+Greenberg+&amp;type=Author&amp;location_code=&amp;limit=60</a> <b>5.</b> <a href="https://discovery1.delnet.in/Search/Results?lookfor=Peter+V.+O&amp;type=Author&amp;location_code=&amp;limit=60">https://discovery1.delnet.in/Search/Results?lookfor=Peter+V.+O&amp;type=Author&amp;location_code=&amp;limit=60</a> <b>6.</b> <a href="https://discovery1.delnet.in/Search/Results?lookfor=George+B.+Thomas&amp;type=Author&amp;location_code=&amp;limit=60">https://discovery1.delnet.in/Search/Results?lookfor=George+B.+Thomas&amp;type=Author&amp;location_code=&amp;limit=60</a> <b>7.</b> <a href="https://discovery1.delnet.in/Search/Results?lookfor=P.N.Wartika&amp;type=Author&amp;location_code=&amp;limit=60">https://discovery1.delnet.in/Search/Results?lookfor=P.N.Wartika&amp;type=Author&amp;location_code=&amp;limit=60</a> <b>8.</b> <a href="https://discovery1.delnet.in/Search/Results?lookfor=Ron+Larson%2C&amp;type=Author&amp;location_code=&amp;limit=60">https://discovery1.delnet.in/Search/Results?lookfor=Ron+Larson%2C&amp;type=Author&amp;location_code=&amp;limit=60</a>		

SNJB's Late Sau. K. B. Jain College of Engineering, Chandwad  
(An Autonomous Institute Affiliated to Savitribai Phule Pune University, Pune)  
Curriculum Structure and Evaluation Scheme  
To be implemented for 2025-29 Batch

25-ESC-1-03: Engineering Graphics		
<b>Teaching Scheme:</b> Theory: 03 Hours/Week	<b>Credit:</b> 03	<b>Examination Scheme:</b> <b>CIE</b> : 20 Marks <b>MSE</b> : 20 Marks <b>SEE</b> : 60 Marks
<b>Prerequisites Courses:</b> Basic Knowledge of geometrical shapes and its construction.		
<b>Companion Course:</b> 25-ESC-1-08: Engineering Graphics Lab		
<b>Course Objectives:</b> <ul style="list-style-type: none"> <li>• Introduce fundamental principles of Engineering Drawing.</li> <li>• Teach different projection methods such as orthographic, isometric.</li> <li>• Familiarize students with technical drawing techniques.</li> <li>• Educate on dimensioning standards and specifications in engineering drawings.</li> <li>• Enhance communication skills through graphical representation of design concepts.</li> </ul>		
<b>Course Outcomes:</b> After completion of the course, learners should be able to		
CO No	CO	BL
C01	<b>Visualize</b> and effectively communicate engineering ideas through graphical representation.	3
C02	<b>Utilize</b> drawing instruments and effectively produce drawings with appropriate dimensioning styles.	3
C03	<b>Understand</b> basic principles of engineering graphics to solve simple design and drafting of engineering application Problems.	3
C04	<b>Apply</b> the theory of projection for line, curves, planes and solids.	3
C05	<b>Draw</b> orthographic projections and isometric views using theory of projection.	3
Course Contents		
Unit I	Projection of Point and line	6 Hours
<b>Fundamentals of Engineering Drawing:</b> Need of Engineering Drawing and design, introduction of drawing instruments and their		

SNJB's Late Sau. K. B. Jain College of Engineering, Chandwad  
(An Autonomous Institute Affiliated to Savitribai Phule Pune University, Pune)  
Curriculum Structure and Evaluation Scheme  
To be implemented for 2025-29 Batch

uses, Sheet layout, Line types and dimensioning and simple geometrical constructions		
<b>Projection of points and lines:</b> Theory of projection, Projection of a Point in first quadrant, Projection of line inclined to both Principle planes (First angle of method of projection only).		
<b>#Exemplar/Case Studies:</b> <ul style="list-style-type: none"> <li>Redraw the given drawing and identify different types of lines, and dimension style used</li> </ul>		
<b>*Mapping of Course Outcomes</b>		CO1, CO2,CO3, CO4, CO5
<b>Unit II</b>	<b>Projection of planes</b>	<b>6 Hours</b>
Projection of regular planes on auxiliary and reference planes by first angle method only, projection of planes- Triangular plane, Quadrilateral Planes, Pentagonal plane, Hexagonal plane and Circular plane etc., Plane inclined to both principle planes.		
<b>#Exemplar/Case Studies:</b> <ul style="list-style-type: none"> <li>Draw F.V, T.V. &amp; S.V. of a given 2D planes like Triangle, Rectangle, Pentagon, Hexagon, Circle</li> </ul>		
<b>*Mapping of Course Outcomes</b>		CO1, CO2,CO3, CO4, CO5
<b>Unit III</b>	<b>Development of Lateral Surfaces</b>	<b>6 Hours</b>
Introduction to development of lateral surfaces and its industrial applications. Draw the development of lateral surfaces for cut sections of cone, pyramid, prism, Cylinder etc. resting on H.P.		
<b>#Exemplar/Case Studies:</b> <ul style="list-style-type: none"> <li>Draw lateral development of any real life product and to make 3D models using card sheet or sheet metal.</li> </ul>		
<b>*Mapping of Course Outcomes</b>		CO1, CO2,CO3, CO4, CO5
<b>Unit IV</b>	<b>Engineering Curves</b>	<b>6 Hours</b>
Introduction to conic sections and its real world applications, various methods to construct the conic sections, Helix for Cone and Cylinder, Rolling Curves (Involute, Cycloid) and Spiral		
<b>#Exemplar/Case Studies:</b> <ul style="list-style-type: none"> <li>Identify different conic sections used in a real life product or phenomena and to draw it using applicable method.</li> </ul>		
<b>*Mapping of Course Outcomes</b>		CO1, CO2,CO3, CO4, CO5
<b>Unit V</b>	<b>Orthographic Projection</b>	<b>6 Hours</b>
Introduction to First and Third angle Projection methods, Orthographic projection of machine elements/parts along with		

SNJB's Late Sau. K. B. Jain College of Engineering, Chandwad  
(An Autonomous Institute Affiliated to Savitribai Phule Pune University, Pune)  
Curriculum Structure and Evaluation Scheme  
To be implemented for 2025-29 Batch

sectional view by first angle method.		
<b>#Exemplar/Case Studies:</b> <ul style="list-style-type: none"> <li>Measure the dimension of any real life product and draw its orthographic views with dimensions using suitable scale.</li> </ul>		
<b>*Mapping of Course Outcomes</b>		CO1, CO2,CO3, CO4, CO5
<b>Unit VI</b>	<b>Isometric Projection</b>	<b>6 Hours</b>
Introduction to isometric projection, oblique projection and perspective projection. Draw the isometric projection from the given orthographic views.		
<b>#Exemplar/Case Studies:</b> <ul style="list-style-type: none"> <li>Read and measure the dimension of any real life product and draw its Isometric views with dimensions using suitable scale.</li> </ul>		
<b>*Mapping of Course Outcomes</b>		CO1, CO2,CO3, CO4, CO5
<b>Learning Resources</b>		
<b>Text Books</b>		
T1: K. Venugopal, K, , "Engineering and Graphics", New Age International, New Delhi,2015 T2: Jolhe, D. A., (2015), "Engineering Drawing with introduction to AutoCAD", Tata McGraw Hill, New Delhi,2015. T3:Bhatt, N. D. and Panchal, V. M., (2016), "Engineering Drawing", Charotar Publication, Anand, India,2016.		
<b>Reference Books :</b>		
R1. B. Bhattacharyya, S.C. Bera "Engineering graphics" I.K. International Publishing House Pvt.Ltd. New Delhi..		



SNJB's Late Sau. K. B. Jain College of Engineering, Chandwad  
(An Autonomous Institute Affiliated to Savitribai Phule Pune University, Pune)  
Curriculum Structure and Evaluation Scheme  
To be implemented for 2025-29 Batch

25-ESC-1-04 : Smart Building and Materials																							
<b>Teaching Scheme:</b> Theory: 2 Hours/Week	<b>Credit:</b> 2	<b>Examination Scheme:</b> <b>CIE :</b> 20 Marks <b>MSE :</b> 20 Marks <b>SEE :</b> 60 Marks																					
<b>Prerequisite Courses:</b> Green Building.																							
<b>Companion Course:</b> 25-ESC-1-09 : Smart Building and Materials Lab.																							
<b>Course Objectives:</b> <ul style="list-style-type: none"> <li>• To acquire the knowledge of modern tools and softwares.</li> <li>• To know the rules of building bylaws.</li> <li>• To learn the concept of intelligent buildings.</li> <li>• To study the different types of construction materials.</li> </ul>																							
<b>Course Outcomes:</b> After completion of the course, learners should be able to <table border="1" data-bbox="203 1081 1502 1564"> <thead> <tr> <th>CONo</th><th>CO</th><th>BL</th></tr> </thead> <tbody> <tr> <td>CO1</td><td>Draw effectively building plan using Computer Aided Drafting software.</td><td>3</td></tr> <tr> <td>CO2</td><td>Understand principles of building planning, bylaws, set back distance etc.</td><td>3</td></tr> <tr> <td>CO3</td><td>Acquire skills and its applications using GIS.</td><td>2</td></tr> <tr> <td>CO4</td><td>Describe the various modern tools of surveying.</td><td>3</td></tr> <tr> <td>CO5</td><td>Understand the concept of conventional and intelligent building.</td><td>2</td></tr> <tr> <td>CO6</td><td>Acquire the knowledge of conventional and smart materials of construction.</td><td>2</td></tr> </tbody> </table>			CONo	CO	BL	CO1	Draw effectively building plan using Computer Aided Drafting software.	3	CO2	Understand principles of building planning, bylaws, set back distance etc.	3	CO3	Acquire skills and its applications using GIS.	2	CO4	Describe the various modern tools of surveying.	3	CO5	Understand the concept of conventional and intelligent building.	2	CO6	Acquire the knowledge of conventional and smart materials of construction.	2
CONo	CO	BL																					
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CO5	Understand the concept of conventional and intelligent building.	2																					
CO6	Acquire the knowledge of conventional and smart materials of construction.	2																					
Course Contents																							
<b>Unit I</b>	<b>Introduction to Computer aided Drafting</b>	<b>6 Hours</b>																					
Introduction to Computer Aided Drafting (2D), Concept of AutoCAD, Toolbars in CAD software, coordinate system, snap, grid, and ortho mode (Absolute, Relative and Polar), setting of units and layout, Drawing commands – point, line, arc, circle, ellipse, Editing																							



SNJB's Late Sau. K. B. Jain College of Engineering, Chandwad  
(An Autonomous Institute Affiliated to Savitribai Phule Pune University, Pune)  
Curriculum Structure and Evaluation Scheme  
To be implemented for 2025-29 Batch

commands – scale, erase, copy, stretch, lengthen and explode, Dimensioning and placing text in drawing area, Sectioning and hatching, Create layers within a drawing, Specifying Geometric.		
<b>#Exemplar/Case Studies :</b> – Develop the line plan of the building using AutoCAD software.		
<b>*Mapping of Course Outcomes</b>		<b>C01</b>
<b>Unit II</b>	<b>Building Layout and Planning</b>	<b>6 Hours</b>
Principles of Building Planning, Classification of buildings, building bylaws, concept of set back distance.		
<b>#Exemplar/Case Studies :</b> –		
<b>*Mapping of Course Outcomes</b>		<b>C02</b>
<b>Unit III</b>	<b>Introduction to GIS &amp; GPS</b>	<b>6 Hours</b>
GPS - Introduction to GPS, Overview of GPS, GPS Segments, Types of GPS, GPS Applications:- GPS for utilities industry, Forestry and natural resources, Precision Farming. GIS - Basic Concept of GIS, Definition and history of GIS, Components of GIS, Recent trends and applications of GIS, Important applications of GIS.		
<b>#Exemplar/Case Studies :</b> –		
<b>*Mapping of Course Outcomes</b>		<b>C03</b>
<b>Unit IV</b>	<b>Introduction to modern testing tools</b>	<b>6 Hours</b>
Measurement of distance and area by EDM and Digital Planimeter. Basics of modern surveying tools like theodolite, total station.		
<b>#Exemplar/Case Studies</b>		
<b>*Mapping of Course Outcomes</b>		<b>C04</b>
<b>Unit V</b>	<b>Intelligent Building</b>	<b>6 Hours</b>
Index-IBI), Difference between a conventional building and an intelligent building, Basic parameters for designing building lighting, Mechanical Transport and Safety (Elevators, lifts, local regulations on lift and elevator, new development in elevator technology), Life Value of Building, Fire detection and safety, Gas alarm, emergency evacuation systems		
<b>#Exemplar/Case Studies:</b> A Field Visit to study intelligent building features of a building		
<b>*Mapping of Course Outcomes</b>		<b>C05</b>

SNJB's Late Sau. K. B. Jain College of Engineering, Chandwad  
(An Autonomous Institute Affiliated to Savitribai Phule Pune University, Pune)  
Curriculum Structure and Evaluation Scheme  
To be implemented for 2025-29 Batch

Unit VI	Introduction to Conventional Materials & Smart Materials	6 Hours
Conventional materials: Stones, Lime, Bricks, Cement, Timber, Steel, Tiles, cementitious materials like fly ash, pond ash, rice husk ash, ground granulated blast furnace slag. Smart materials: Piezoelectric Materials, Shape Memory Alloys, Magnetostrictive Materials, Electrochromic materials, Fibers, Sensors.		
#Exemplar/Case Studies:		
*Mapping of Course Outcomes	C06	
Learning Resources		
Text Books		
T1: T. Jeyapooran, “Engineering Drawing with AutoCAD 2000”, Vikas Publishing House, Delhi, 2010 T2: Dr. B.C. Punmia   Er. Ashok K. Jain   Dr. Arun K. Jain, “Surveying” Laxmi Publication, 2016		
Reference Books :		
R1: Panda B C, “Principles of Remote Sensing”, Viva Books Private Limited, 2005 R2: Gurucharan Singh, “Building Planning, Scheduling and Design”, 2 nd Edition, Khanna Publishers, 2010. R3.: Kailas Phalak, Kisan Bidkar, “Intelligent Building” Lambert Academic Publishing, 2019		
Additional Resources: (Books, e-Resources) : -		
MOOC Courses links : NPTEL : <a href="https://nptel.ac.in/courses/105108077">https://nptel.ac.in/courses/105108077</a> NPTEL : <a href="https://nptel.ac.in/courses/112102101">https://nptel.ac.in/courses/112102101</a> NPTEL : <a href="https://archive.nptel.ac.in/courses/105/102/105102088/">https://archive.nptel.ac.in/courses/105/102/105102088/</a>		

SNJB's Late Sau. K. B. Jain College of Engineering, Chandwad  
(An Autonomous Institute Affiliated to Savitribai Phule Pune University, Pune)  
Curriculum Structure and Evaluation Scheme  
To be implemented for 2025-29 Batch

25-BSC-1-06: Engineering Chemistry Lab		
<b>Teaching Scheme:</b> Practical: 02 Hours/Week	<b>Credit:</b> 01	<b>Evaluation Scheme:</b> Termwork (TW) : 25 Marks
<b>Prerequisites:</b> 11 th and 12 th Science Chemistry Basic knowledge		
<b>Companion Course:</b> 25-BSC-1-02 : Engineering Chemistry		
<b>Course Objectives:</b> <ul style="list-style-type: none"> <li>To familiarize students with titration, spectroscopic analysis, and other typical laboratory procedures utilized in engineering.</li> <li>Introducing students to standard laboratory tools and apparatus utilized in chemical analysis and experimentation.</li> <li>To enhance students' ability to communicate scientific results in writing and oral forms through laboratory reports.</li> <li>To promote professional and ethical behavior in laboratory work, including honesty, cooperation, and time management.</li> </ul>		
<b>Course Outcomes:</b> After completion of the course, learners should be able to		
CONo	Course outcomes	BL
CO1	<b>Apply</b> analytical techniques to determine water hardness, alkalinity, demonstrating an understanding of water quality parameters.	4
CO2	<b>Utilize</b> a colorimeter to measure the maximum absorption wavelength and determine the unknown concentration of a sample, showcasing competence in spectrophotometric methods.	4
CO3	Synthesize polymers, biodiesel from oil, semiconductor quantum dots, <b>acquiring</b> practical expertise in material synthesis and renewable energy sources.	3
CO4	<b>Employ</b> Mohr's Method to estimate chloride content and determine the strength of a strong acid using a conductometer, pH meter expanding their analytical toolkit.	4



SNJB's Late Sau. K. B. Jain College of Engineering, Chandwad  
(An Autonomous Institute Affiliated to Savitribai Phule Pune University, Pune)  
Curriculum Structure and Evaluation Scheme  
To be implemented for 2025-29 Batch

<b>C05</b>	<b>Utilize</b> a Bomb calorimeter and Proximate Analysis to determine the calorific value and composition of a solid fuel, understanding the energy content of fuels.	<b>3</b>
<b>C06</b>	<b>Apply</b> electroplating to coat copper on iron, demonstrating knowledge of electrodeposition techniques (ECE).	<b>3</b>

#### Guidelines for Instructor's Manual

The instructor's manual is to be developed as a reference and hands-on resource. It should include prologue (about University/program/ institute/ department/foreword/ preface), curriculum of the course, conduction and Assessment guidelines, topics under consideration, concept, objectives, outcomes, set of typical applications/assignments/ guidelines, and references.

#### Guidelines for Student's Laboratory Journal

The laboratory assignments are to be submitted by students in the form of a journal. Journal consists of Certificate, table of contents, and handwritten write-up of each assignment. Write-up should include Title, Date of Completion, Objectives, diagram, working principle, procedure, observations, graphs, calculations, conclusion and questions, Assessment grade/marks and assessor's sign, Theory- Concept in brief). For reference one or two journals may be maintained in the Laboratory.

#### Guidelines for Laboratory /Term Work Assessment

Continuous assessment of laboratory work should be based on overall performance of Laboratory assignments by a student. Each Laboratory assignment assessment will assign grade/marks based on parameters, such as timely completion, performance, understanding, and presentation/journal writing.

#### Guidelines for Laboratory Conduction

1. The teacher will brief the given experiment to students, its procedure, observations calculation, and outcome of this experiment.
2. Apparatus, chemicals, solutions and equipment required for given experiment will be provided by the lab assistants
3. Students will perform the same experiment in a group under the supervision of faculty and lab assistants. After performing the experiment students will check their readings, and calculations from their respective teacher.
4. Students follow lab guideline as given below
  - Follow lab timings strictly.
  - Keep your belongings and bags in the rack.

SNJB's Late Sau. K. B. Jain College of Engineering, Chandwad  
(An Autonomous Institute Affiliated to Savitribai Phule Pune University, Pune)  
Curriculum Structure and Evaluation Scheme  
To be implemented for 2025-29 Batch

- Use instruments of the lab properly.
- Use fans and tubes of the lab only if required.
- Do not disturb an arranged set of practicals.
- Never work alone in the laboratory.
- Never begin working, until your instructor arrives.
- Never bring smoking materials, food or drink into the chemistry lab.
- Many laboratory chemicals are poisonous. Never taste a chemical or a solution.
- Do not use broken or cracked glass equipment.
- Read the label carefully before removing a chemical from a container.
- Do not pipette out any concentrated acids, alkalis and buffer solutions.
- While diluting H<sub>2</sub>SO<sub>4</sub>, pour the acid very slowly into water with constant stirring. Do not add water to the acid.
- Use tongs wherever necessary especially when you have to pick up hot objects.
- Arrange the stools properly after use.
- Handle apparatus with care and wash them thoroughly before and after use.
- At once report all accidents to your teacher.
- Get your write up checked regularly and in time.

**Virtual Laboratory: (If Any):-**

1. <https://vlab.amrita.edu/?sub=2>
2. <https://chemistryvl.pict.edu/#/>
3. <https://www.olabs.edu.in/?pg=topMenu&id=41>

**Suggested List of Laboratory Experiments/Assignments(Any Eight)**

Sr No	Assignment Title	Mapping of Course Outcomes
1.	Water Analysis: Determination of total hardness of water by the EDTA method for its quality analysis	CO1
2.	Water Analysis: Determination of Alkalinity of water	CO1
3.	Acid-Base Titration: Determination of the strength of a strong acid using a pH meter	CO4
4.	Spectrophotometry: Measurement of the maximum absorption wavelength of a sample and determination of its unknown concentration using a colorimeter.	CO2

SNJB's Late Sau. K. B. Jain College of Engineering, Chandwad  
(An Autonomous Institute Affiliated to Savitribai Phule Pune University, Pune)  
Curriculum Structure and Evaluation Scheme  
To be implemented for 2025-29 Batch

5.	Electrochemical Techniques (ECE): To coat copper on an iron plate using electroplating.	C06
6.	Fuel Analysis: Proximate analysis of coal to understand its composition.	C05
7.	Polymer Synthesis: Preparation of Phenol Formaldehyde / Urea Formaldehyde resin.	C03
8.	Biodiesel Production: Preparation of biodiesel from oil.	C03
9.	Fuel Analysis: Determine the calorific value of given solid fuel by using Bomb calorimeter.	C05
10.	Nanomaterial Synthesis: Colloidal synthesis of 2-6 or 3-5 semiconductor quantum dots nanoparticles	C03
11.	Quantitative Analysis: Estimation of Chloride content by Mohr's Method	C04
12.	Acid -Base Titration: Determination of strength of strong acid using a Conductometer.	C04

#### Learning Resources

##### Text Books :

- T1.** O.P. Varmani and A.K.Narula, "Applied Chemistry 'Theory and Practice", 2ed, New Age International Publishers, New Delhi 2012.
- T2.** S.K.Bhasin and Sudha Rani, "Laboratory manuals on Engg.Chemistry", 3 ed, Dhanpat Rai publishing company (Pvt) Ltd, New Delhi-2012.
- T3.** Archana Thakur, "Practical Engineering Chemistry", Alpha Science International Limited, 2019

##### Reference Book :

- R1.** G. R. Chatwal & S. K. Anand, "Instrumental Methods of Chemical Analysis", Himalaya Publishing House. 2019

##### Additional Resources: (Books, e-Resources)

[G. H. Jeffery J. Bassett J. Mendham R C. Denney, "Textbook of Quantitative Chemical Analysis", 5th Edition](#)

SNJB's Late Sau. K. B. Jain College of Engineering, Chandwad  
(An Autonomous Institute Affiliated to Savitribai Phule Pune University, Pune)  
Curriculum Structure and Evaluation Scheme  
To be implemented for 2025-29 Batch

25-ESC-1-08: Engineering Graphics Lab																							
<b>Teaching Scheme:</b> Practical: 2 Hours/Week	<b>Credit:</b> 01	<b>Examination Scheme:</b> Term work (TW) : 25 Marks																					
<b>Prerequisites Courses:</b> Basic Knowledge of geometrical shapes, its construction and knowledge of computer handling.																							
<b>Companion Course:</b> 25-ESC-1-03: Engineering Graphics																							
<b>Course Objectives:</b> <ul style="list-style-type: none"> <li>• Introduce fundamental principles of Engineering Drawing.</li> <li>• Educate on dimensioning standards and specifications in engineering drawings.</li> <li>• Teach different projection methods such as orthographic, isometric.</li> <li>• Provide hands-on training in CAD software for graphical communication.</li> <li>• Enhance communication skills through graphical representation of design concepts.</li> </ul>																							
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<b>Guidelines for Student's Laboratory Journal</b> The laboratory assignments are to be submitted by students in the form of a bunch of sheets. Bunch																							



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(An Autonomous Institute Affiliated to Savitribai Phule Pune University, Pune)  
Curriculum Structure and Evaluation Scheme  
To be implemented for 2025-29 Batch

consists of Certificate, table of contents, and hand drawn sheets along with CAD Printout of each assignment (Title of assignment, Date of Completion, date of submission, Scale used, name of students, roll number, branch and division etc.) in a prescribed template provided on printed A2 size (594mm X 420mm) sheet.

### Guidelines for Laboratory /Term Work Assessment

Continuous assessment of laboratory work should be based on overall performance of Laboratory assignments by a student. Each Laboratory assignment assessment will assign marks based on the rubrics of evaluation prepared by course instructor, such as Proper Line Types, Graphically Accurate, Dimensions and Timely Submission for manual assessment and for CAD sheet assessment will be based on accuracy of dimension, level of detailing, use of CAD features and timely submission.

### Guidelines for Laboratory Conduction

**Group-A:** Draw minimum one problem on each assignment on A2 size drawing sheet and same problem using CAD software. During the practical sessions the practice of drawing and familiarization with CAD software can be initially done for 2 to 3 practical sessions. After having hands-on experience with drawing instruments and CAD Software students have to draw the simple as well as some complex problems.

**Group-B:** Students have to solve a minimum of one assignment from group B by using CAD Software.

### Suggested List of Laboratory Assignments

#### Group A: Assignments (Mandatory Assignment)

Sr No	Assignment Title	*Mapping of Course Outcomes
1.	Draw projection of lines inclined to both principal planes.	C01, C06
2.	Draw Projection of different 2D planes inclined to both principal planes.	C01, C02, C06
3.	Draw the development of the lateral surface of a solids/ truncated solids.	C01, C02, C03, C06
4.	Construct Engineering curves	C01, C02, C03, C04, C06
5.	Draw orthographic and Isometric views of a given object.	C01, C02, C03, C04, C05, C06
6.	Draw projection of lines inclined to both principal planes.	C01, C06



SNJB's Late Sau. K. B. Jain College of Engineering, Chandwad  
(An Autonomous Institute Affiliated to Savitribai Phule Pune University, Pune)  
Curriculum Structure and Evaluation Scheme  
To be implemented for 2025-29 Batch

Group B: Assignments (Out of List perform minimum 1)		
Sr No	Assignment Title	*Mapping of Course Outcomes
1.	Draw the Orthographic and isometric views of a Workshop Job prepared during the workshop practice using CAD software.	C01, C02, C03, C04, C05, C06
2.	Draw Orthographic and isometric projection of desktop monitor / CPU Box / Mouse using CAD software.	C01, C02, C03, C04, C05, C06
3.	Draw Simple elevation and plan of Floor of own house using CAD software.	C01, C02, C03, C04, C05, C06
Learning Resources		
Text Books		
T1: K. Venugopal, K, (2015), "Engineering and Graphics", New Age International, New Delhi. T2: Jolhe, D. A., (2015), "Engineering Drawing with introduction to AutoCAD", Tata McGraw Hill, New Delhi. T3: Bhatt, N. D. and Panchal, V. M., (2016), "Engineering Drawing", Charotar Publication, Anand, India.		
Reference Books :		
R1. B. Bhattacharyya, S.C. Bera 'Engineering graphics' I.K. International Publishing House Pvt.Ltd. New Delhi. R2. Sham Tickoo, Vivek Kumar Singh, Swapna D 'Auto CAD for Engineers and Designers (2023)' dreamTech Press.		

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(An Autonomous Institute Affiliated to Savitribai Phule Pune University, Pune)  
Curriculum Structure and Evaluation Scheme  
To be implemented for 2025-29 Batch

25-ESC-1-09 : Smart Building And Materials Lab																				
<b>Teaching Scheme:</b> Practical: 2 Hours/Week	<b>Credit:</b> 1	<b>Examination Scheme:</b> Termwork (TW) : 25 Marks																		
<b>Prerequisites Courses:</b> -----																				
<b>Companion Course:</b> -----																				
<b>Course Objectives:</b> <ul style="list-style-type: none"> <li>• To understand basic principles of building planning.</li> <li>• To acquire the knowledge of modern tools.</li> <li>• Identify various building materials and their structural requirements.</li> <li>• To learn the fundamentals of GIS and GPS</li> </ul>																				
<b>Course Outcomes:</b> After completion of the course, learners should be able to <table border="1" data-bbox="215 1045 1466 1455"> <thead> <tr> <th>CONo</th><th>CO</th><th>BL</th></tr> </thead> <tbody> <tr> <td>C01</td><td>Draw the building plan using Autocad</td><td>3</td></tr> <tr> <td>C02</td><td>Understand the use of modern tools</td><td>3</td></tr> <tr> <td>C03</td><td>Understand the basics of construction materials.</td><td>2</td></tr> <tr> <td>C04</td><td>Demonstrate applications of GIS and GPS</td><td>2</td></tr> <tr> <td>C05</td><td>Get the knowledge of intelligent building.</td><td>2</td></tr> </tbody> </table>			CONo	CO	BL	C01	Draw the building plan using Autocad	3	C02	Understand the use of modern tools	3	C03	Understand the basics of construction materials.	2	C04	Demonstrate applications of GIS and GPS	2	C05	Get the knowledge of intelligent building.	2
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<b>Guidelines for Instructor's Manual</b> The instructor's manual is to be developed as a reference and hands-on resource. It should include a prologue (about University/program/ institute/ department/foreword/ preface), curriculum of the course, conduction and Assessment guidelines, topics under consideration, concept, objectives, outcomes, set of typical applications/assignments/ guidelines, and references.																				
<b>Guidelines for Student's Laboratory Journal</b> The laboratory assignments are to be submitted by students in the form of a journal. Journal consists of Certificate, table of contents, and handwritten write-up of each assignment (Title, Date of Completion, Objectives, Problem Statement,, Assessment																				



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(An Autonomous Institute Affiliated to Savitribai Phule Pune University, Pune)  
Curriculum Structure and Evaluation Scheme  
To be implemented for 2025-29 Batch

grade/marks and assessor's sign, Theory- Concept in brief, test cases, Test Data Set(if applicable), conclusion/analysis. For reference one or two journals may be maintained in the Laboratory.

### Guidelines for Laboratory /Term Work Assessment

Continuous assessment of laboratory work should be based on the overall performance of Laboratory assignments by a student. Each Laboratory assignment assessment will assign grades/marks based on parameters, such as timely completion, performance, innovation, efficient codes, and punctuality.

### Guidelines for Laboratory Conduction

1. All the experiments mentioned in the syllabus are compulsory.
2. Experiments should be performed in the group of 4-5 students.
3. Use of open source software and recent versions is to be encouraged.

### Suggested List of Laboratory Experiments/Assignments

#### Group A: Assignments (Mandatory Assignment)

Sr No	Assignment Title	*Mapping of Course Outcomes
1.	2 D Drawing using Autocad	C01, C02
2.	Preparation of Line plan / center line plan using Cad.	C01, C02
3.	Distance measurement using EDM	C02
4.	Field test of materials: Bricks, Cement.	C03
5.	Area calculation by digital Planimeter	C02

#### Group B: Assignments (Out of List perform any 2) (Optional)

Sr No	Assignment Title	*Mapping of Course Outcomes
1.	Assignment on GIS and GPS	C04
2.	Assignment on Life Value of Building	C05
3.	Assignment on Day light system	C05

#### Group C: Assignments (if Any) <<Mini Project/Field Visit Etc>>

Sr No	Assignment Title	*Mapping of Course Outcomes
1.	Site visit on construction site	C03



SNJB's Late Sau. K. B. Jain College of Engineering, Chandwad  
(An Autonomous Institute Affiliated to Savitribai Phule Pune University, Pune)  
Curriculum Structure and Evaluation Scheme  
To be implemented for 2025-29 Batch

Learning Resources (If applicable)
<b>Text Books</b>
T1.:P. NageswaraRao "AutoCAD for Engineering Drawing Made Easy", Tata McGraw Hill, New Delhi. T2: M. Anji Reddy, "Remote Sensing & Geographical Information System", BS Publications, Hyderabad.
<b>Reference Books :</b>
R1: John R. Jensen, "Remote Sensing & Digital Image Processing", Department of Geography University of South Carolina Columbia, Pearson Prentice Hall,2007
<b>Additional Resources: (Books, e-Resources)</b> <ul style="list-style-type: none"><li>• <a href="https://www.youtube.com/watch?v=cmR9cfWJRUI">https://www.youtube.com/watch?v=cmR9cfWJRUI</a></li></ul>



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(An Autonomous Institute Affiliated to Savitribai Phule Pune University, Pune)  
Curriculum Structure and Evaluation Scheme  
To be implemented for 2025-29 Batch

25-VSC-1-02: TechShop																							
<b>Teaching Scheme:</b> Practical: 4 Hours/Week	<b>Credit: 2</b>	<b>Examination Scheme:</b> Termwork (TW) : 50 Marks																					
<b>Prerequisites Courses:</b> Basic safety rules, basic knowledge of geometrical drawing																							
<b>Course Objectives:</b> <ul style="list-style-type: none"> <li>• To develop students' skill sets in various construction activities in Civil Engineering.</li> <li>• To impart the basic knowledge and understanding related to building construction.</li> <li>• To provide exposure to the students with hands-on experience in various basic engineering practices in automobiles.</li> <li>• To know the function of engine and gear oil used in vehicles.</li> <li>• To understand workshop practices and safety Norms.</li> <li>• To know the various manufacturing shops in the workshop.</li> </ul>																							
<b>Course Outcomes:</b> After completion of the course, learners should be able to <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>CO No</th><th>CO</th><th>BL</th></tr> </thead> <tbody> <tr> <td>C01</td><td><b>Illustrate</b> the importance of various construction materials and activities.</td><td>3</td></tr> <tr> <td>C02</td><td><b>Perform</b> on site construction activities (Lineout, masonry, Casting etc.)</td><td>3</td></tr> <tr> <td>C03</td><td><b>Use</b> different tools and equipment for removal of wheel, puncture of tyre cleaning of spark Plug and battery terminals of vehicles</td><td>3</td></tr> <tr> <td>C04</td><td><b>Select</b> appropriate engine and gear oil for a particular vehicle</td><td>3</td></tr> <tr> <td>C05</td><td><b>Apply</b> the safety precautions/practices in the workshop</td><td>3</td></tr> <tr> <td>C06</td><td><b>Illustrate</b> the various manufacturing processes used in the workshop.</td><td>3</td></tr> </tbody> </table>			CO No	CO	BL	C01	<b>Illustrate</b> the importance of various construction materials and activities.	3	C02	<b>Perform</b> on site construction activities (Lineout, masonry, Casting etc.)	3	C03	<b>Use</b> different tools and equipment for removal of wheel, puncture of tyre cleaning of spark Plug and battery terminals of vehicles	3	C04	<b>Select</b> appropriate engine and gear oil for a particular vehicle	3	C05	<b>Apply</b> the safety precautions/practices in the workshop	3	C06	<b>Illustrate</b> the various manufacturing processes used in the workshop.	3
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<b>Guidelines for Instructor's Manual</b>  The instructor's manual shall contain: <ul style="list-style-type: none"> <li>• The production drawing of a job with all linear and geometric dimensions,</li> </ul>																							

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(An Autonomous Institute Affiliated to Savitribai Phule Pune University, Pune)  
Curriculum Structure and Evaluation Scheme  
To be implemented for 2025-29 Batch

<ul style="list-style-type: none"> <li>• Raw material, size and shape, and allowances provided.</li> <li>• List of drawings and tools required.</li> <li>• Process plan to complete the job.</li> <li>• General safety instructions.</li> </ul>		
<p style="text-align: center;"><b>Guidelines for Student's Laboratory Journal</b></p> <ul style="list-style-type: none"> <li>• The student has to maintain a file consisting of drawings/sketches of the jobs and a brief description of tools, equipment, and procedures used for doing the job and schedule.</li> <li>• The student has to maintain one file for write-ups based on the demonstration of Techshop</li> </ul>		
<p style="text-align: center;"><b>Guidelines for Laboratory /Term Work Assessment</b></p> <p>Term work assessment shall be based on the timely completion of jobs, quality of job, skill acquired, and maintaining the journal, as well as brief write-ups on illustrations/sketches of demonstrated parts/mechanisms/machine tools, etc.</p>		
<p style="text-align: center;"><b>Guidelines for Laboratory Conduction</b></p> <p>All assignment of each module are compulsory</p>		
<p style="text-align: center;"><b>Suggested List of Laboratory Experiments/Assignments</b></p>		
<b>Module I</b>	<b>Civil Engineering Workshop</b>	
<b>Sr No</b>	<b>Assignment Title</b>	<b>*Mapping of Course Outcomes</b>
1.	<b>Civil Engineering Activities At Construction Site</b> Perform lineout of a building using Nylon twine, Measuring Tape, Marking Pegs, Lime Powder.	C01, C02
2.	<b>Masonry:</b> Practical Study of Common Brick Bonds in Masonry.	C01, C02
3.	<b>Precast Element Casting :</b> Flower Pot Making Using Concrete and Mould.	C01, C02
4.	<b>Finishing Works:</b> Prepare the surface for whitewashing and painting using brush, roller, spray then apply it to the walls.	C02
5.	<b>Visit to construction site:</b>	C02

SNJB's Late Sau. K. B. Jain College of Engineering, Chandwad  
(An Autonomous Institute Affiliated to Savitribai Phule Pune University, Pune)  
Curriculum Structure and Evaluation Scheme  
To be implemented for 2025-29 Batch

	Visit to the construction site to study the construction material and construction activities.	
<b>Module II</b>	<b>Mechanical</b>	
<b>Sr No</b>	<b>Assignment Title</b>	<b>*Mapping of Course Outcomes</b>
1.	Demonstration of Hand tools and Cleaning tools and applications in the Automobile and Mechanical field.	C03
2.	Use of various tools and equipment like screw jack, spanners for removal of wheels and puncture of tyres of vehicle.	C03
3.	Inspect and clean the Spark plug of the motorcycle/scooter.	C03
4.	Assignment on importance of engine oils and understanding of various engine oil grading system in two/four wheeler vehicles	C04
5.	Assignment on importance of gear oils and understanding of gear oil grading system in two/four wheeler vehicles.	C04
6.	Study of maintenance of batteries used in two/four wheeler vehicles.	C03
<b>Module III</b>	<b>Workshop</b>	
<b>Sr No</b>	<b>Assignment Title</b>	<b>*Mapping of Course Outcomes</b>
1.	<b>Safety in Workshop:</b> Fire hazards, electric short circuit-causes and remedies, machine protection, human protection, accident prevention methods, and the ability to observe safe working habits	C05
2.	<b>Demonstration of lathe Machine:</b> Demonstration on various functions of lathe parts: Headstock, Tailstock, Carriage, Lead screw, All geared Mechanism, Apron mechanism etc.	C05, C06
3.	<b>Demonstration of Carpentry Processes:</b> Introduction to woodworking, kinds of woods, hand tools & machines, Types of joints, wood turning. Pattern making, types of patterns, contraction, draft and machining allowances	C05, C06

SNJB's Late Sau. K. B. Jain College of Engineering, Chandwad  
(An Autonomous Institute Affiliated to Savitribai Phule Pune University, Pune)  
Curriculum Structure and Evaluation Scheme  
To be implemented for 2025-29 Batch

4.	<b>Demonstration of Joining Processes:</b> Includes making temporary and permanent joints between similar and dissimilar material by processes of chemical bonding, mechanical fasteners and fusion technologies	C05, C06
5.	<b>Demonstration of Fitting Processes:</b> Types of Fits, concepts of interchangeability, datum selection, location layout, marking, cutting, shearing, chipping, sizing of metals, drilling and tapping	C05, C06
6.	<b>Demonstration of Sheet metal work:</b> Introduction to sheet metal operations: punching, blanking, bending, drawing, with riveting/brazing/soldering (at least one temporary and one Permanent joint either using resistance welding/Arc welding)	C05, C06
<b>Learning Resources</b>		
<b>Text Books</b>		
<b>T1.</b> A Text Book of Automobile Engineering - R. K. Rajput <b>T2.</b> A Textbook of Internal Combustion Engines : R.K. Rajput <b>T3.</b> Elements of workshop technology/vol 1 manufacturing processes S. K. Hajra Choudhury, A. K. Hajra Choudhury and Nirjhar Roy <b>T4.</b> Workshop Technology II, S. K. Hajra Choudhury		
<b>Reference Books :</b>		
<b>R1.</b> Massey Howard C, Basic Plumbing With Illustrations, Craftsman Book Co: California, ISBN 9780934041997 <b>R2.</b> PWD- Standard Data Book for Building Work, PWD Government of Maharashtra , Mumbai <b>R3.</b> CPWD work manual, CPWD Government of India, New Delhi.		

SNJB's Late Sau. K. B. Jain College of Engineering, Chandwad  
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Curriculum Structure and Evaluation Scheme  
To be implemented for 2025-29 Batch

25-CCC-1-A: Yoga			
<b>Teaching Scheme:</b> Practical: 2 Hours / Week.		<b>Credit:</b> 01	<b>Evaluation Scheme:</b> Term work <b>(TW)</b> : 50 Marks
<b>Prerequisite Courses:</b> Warm up, stretches before asanas.			
<b>Companion Course:</b> 25-CCC-1-02: Sports			
<b>Course Objectives:</b> <ul style="list-style-type: none"><li>• To motivate the students for higher education in Yogasana</li><li>• To improve physical and mental fitness, remove stress and ethical knowledge about Yoga</li><li>• To get acquainted with Warm up, Surya Namaskar, Yogasana, Pranayama, meditation practices</li><li>• To understand the importance of healthy diet and hygienic practices for maintaining good health</li></ul>			
<b>Course Outcomes:</b> After completion of the course, learners should be able to			
CO No	CO	BL	
C01	<b>Explain</b> the Yoga ethics as an Indian culture	2	
C02	<b>Apply</b> basic Yoga and Pranayama in daily life to maintain physical and Mental fitness	3	
C03	<b>Explain and Practice</b> of meditation for improving concentration and better handling of stress	3	
C04	<b>Explain and adopt</b> healthy diet and hygienic practices for maintaining good health	3	
<b>Course Contents</b>			
Unit I	Introduction of Yoga	4 Hours	C01,C04
Introduction: Presentations on Introduction to Yoga and its History, Meaning, History & Development of			

SNJB's Late Sau. K. B. Jain College of Engineering, Chandwad  
(An Autonomous Institute Affiliated to Savitribai Phule Pune University, Pune)  
Curriculum Structure and Evaluation Scheme  
To be implemented for 2025-29 Batch

Yoga, General Guidelines for Yoga ethics & Practice. Perform warming up exercises to prepare the body from head to toe for Yoga			
<b>Unit II</b>	<b>Surya Namaskar</b>	<b>4 Hours</b>	<b>C01,C02</b>
Perform all the postures of Surya Namaskar one by one in a very slow pace, after warming up. Perform multiple Surya Namaskar (Starting with three and gradually increasing it to twelve) Shavasana is essential for self-relaxation			
<b>Unit III</b>	<b>Basic Asanas</b>	<b>8 Hours</b>	<b>C01,C02,C03</b>
Perform Yogasana to develop body strength and flexibility, Supine Posture - Sarvangasana, Halasana, Setubandhasana Prone Posture - Bhujangasana, Shalabhasana, Makarasana Sitting Posture Paschimottanasana. Bhadrasana, Vakrasana Standing Posture - Veer Bhadrasana Vrikshasana, Trikonasana Shavasana is essential for self-relaxation.			
<b>Unit IV</b>	<b>Basic Pranayama, Kapalbhati &amp; Meditation</b>	<b>8 Hours</b>	<b>C01,C02,C03</b>
Perform Pranayama, Meditation in daily life to maintain physical and Mental fitness, Pranayama:- Perform Bhastrika Pranayam, Anulom-Vilom Pranayam Kriya, Practice Kapalbhati Pranayam Kriya Practice Bhramari Pranayam, Meditation:- Perform sitting in Dhyana Mudra and Meditating. Start with five minutes and slowly increase to higher durations, Guideline for diet and hygienic Practices.			
<b>Learning Resources</b>			
<b>Text Books</b>			
<b>T1.</b> Swami Vivekananda, "Patanjali's Yoga Sutras", Fingerprint Publishing (2023) Prakash Books India Pvt Ltd, New Delhi ISBN-13?: ? 978-9354407017 <b>T2.</b> Luisa Ray, Angus Sutherland, "Yoga for Every Body: A beginner's guide to the practice of yoga Postures, Breathing exercises and me", Vital Life Books (2022) ISBN-13?: ? 978- 1739737009.			
<b>Reference Books :</b>			
<b>R1.</b> Swami Saradananda, Mudras for Modern Living: 49 inspiring cards to boost your health, enhance your yoga and deepen your, Watkins Publishing (2019) ISBN-13?: ? 978-1786782786 <b>R2.</b> Martha Davis, Elizabeth Robbins, Matthew McKay, Eshelman MSW, The Relaxation and Stress Reduction Workbook, A New Harbinger Self-Help Workbook (2019) <b>R3.</b> Ann Swanson, Science of Yoga: Understand the Anatomy and Physiology to Perfect Your Practice,			

SNJB's Late Sau. K. B. Jain College of Engineering, Chandwad  
(An Autonomous Institute Affiliated to Savitribai Phule Pune University, Pune)  
Curriculum Structure and Evaluation Scheme  
To be implemented for 2025-29 Batch

ISBN-13: 978-1465479358.

**Additional Resources: (Books, e-Resources)**

- [https://onlinecourses.swayam2.ac.in/aic19\\_ed28/preview-introduction to Yoga and Applications of Yog](https://onlinecourses.swayam2.ac.in/aic19_ed28/preview-introduction%20to%20Yoga%20and%20Applications%20of%20Yoga)
- [https://onlinecourses.swayam2.ac.in/aic23\\_ge09/preview](https://onlinecourses.swayam2.ac.in/aic23_ge09/preview)
- [https://onlinecourses.swayam2.ac.in/aic23\\_ge05/preview](https://onlinecourses.swayam2.ac.in/aic23_ge05/preview)
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- [https://onlinecourses.nptel.ac.in/noc21\\_hs29/preview](https://onlinecourses.nptel.ac.in/noc21_hs29/preview)
- [https://onlinecourses.swayam2.ac.in/nce19\\_sc04/preview](https://onlinecourses.swayam2.ac.in/nce19_sc04/preview)
- <https://www.classcentral.com/course/swayam-fitness-management->





SNJB's Late Sau. K. B. Jain College of Engineering, Chandwad  
(An Autonomous Institute Affiliated to Savitribai Phule Pune University, Pune)  
Curriculum Structure and Evaluation Scheme  
To be implemented for 2025-29 Batch

25-CCC-1-B : Sports			
Teaching Scheme: Practical: 2 Hours/Week		Credit: 01	Examination Scheme: Termwork (TW) : 50 Marks
Prerequisites Courses: Basic knowledge of sports			
Companion Course: 25-CCC-1-01 Yoga			
<b>Course Objectives:</b> <ul style="list-style-type: none"><li>To maintain their mental and physical wellness upright and develop ability in them to cope up with the stress arising in life.</li><li>To create space in the curriculum to nurture the potential of the students in sports/games/ etc.</li><li>To introduce a practice oriented introductory course on the subject. More involved / advanced course may come up in subsequent years of study</li><li>Develop techniques and tactics involved in organized physical activities, games and sports</li><li>Develop positive health related fitness habits which can be practiced lifelong so as to prevent degenerative diseases.</li></ul>			
<b>Course Outcomes:</b> After completion of the course, learners should be able to			
CO No	CO	BL	
CO1	Design basic training plans considering energy systems and physiological adaptations.	2	
CO2	Explain wellness and its importance and define the components of wellness & Classify physical fitness and recognize its importance in life.	3	
CO3	Apply psychological strategies to improve athletes & motivation, goal- setting, and mental resilience	3	
CO4	Enhanced physical fitness leads to improved athletic performance and overall well-being	3	
Course Contents			
Unit I	Introduction of Physical Education & Sports	4 Hours	CO1,CO2,CO3,CO4
Concept of Physical Education, its Definition and Scope,Concept of Physical Fitness,Components of Health Related Physical Fitness (Cardio-vascular Endurance, Muscular Strength Endurance, Flexibility, and Body Composition) and Activities to improve these components,Physical Activity Guidelines (Physical activity for health benefits)			
Unit II	Physical Fitness, Wellness, and Lifestyle	6 Hours	CO1,CO2,CO3,CO4



SNJB's Late Sau. K. B. Jain College of Engineering, Chandwad  
(An Autonomous Institute Affiliated to Savitribai Phule Pune University, Pune)  
Curriculum Structure and Evaluation Scheme  
To be implemented for 2025-29 Batch

Meaning & importance of Wellness, Health, and Physical Fitness, Traditional Sports & Regional Games for promoting wellness, Leadership through Physical Activity and Sports			
<b>Unit III</b>	<b>Practice of different sport Activity</b>	<b>10 Hours</b>	<b>C01,C02,C03,C04</b>
Every student should participate in game/sports selected by him/her			
<b>Unit IV</b>	<b>Fitness Assessment</b>	<b>4 Hours</b>	<b>C01,C02,C03,C04</b>
Cardiovascular Endurance, Flexibility, Muscular Strength Endurance and,Body Composition			
<b>Learning Resources</b>			
<b>Text Books</b>			
<b>T1.</b> Foundation of Physical Education, Exercise Science and Sports,Bucher, C. A., & Wuest, D. A. (2010).. Tata McGraw Hill Education Private Limited. New Delhi. <b>T2.</b> First Aid Handbook.keeceh, P. (2010), Hermes House. London. <b>T3.</b> Physical Activity and Health Guidelines,Rahl, R. V. (2010). Human Kinetics. USA <b>T4.</b> Principle and History of Physical Education and Sports,Singh, D. K. (2010),Friends Publication. New Delhi. <b>T5.</b> Textbook of Applied Measurement Evaluation & Sports Selection,Kansal, D. K. (2008). Sports and Spiritual Science			
<b>Reference Books :</b>			
<b>R1.</b> NSCA's Guide to Test and Assessment,Miller, T. (2012), Human Kinetics, USA. <b>R2.</b> Test Measurement and Evaluation in Physical Education and Sports,Yobu, A. (2010). Friends Publication. New Delhi. <b>R3.</b> Measurement and Evaluation in Physical Education, Lipman, H. A. (2009). Friends Publication, New Delhi. <b>R4.</b> Measurement and Evaluation in Human Performance,Morrow, J. Jackson, A., Disch, J., & Mood, D. (2005). Human Kinetics, JSA.			
<ul style="list-style-type: none"> <li><b>Additional Resources:-</b></li> </ul>			
<ul style="list-style-type: none"> <li><b>MOOC Courses links :-</b></li> </ul>			

SNJB's Late Sau. K. B. Jain College of Engineering, Chandwad  
(An Autonomous Institute Affiliated to Savitribai Phule Pune University, Pune)  
Curriculum Structure and Evaluation Scheme  
To be implemented for 2025-29 Batch

25-CCC-1-C : NSS			
<b>Teaching Scheme:</b> Practical: 2 Hours / Week		<b>Credit:</b> 1	<b>Examination Scheme:</b> Termwork (TW) : 50 Marks
<b>Prerequisites Courses:</b>			
<b>Companion Course:</b>			
<b>Course Objectives:</b> <ul style="list-style-type: none"><li>To understand the NSS Scheme in Nation Building</li><li>To understand the importance of Shramdan to youth</li><li>To understand the importance of Awareness Activities to youth</li><li>To provide a technical solution to the different issues of society</li></ul>			
<b>Course Outcomes:</b> After completion of the course, learners should be able to			
CO No	CO	BL	
1	Describe the concept of Youth and compare the international definitions of the term Youth.	2	
2	Students will be able to appreciate our demographic advantage and its role in nation-building.	3	
3	Know the growth and evolution of NSS and its role in nation-building through community service.	2	
4	Visualize the signs, symbols, and logo of NSS and understand their broader meaning.	4	
<b>Course Contents</b>			
Unit I	Introduction to NSS	4 Hours	C01
Origin of NSS, Aims and Objectives of NSS, Motto of NSS, NSS Symbol, NSS Song, NSS Day, Basic Concepts and Components, NSS Program and Activities			
Unit II	Shramdan	4 Hours	C02
Campus Cleaning, Tree Plantation, Weeding, Watering, any other activities, Registration of all students on MyBharat Portal			
Unit III	Awareness Programs	4 Hours	C03

SNJB's Late Sau. K. B. Jain College of Engineering, Chandwad  
(An Autonomous Institute Affiliated to Savitribai Phule Pune University, Pune)  
Curriculum Structure and Evaluation Scheme  
To be implemented for 2025-29 Batch

<b>Awareness Programs:</b> awareness rallies, blood donation, voter awareness, Fit India, Celebration of National and International Days, Personality Development Programs, Waste management awareness, Health awareness, Awareness for self-Employment in adapted villages, constructive activities, any other activities			
<b>Unit IV</b>	<b>Community Engagement and Problem Solving</b>	<b>4 Hours</b>	<b>C04</b>
Visit to the adapted Village, identification of problems, propose a solution for the same, drafting and development of a procedure, model, or design			
<b>Learning Resources</b>			
<b>Text Books</b>			
<b>T1. NATIONAL SERVICE SCHEME MANUAL (REVISED) 2006</b> Government of India, Ministry of Youth Affairs & Sports, New Delhi <b>T2. Prof. B.K. Shivanna, "National Service Scheme"</b> Printing Press, KSOU, Mysore, 2011 <b>T3. MadhuAhuja, Students Leaders in the National Service Scheme (NSSS) in Delhi: A case study 1986</b> (New Delhi: Dept. of Management and Extension, Lady Irwin College, University of Delhi, 1986) <b>T4. Chattarjee, B., Social service opportunities for students in Slum Areas</b> (reprint: Delhi: Delhi School of Social Work, University of Delhi, 1973)			
<b>Reference Books :</b>			
<b>R1. Jones Gill, (2009), Youth, Polity Press, UK. i) Kehily Jane Mary (Etd.) (2007), Understanding Youth: Perspectives, Identities and Practices, Sage Publications, London.</b> <b>R2. Landis H. Paul, (2011), Adolescence and Youth: The Process of Maturing, Sarup Book Publishers Pvt. Ltd., New Delhi</b>			
<b>MOOC Courses links :</b>			
<ul style="list-style-type: none"> <li>Community Engagement and Social Responsibility - <a href="https://onlinecourses.swayam2.ac.in/ugc24_ge05">https://onlinecourses.swayam2.ac.in/ugc24_ge05</a></li> </ul>			

SNJB's Late Sau. K. B. Jain College of Engineering, Chandwad  
(An Autonomous Institute Affiliated to Savitribai Phule Pune University, Pune)  
Curriculum Structure and Evaluation Scheme  
To be implemented for 2025-29 Batch

24-CCC-1-D: Cultural			
Teaching Scheme : Practical: 02 Hrs / Week		Credit: 01	Evaluation Scheme: Term work (TW) : 50 Marks
Prerequisites Courses: - -----			
Companion Course: .. -----			
<b>Course Objectives:</b> <ul style="list-style-type: none"><li>• Students develop their ability to communicate ideas, emotions, and narratives effectively to an audience.</li><li>• Students learn to work together, cooperate, and compromise, establishing key collaboration skills, through group rehearsals and performances.</li><li>• Through painting, drawing, writing, and other artistic activities, students can explore their thoughts, emotions, and ideas in meaningful ways.</li></ul>			
<b>Course Outcomes:</b> After completion of the course, learners should be able to:			
CO No	CO	BL	
C01	<b>Understand</b> the improvement of cultural perspective in daily life.	2	
C02	<b>Experience</b> physical benefits such as improved lung capacity, posture, relaxation, and stress relief through singing & to identify, evaluate, and enjoy many melodic aspects, including tone, pitch, rhythm, and intensity of sound	5	
C03	<b>Develop</b> proficiency in various artistic techniques and mediums, such as drawing, painting, sculpture, printmaking, or digital art.	3	
C04	<b>Develop</b> debating -Communal conversation.	3	
Course Contents			
Unit I	Performing Arts- Dance & Drama	6 Hours	C01,C02

SNJB's Late Sau. K. B. Jain College of Engineering, Chandwad  
(An Autonomous Institute Affiliated to Savitribai Phule Pune University, Pune)  
Curriculum Structure and Evaluation Scheme  
To be implemented for 2025-29 Batch

<p><b>Dance</b>-Performance Practices :( conventions of performance etiquette, audience engagement, and stage presence in different cultural contexts.), Cultural Exchange: The interchange of cultural aspects between various communities and areas, including movements, rhythms, music, costumes, and themes, has an impact on dance practices.</p> <p><b>Drama</b>-Performance Skills: Developing performance skills, including acting, voice, movement, and improvisation, through practical exercises and rehearsals, Theatrical Production: Learning about the process of theatrical production, including stagecraft, set design, costume design, lighting, sound, and directing.</p>			
<b>Unit II</b>	<b>Music-Melody</b>	<b>6 Hours</b>	<b>C01,C02</b>
<p><b>Song</b>:Vocal Technique: Breathing exercises and techniques to develop proper breath support and control. Listening skills, enabling you to recognize, assess, and appreciate various elements of melody, such as tone, pitch, rhythm, and sound intensity.</p> <p><b>Instrumental</b>: Fundamentals of music theory, including notation, scales, intervals, chords, and key signatures.</p>			
<b>Unit III</b>	<b>Visual Arts &amp; Literary Arts</b>	<b>6 Hours</b>	<b>C01,C03</b>
<p><b>Visual Arts</b>: painting, drawing, poster making sculpture(assembling materials such as clay, wood, metal, stone, or plaster), printmaking, photography. <b>Literary Arts</b>: Creative writing, Letters, Written arts, Verbal arts, Poetry Making</p>			
<b>Unit IV</b>	<b>Debating-communal conversation</b>	<b>4 Hours</b>	<b>C01,C04</b>
<p>Extempore, Forum debates, Express you! Panel discussions, JAM's (in the Just a Minute public speaking exercise, participants are asked to talk without hesitation for one minute on a particular topic.)</p>			
<b>Learning Resources</b>			
<b>Text Books:</b>			
<p><b>T1.</b> Ganendra Dutt Bajpai, "Text Book of dance" , Publisher-Kanishka, ISBN-13 978-8184576177.</p> <p><b>T2.</b> Dr.Shilpa Bahulekar,"KalaShasra Visharad", Publisher-Sanskar Prakashan,Third Edition.</p>			
<b>Reference Books :</b>			
<p><b>R1.</b>"Sangeet Ratnavali" by Ashok Kumar Yaman</p> <p><b>R2.</b>"fundamentals of visual art by Dr. Anuj Choudhary"</p>			
<p><b>Additional Resources: (Books, e-Resources)</b></p> <p><a href="https://smp.gymkhana.iitb.ac.in/extra_culture.php">https://smp.gymkhana.iitb.ac.in/extra_culture.php</a></p>			
<ul style="list-style-type: none"> <li>● <b>MOOC Courses links :-----</b></li> </ul>			

SNJB's Late Sau. K. B. Jain College of Engineering, Chandwad  
(An Autonomous Institute Affiliated to Savitribai Phule Pune University, Pune)  
Curriculum Structure and Evaluation Scheme  
To be implemented for 2025-29 Batch

25-IKS-1-01 : Indian Knowledge System																	
<b>Teaching Scheme:</b> TU: 2 Hours/Week	<b>Credit:</b> 2	<b>Evaluation Scheme:</b> Term work (TW) : 50 Marks															
<b>Prerequisites Courses:</b> – Nil																	
<b>Companion Course:</b> – Nil																	
<b>Course Objectives:</b> <ul style="list-style-type: none"> <li>To facilitate the students with the concepts of Indian traditional knowledge and to make them understand the importance of roots of Indian Knowledge System</li> <li>To make students acquainted with the facets of traditional knowledge &amp; their relevance and help them be able to apply it to their day-to-day life.</li> </ul>																	
<b>Course Outcomes:</b> After completion of the course, learners should be able to <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>CO No</th><th>CO</th><th>BL</th></tr> </thead> <tbody> <tr> <td>CO1</td><td><b>Explain</b> the foundation and significance of the Indian Knowledge System.</td><td>2</td></tr> <tr> <td>CO2</td><td><b>Advocate</b> for the preservation of traditional knowledge.</td><td>3</td></tr> <tr> <td>CO3</td><td><b>Apply</b> traditional knowledge principles to various fields.</td><td>3</td></tr> <tr> <td>CO4</td><td><b>Analyze</b> the ongoing influence of Indian Knowledge Systems in the modern world.</td><td>4</td></tr> </tbody> </table>			CO No	CO	BL	CO1	<b>Explain</b> the foundation and significance of the Indian Knowledge System.	2	CO2	<b>Advocate</b> for the preservation of traditional knowledge.	3	CO3	<b>Apply</b> traditional knowledge principles to various fields.	3	CO4	<b>Analyze</b> the ongoing influence of Indian Knowledge Systems in the modern world.	4
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CO4	<b>Analyze</b> the ongoing influence of Indian Knowledge Systems in the modern world.	4															
Course Contents																	
<b>Unit I</b>	<b>Introduction of Indian Education System</b>	<b>6 Hours</b>															
<b>Indian Education System</b> Gurukul system, Ancient Universities (Nalanda, Takshashila, Vikramshila etc.) <b>Indian Ancient Scientists and Their Inventions</b> Patanjali, Aryabhatta, Charaka, Varahmitra, Vardhanmaan Mahaveer, Bhaskaracharya, Brahmagupta, Aadibramha Adinath. Etc.																	

SNJB's Late Sau. K. B. Jain College of Engineering, Chandwad  
(An Autonomous Institute Affiliated to Savitribai Phule Pune University, Pune)  
Curriculum Structure and Evaluation Scheme  
To be implemented for 2025-29 Batch

<b>Indian Art and Architecture</b> Tanjore Paintings, Madhubani Paintings, Warli Paintings, etc. ,Harappa and Mohenjo-Daro Civilization, Temples and other Religious Places, Forts and monuments.		
<b>Exemplar/Case Studies:</b> A case study on integrating Ancient wisdom into modern Education.		
<b>Mapping of Course Outcomes</b>		<b>C01</b>
<b>Unit II</b>	<b>Indian Mathematics &amp; Astronomy</b>	<b>6 Hours</b>
<p><b>Introduction to Indian Mathematics,</b> Binary mathematics and combinatorial problems in ChandaḥŚāstra . Algebra, Geometry, Trigonometry (Sine &amp; Cosine), Magic squares in India.</p> <p><b>Introduction to Indian astronomy,</b>Indian contributions in astronomy ,The celestial coordinate system ,Elements of the Indian calendar , Notion of years and months.</p>		
<b>Exemplar/Case Studies:</b> Aryabhata's astronomical observations and calculations laid the foundation for modern trigonometry and spherical geometry.		
<b>Mapping of Course Outcomes</b>		<b>C03</b>
<b>Unit III</b>	<b>Indian Polity and Economy (I)</b>	<b>4 Hours</b>
<p><b>Indian Polity and Economy</b> Indian conception of well-organized Polity and flourishing Economy of handcrafts, textile etc. as introduction, Foundational texts, and The notion of Bharatavarsha as a Chakravarti-Kshetra and important attributes of Chakravartin, King as the protector of Dharma. King as the strength and support of the weak, King as the protector of Varta, King as the protector of the times, Meaning of Varta: Krishi, Gopalana and Vanijya forming the basis of Varta and the core of economic, Activity in society. The importance of sharing, The Grams as the center of the polity.</p>		
<b>Exemplar/Case Studies:</b> The <b>Mauryan and Gupta empires</b> exemplified administrative prowess and economic prosperity, with advancements in trade routes, currency systems, and taxation policies.		
<b>Mapping of Course Outcomes</b>		<b>C02</b>
<b>Unit III</b>	<b>Trade In Ancient India (II)</b>	<b>3 Hours</b>
<b>Trade In Ancient India (II):</b> Types of Trade, Kautilya on Trade, Trade Routes, Port & Sailors, The Famous Silk Route, By product of Trade cultural Exchange.		
<b>Exemplar/Case Studies:</b> The case of the Silk Route and the maritime trade routes highlights India's pivotal role in		



SNJB's Late Sau. K. B. Jain College of Engineering, Chandwad  
(An Autonomous Institute Affiliated to Savitribai Phule Pune University, Pune)  
Curriculum Structure and Evaluation Scheme  
To be implemented for 2025-29 Batch

facilitating exchanges of goods, ideas, and cultures.		
<b>Mapping of Course Outcomes</b>		<b>C02</b>
<b>Unit IV</b>	<b>Achievements of India in Engineering &amp; Technology</b>	<b>6 Hours</b>
Engineering and Technology in Ancient India, Engineering and Technology in Medieval India, Engineering and Technology in Modern India, Engineering and Technology: Metals and Metalworking, Water Management System.		
<b>Exemplar/Case Studies:</b> The Construction of Monumental Structure of Rangmahal , Renuka Devi Temple Chandwad		
<b>Mapping of Course Outcomes</b>		<b>C04</b>
<b>Learning Resources</b>		
<b>Text Books</b>		
<b>T1.</b> B. Mahadevan, V. R. Bhat, NagendraPavana, "Introduction to Indian Knowledge Systems Concepts and Applications", PHI Learning Publications, Delhi, 2022.		
<b>Reference Books :</b>		
<b>R1.</b> SatishchandraChaterjee, DheerendramohanDatta, "An Introduction to Indian Philosophy",MotilalBanarsidass Publishing House, New Delhi, 2016 <b>R2.</b> V.Sivaramakrishnan (Ed.), "Cultural Heritage of India-course material", BharatiyaVidyaBhavan, Mumbai. 5th Edition,2014 <b>R3.,</b> KapilKapoor, Avadesh Kumar Singh,"Knowledge Traditions and Practices of India", Vol. 1, 2005, DK Print World (P) Ltd., ISBN 81-246-0334		
<b>Additional Resources: (Books, e-Resources)</b>		
<b>MOOC Courses links :</b> <b>SWAYAM/NPTEL</b> <ul style="list-style-type: none"> <li><b>Indian Knowledge System (IKS) : Concepts and Applications in Engineering</b> By Prof. B. Mahadevan, Dr. VinayakRajatBhat, Dr. R VenkataRaghavan   Indian Institute of Management Bangalore (IIMB), Chanakya University, Bangalore (<a href="https://onlinecourses.swayam2.ac.in/imb23_mg53/preview">https://onlinecourses.swayam2.ac.in/imb23_mg53/preview</a>)</li> <li><b>Indian Knowledge System (IKS) : Concepts and Applications in Science</b></li> </ul>		

SNJB's Late Sau. K. B. Jain College of Engineering, Chandwad  
(An Autonomous Institute Affiliated to Savitribai Phule Pune University, Pune)  
Curriculum Structure and Evaluation Scheme  
To be implemented for 2025-29 Batch

By Prof. B. Mahadevan, Dr. VinayakRajatBhat, Dr. R VenkataRaghavan | Indian Institute of Management Bangalore  
(IIMB), Chanakya University, Bangalore

([https://onlinecourses.swayam2.ac.in/imb23\\_mg53/preview](https://onlinecourses.swayam2.ac.in/imb23_mg53/preview))

- <http://www.iitkgp.ac.in/departement/KS;jsessionid=C5042785F727F6EB46CBF432D7683B63>.  
(Centre of Excellence for Indian Knowledge System, IIT Kharagpur)



SNJB's Late Sau. K. B. Jain College of Engineering, Chandwad  
(An Autonomous Institute Affiliated to Savitribai Phule Pune University, Pune)  
Curriculum Structure and Evaluation Scheme  
To be implemented for 2025-29 Batch

25-AEC-1-01: Professional Communication Skills			
Teaching Scheme: Tutorial: 1Hours/Week.		Credit: 1	Examination Scheme: Termwork (TW) : 25 Marks
Prerequisites Courses: Basic Proficiency in English Language			
Companion Course: NA			
Course Objectives: <ul style="list-style-type: none"><li>To know the basic principles of communication skills</li><li>To improve the verbal communication skills through participation</li><li>To learn different visual tools of presentation</li><li>To learn the importance of writing technical document</li></ul>			
Course Outcomes: After completion of the course, learners should be able to			
CO No	CO	BL	
CO1	Understand the communication ethics and apply the principles and practices of Communication in daily life.	2	
CO2	Illustrate the verbal communication skills by effectively participating in a group discussion.	3	
CO3	Use various visual aids for enhancing the presentation skills.	4	
CO4	Write a technical document with correctness of language, appropriate vocabulary and style.	5	
Course Contents			
Unit I	Introduction to Communication & Speaking Skills	4 Hours	CO1 , CO3
Introduction to Theory of Communication, Types of Communication, Barriers to Communication, Communication Ethics, Job Interviews			
Exemplar/Case Studies: Write and narrate an article of your choice			

SNJB's Late Sau. K. B. Jain College of Engineering, Chandwad  
(An Autonomous Institute Affiliated to Savitribai Phule Pune University, Pune)  
Curriculum Structure and Evaluation Scheme  
To be implemented for 2025-29 Batch

<b>Unit II</b>	<b>Group Discussion</b>	<b>4 Hours</b>	<b>CO1 ,CO2,CO3</b>
Basics of a Group Discussion, Understanding the different types of Group Discussions, Practical tips and suggestions for a GD.			
<b>Exemplar/Case Studies:</b> Having Group Discussion of any given Topics.			
<b>Unit III</b>	<b>Presentation Skills &amp; Public Speaking for Engineers</b>	<b>4 Hours</b>	<b>CO2 , CO3</b>
Structuring a compelling presentation, Engaging an audience using visual aids effectively, Techniques to manage and reduce public speaking anxiety, making a clear and concise speech outline.			
<b>Exemplar/Case Studies:</b> Having presentation of any given Topics.			
<b>Unit IV</b>	<b>Professional Writing</b>	<b>4 Hours</b>	<b>CO4</b>
Job Application with Resume, Office Drafting: Notice, Email, Technical Articles, Report Writing. Business Correspondence: Enquiry letter, Order letter, Complaint Letter and Adjustment letters			
<b>Exemplar/Case Studies:</b> Write down any one professional writing on following: <ul style="list-style-type: none"> <li>● Resume writing</li> <li>● Leave Application to HOD/Principal</li> <li>● Blog Writing/Content Writing</li> <li>● Cover letter for internship application</li> <li>● Request letter for a Bonafide Certificate/ Enquiry letter</li> </ul>			
<b>Learning Resources</b>			
<b>Text Books</b>			
<b>T1.</b> Meenakshi Raman, Sangeeta Sharma, "Technical Communication, Principles and Practice", Oxford University Press- ISBN 978-13-16640-08-1 <b>T2.</b> Rajendra Pal, J.S. Korlahalli, "Essential of Business Communication", Sultan Chand & Sons, New Delhi ISBN 9788180547294i			
<b>Reference Books :</b>			
<b>R1.</b> E. H. Mcgrath, "Basic Managerial Skills for All", Prentice Hall India Learning Private Limited; 9 edition (2011), ISBN: 9788120343146 <b>R2.</b> R. Subramanian, "Professional Ethics", Oxford University Press; Second edition 17 April 2017, ISBN: 019947			
<b>Additional Resources: (Books, e-Resources)</b> <ul style="list-style-type: none"> <li>● <a href="https://www.britishcouncil.in">https://www.britishcouncil.in</a></li> </ul>			

SNJB's Late Sau. K. B. Jain College of Engineering, Chandwad  
(An Autonomous Institute Affiliated to Savitribai Phule Pune University, Pune)  
Curriculum Structure and Evaluation Scheme  
To be implemented for 2025-29 Batch

- <https://www.chrmp.com/correct-english-usage-for-effective-technical-writing/#:-:text=Write%20in%20plain%20English,voice%20instead%20of%20passive%20voice/>
- Technical Writing Blogs - <https://draft.dev/learn/the-best-technical-writing-blogs>.

**MOOC Courses links :**

- Technical Writing for Engineers [The Ultimate Guide & Course] - <https://www.instructionalsolutions.com/blog/technical-writing-engineers>
- SWAYAM NPTEL Course - Technical English for Engineers, By Prof. Aysha Iqbal- [https://onlinecourses.nptel.ac.in/noc20\\_hs56/preview](https://onlinecourses.nptel.ac.in/noc20_hs56/preview)
- SWAYAM NPTEL Course - English Language for Competitive Exams, By Prof. Aysha Iqbal
- Google for Developers - Technical Writing Courses - <https://developers.google.com/tech-writing>



SNJB's Late Sau. K. B. Jain College of Engineering, Chandwad  
(An Autonomous Institute Affiliated to Savitribai Phule Pune University, Pune)  
Curriculum Structure and Evaluation Scheme  
To be implemented for 2025-29 Batch

# Semester-II



SNJB's Late Sau. K. B. Jain College of Engineering, Chandwad  
(An Autonomous Institute Affiliated to Savitribai Phule Pune University, Pune)  
Curriculum Structure and Evaluation Scheme  
To be implemented for 2025-29 Batch

25-BSC-1-01 : Engineering Physics		
<b>Teaching Scheme:</b> Theory:3 Hours/Week	<b>Credit:</b> 3	<b>Examination Scheme:</b> <b>CIE :</b> 20 Marks <b>MSE :</b> 20 Marks <b>SEE :</b> 60 Marks
<b>Prerequisite Courses:</b> Useful Concepts: Band theory of solids, Classification of solids, Study of Atoms, Molecules and atomic theory and Rutherford Expt, Photoelectric effect, Transducer, Origin of Quantum mechanics and its comparison with classical mechanics, Dual nature of radiation, Meaning of calibration, Piezoelectric effect, Polarisation, Properties of Matter, Electric field, Magnetic Field.		
<b>Companion Course:</b> 25-BSC-1-05 Engineering Physics Lab.		
<b>Course Objectives:</b> <ul style="list-style-type: none"> <li>To provide inclusive knowledge of fundamental physics principles encouraging engineering students to venture in applications.</li> <li>To teach basic concepts and principles of physics, relate them to laboratory experiments.</li> </ul>		
<b>Course Outcomes:</b> After completion of the course, learners should be able to		
CONo	CO	BL
C01	<b>Apply</b> the principles of Measurement and Dimensions for concepts of Engineering Physics.	3
C02	<b>Discuss</b> the principles of physics to solve engineering problems and applications.	2
C03	<b>Describe</b> laser, Sensor & Fiber optics applications.	2
C04	<b>Explore</b> to Gain insights into the interdisciplinary nature of engineering, bridging physics with other fields.	3
C05	<b>Understand</b> the core concepts of quantum mechanics & their uses.	2
C06	<b>Identify</b> the impact of nanotechnology on various fields.	2
Course Contents		
Unit I	Dimensions and Semiconductor Physics	7 Hours

SNJB's Late Sau. K. B. Jain College of Engineering, Chandwad  
(An Autonomous Institute Affiliated to Savitribai Phule Pune University, Pune)  
Curriculum Structure and Evaluation Scheme  
To be implemented for 2025-29 Batch

Measurements and Dimension, Need for Measurement: Units of Measurement, Systems of units; SI units, fundamental and derived units, Significant Figures, Dimensions of physical quantities, Band theory of solids, Classification of Conductor, Semiconductor & insulator on basis of band theory, Electrical Conductivity in Semiconductors, Fermi-Dirac Statistics, Hall effect, Applications of Semiconductors, P-n Junction, (Zero, forward & reverse Biasing based on band theory), Solar cell.		
<b>Exemplar/Case Studies:</b> 1] To measure dimensions of different equipments like wire, metal bob, sheet etc 2] To study different equipment of computers made up of semiconductor material.		
<b>*Mapping of Course Outcomes</b>		<b>C01, C02, C04</b>
<b>Unit II</b>	<b>Crystallography</b>	<b>7 Hours</b>
Introduction, Lattice direction, Miller indices, Lattice planes, Lattice point and space lattice, The basis and crystal structure, Unit cell and lattice parameter, Primitive cell, The seven crystal systems and Bravais space lattice. The unit cell characteristics Number of atoms per unit cell, Atomic radius, Coordination number, Packing density. Separations between lattice planes in a cubic crystal, X-ray diffraction, Bragg's law.		
<b>Exemplar/Case Studies:</b> 1] To study different parameters of silicon such as structure, defects etc (Solar Cell) 2] To analyze different crystals in nature like chalk, alum, NaCl, Sugar etc.		
<b>*Mapping of Course Outcomes</b>		<b>C01, C02, C04</b>
<b>Unit III</b>	<b>Photonics and LASER</b>	<b>7 Hours</b>
Introduction of LASER, Fundamentals of Laser: Absorption, Spontaneous emission and Stimulated emission, Metastable state, Resonant cavity, Population inversion, three & four level lasers. types of pumping, Ruby Laser, Semiconductor Laser (heterojunction laser diode), He-Ne laser, Applications (Engineering, Medical, Communication) Parameters of optical fibers: Critical angle, total internal reflection, Numerical Aperture, Acceptance angle and acceptance cone, Numericals, Types of optical fibers: step index, graded index, Advantages of optical fiber communication.		
<b>#Exemplar/Case Studies:</b> 1] To verify and study light through different technology like fiber optics, sensors, solar cells etc.		
<b>*Mapping of Course Outcomes</b>		<b>C01, C02, C03, C04</b>
<b>Unit IV</b>	<b>Physics of Sensor and Characterization Techniques</b>	<b>7 Hours</b>
Ultrasonic sensors: Concept of inverse piezoelectricity, use of piezoelectric transducer as ultrasonic generator, Applications, Light sensors (LDR): Concept of Polarisation- Double Refraction (Half Shade Polarimeter-Principle & Applications, Material Characterization Techniques and Instrumentation (e.g. XRD)		
<b>#Exemplar/Case Studies:</b> 1] To study different sensors like pressure, temperature, displacement etc for finding different Domestic & Societal Applications.		
<b>*Mapping of Course Outcomes</b>		<b>C01, C02, C03, C04</b>



SNJB's Late Sau. K. B. Jain College of Engineering, Chandwad  
(An Autonomous Institute Affiliated to Savitribai Phule Pune University, Pune)  
Curriculum Structure and Evaluation Scheme  
To be implemented for 2025-29 Batch

<b>Unit V</b>	<b>Quantum Physics</b>	<b>7 Hours</b>
Introduction (Interaction of matter with radiation, Matter waves,) De Broglie hypothesis, Wave Packet), De Broglie hypothesis, Wave Packet, Concept of Phase velocity and group velocity and relation with particle velocity (Introductory), Heisenberg Uncertainty Principle, Concept Of Wave function and Probability Density; Physical interpretation of wave function, Schrodinger's time independent wave equation Applications: Particles trapped in one dimensional infinite potential well, Tunneling effect and STM, Fundamentals of Quantum Computing (Difference between classical computing & quantum computing, Quantum Superposition theorem, Quantum Entanglement theorem, Quantum cryptography)- Computer and AIDS Engineering		
<b>#Exemplar/Case Studies:</b> Applications of STM.(Medical)		
<b>*Mapping of Course Outcomes</b>		<b>C01, C02, C04, C05</b>
<b>Unit VI</b>	<b>NDT and Nanotechnology</b>	<b>7 Hours</b>
Non Destructive Testing - Classification of Non-destructive testing methods, Principles of physics in Non-destructive Testing, Advantages of Non-destructive testing methods, Acoustic Emission Testing - Ultrasonic (thickness measurement, flaw detection), Radiography testing, Nanotechnology - Introduction to nanotechnology, Quantum confinement and surface to volume ratio, Properties of nanoparticles: optical, electrical, mechanical.Applications of nanoparticles: Medical (targeted drug delivery), electronics, Space and Defence, automobile, environment and energy.		
<b>#Exemplar/Case Studies: 1]</b> To analyze the different properties of material components. (View Nanomaterial)		
<b>*Mapping of Course Outcomes</b>		<b>C01, C02, C04, C06</b>
<b>Learning Resources</b>		
<b>Text Books</b>		
T1. Avadhanulu & Kshirsagar "A textbook of Engineering Physics"-S. Chand Publication 2023. T2. S. O. Pillai "A textbook of Engineering Physics", New Age International Publishers 2023.		
<b>Reference Books :</b>		
R1: David. J. Griffiths- Introduction to Quantum Mechanics- Cambridge university . R2: Arthur Beiser-Concepts of Modern Physics-Tata McGraw Hill R3:S. O. Pillai-Solid State Physics- New Age International Publishers 2023.		
<b>Additional Resources: (Books, e-Resources)</b>		
1.E-Book of "Engineering Physics" for FE students. <a href="#">Click Here</a> 2. <a href="https://discovery1.delnet.in/Search/Results?lookfor=s+o+pillai&amp;type=Author&amp;location_code=">https://discovery1.delnet.in/Search/Results?lookfor=s+o+pillai&amp;type=Author&amp;location_code=</a> 3. <a href="https://discovery1.delnet.in/Search/Results?lookfor=Avadhanulu+%26+Kshirsagar&amp;type=Author&amp;location_code=&amp;limit=60">https://discovery1.delnet.in/Search/Results?lookfor=Avadhanulu+%26+Kshirsagar&amp;type=Author&amp;location_code=&amp;limit=60</a> 4. <a href="https://discovery1.delnet.in/Search/Results?lookfor=A.S.+Vasudeva&amp;type=Author&amp;location_code=&amp;limit=60">https://discovery1.delnet.in/Search/Results?lookfor=A.S.+Vasudeva&amp;type=Author&amp;location_code=&amp;limit=60</a>		

SNJB's Late Sau. K. B. Jain College of Engineering, Chandwad  
(An Autonomous Institute Affiliated to Savitribai Phule Pune University, Pune)  
Curriculum Structure and Evaluation Scheme  
To be implemented for 2025-29 Batch

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| 5. <a href="https://discovery1.delnet.in/Search/Results?lookfor=David.+J.+Griffiths&amp;type=Author&amp;location_code=&amp;limit=60">https://discovery1.delnet.in/Search/Results?lookfor=David.+J.+Griffiths&amp;type=Author&amp;location_code=&amp;limit=60</a><br>6. <a href="https://discovery1.delnet.in/Search/Results?look for=Arther+Beiser+&amp;type=Author&amp;location_code=&amp;limit=60">https://discovery1.delnet.in/Search/Results?look for=Arther+Beiser+&amp;type=Author&amp;location_code=&amp;limit=60</a> |
| <b>MOOC Courses links :</b><br>1. <a href="https://onlinecourses.nptel.ac.in/noc25_ph07/preview">https://onlinecourses.nptel.ac.in/noc25_ph07/preview</a><br>2. <a href="https://onlinecourses.nptel.ac.in/noc20_bt16/preview">https://onlinecourses.nptel.ac.in/noc20_bt16/preview</a>  |



SNJB's Late Sau. K. B. Jain College of Engineering, Chandwad  
(An Autonomous Institute Affiliated to Savitribai Phule Pune University, Pune)  
Curriculum Structure and Evaluation Scheme  
To be implemented for 2025-29 Batch

25-BSC-1-04: Statistics and Integral Calculus		
<b>Teaching Scheme:</b> Theory: 03 Hours/Week.	<b>Credit : 03</b>	<b>Evaluation Scheme:</b> <b>CIE : 20 Marks.</b> <b>MSE :20 Marks.</b> <b>SEE : 60 Marks.</b>
<b>Prerequisites Courses:</b> Basics of Integration, Basics of Statistics , General probability		
<b>Companion Course:</b> -----		
<b>Course Objectives:</b> <ul style="list-style-type: none"> <li>To make the students familiarize with Mathematical Modeling of advanced techniques of Fourier series integration, tracing of curve, multiple integrals and their applications.</li> <li>The aim is to equip them with the basic concepts of statistics, probability functions &amp; hypothesis tests.</li> </ul>		
<b>Course Outcomes:</b> After completion of the course, learners should be able to		
CO No	CO	BL
C01	<b>Understand</b> the basic Concept.	2
C02	<b>Find</b> the Mean, Median, Mode, Standard deviation, Correlation, regression, probability of given data , area of double integration and rectification of curve.	3
C03	<b>Apply</b> the Proper and improper integrals by some special functions.	3
C04	<b>Apply</b> advanced integration techniques such as Reduction formulae, Beta functions, and Gamma functions needed in evaluating multiple integrals and their applications	3
C05	Analyse the Problems and <b>apply</b> the appropriate concept	3
C06	<b>Apply</b> the concept of Statistics, Probability and Integral Calculus for real life Engineering Problems.	3
Course Contents		
Unit I	Statistics- Correlation and Regression line	7 Hours

SNJB's Late Sau. K. B. Jain College of Engineering, Chandwad  
(An Autonomous Institute Affiliated to Savitribai Phule Pune University, Pune)  
Curriculum Structure and Evaluation Scheme  
To be implemented for 2025-29 Batch

Measures of central tendency, Standard deviation, coefficient of variation, Moments, Skewness and Kurtosis, Correlation and Regression, Reliability of Regression Estimates, Curve fitting: fitting of straight line, parabola and related curves		
<b>Exemplar/Case Studies:</b> Case study on Correlation .		
<b>*Mapping of Course Outcomes</b>		<b>C01,C02, C05, C06</b>
<b>Unit II</b>	<b>Basic Probability &amp; Probability Distribution.</b>	<b>7 Hours</b>
Theorems on Probability, Bayes Theorem, Random variables, Mathematical Expectation, Probability density function, Probability distributions: Binomial, Poisson, Normal and Hypergeometric, Test of Hypothesis: Chi-Square test, t-distribution		
<b>Exemplar/Case Studies:</b> Case study on Probability Distribution		
<b>*Mapping of Course Outcomes</b>		<b>C01,C02, C05, C06</b>
<b>Unit III</b>	<b>Fourier series</b>	<b>7 Hours</b>
Definition ,Dirichlet's Condition, Full Range Fourier Series, Half Range Fourier Series, Harmonic Analysis Parseval's Identity And Application to Engineering problem.		
<b>Exemplar/Case Studies:</b> –		
<b>*Mapping of Course Outcomes</b>		<b>C01,C05, C06</b>
<b>Unit IV</b>	<b>Integral Calculus</b>	<b>7 Hours</b>
Reduction Formulae, Beta and Gamma functions, Differentiation Under Integral Sign, Error Function.		
<b>Exemplar/Case Studies:</b> –		
<b>*Mapping of Course Outcomes</b>		<b>C01,C03, C04, C05</b>
<b>Unit V</b>	<b>Curve Tracing</b>	<b>7 Hours</b>
Tracing of Curves – Cartesian, Polar curves, Parametric curves, Rectification of curves.		
<b>Exemplar/Case Studies:</b> –		
<b>*Mapping of Course Outcomes</b>		<b>C01,C02, C05, C06</b>
<b>Unit VI</b>	<b>Multiple Integral and Its Applications</b>	<b>7 Hours</b>
Double and Triple integrations, Change of order of integration, Applications to find Area, Volume, Mass, Centre of Gravity and		

SNJB's Late Sau. K. B. Jain College of Engineering, Chandwad  
(An Autonomous Institute Affiliated to Savitribai Phule Pune University, Pune)  
Curriculum Structure and Evaluation Scheme  
To be implemented for 2025-29 Batch

Moment of Inertia.	
<b>Exemplar/Case Studies: –</b>	
<b>*Mapping of Course Outcomes</b>	<b>C01,C02, C04, C05, C06</b>
<b>Learning Resources</b>	
<b>Text Books</b>	
<b>T1.</b> .B. V. Ramana ,“Higher Engineering Mathematics”, (Tata McGraw Hill) (2017, 29- edition) <b>T2.</b> B. S. Grewal, “Higher Engineering Mathematics “, (Khanna Publication, Delhi(2014. 2- edition )	
<b>Reference Books :</b>	
<b>R1.</b> Erwin Kreyszig , “ Advanced Engineering Mathematics” , (Wiley Eastern Ltd.), (2014, 9- edition ) <b>R2.</b> M. D. Greenberg , “Advanced Engineering Mathematics” , (Pearson Education), (2014. 2- edition) <b>R3.</b> Peter V. O'Neil, “ Advanced Engineering Mathematics “ , (Thomson Learning) , (2013,7- edition)	
<b>Additional Resources: (Books, e-Resources)</b> 1. <a href="https://discovery1.delnet.in/Search/Results?lookfor=B.+V.+Ramana&amp;type=Author&amp;location_code=&amp;limit=60">https://discovery1.delnet.in/Search/Results?lookfor=B.+V.+Ramana&amp;type=Author&amp;location_code=&amp;limit=60</a> 2. <a href="https://discovery1.delnet.in/Search/Results?lookfor=B.+S.+Grewal&amp;type=Author&amp;location_code=&amp;limit=60">https://discovery1.delnet.in/Search/Results?lookfor=B.+S.+Grewal&amp;type=Author&amp;location_code=&amp;limit=60</a> 3. <a href="https://discovery1.delnet.in/Search/Results?lookfor=Erwin+Kreyszig&amp;type=Author&amp;location_code=&amp;limit=60">https://discovery1.delnet.in/Search/Results?lookfor=Erwin+Kreyszig&amp;type=Author&amp;location_code=&amp;limit=60</a> 4. <a href="https://discovery1.delnet.in/Search/Results?lookfor=M.+D.+Greenberg+&amp;type=Author&amp;location_code=&amp;limit=60">https://discovery1.delnet.in/Search/Results?lookfor=M.+D.+Greenberg+&amp;type=Author&amp;location_code=&amp;limit=60</a> 5. <a href="https://discovery1.delnet.in/Search/Results?lookfor=Peter+V.+O&amp;type=Author&amp;location_code=&amp;limit=60">https://discovery1.delnet.in/Search/Results?lookfor=Peter+V.+O&amp;type=Author&amp;location_code=&amp;limit=60</a> 6. <a href="https://discovery1.delnet.in/Search/Results?lookfor=George+B.+Thomas&amp;type=Author&amp;location_code=&amp;limit=60">https://discovery1.delnet.in/Search/Results?lookfor=George+B.+Thomas&amp;type=Author&amp;location_code=&amp;limit=60</a> 7. <a href="https://discovery1.delnet.in/Search/Results?lookfor=P.N.Wartika&amp;type=Author&amp;location_code=&amp;limit=60">https://discovery1.delnet.in/Search/Results?lookfor=P.N.Wartika&amp;type=Author&amp;location_code=&amp;limit=60</a> 8. <a href="https://discovery1.delnet.in/Search/Results?lookfor=Ron+Larson%2C&amp;type=Author&amp;location_code=&amp;limit=60">https://discovery1.delnet.in/Search/Results?lookfor=Ron+Larson%2C&amp;type=Author&amp;location_code=&amp;limit=60</a>	

SNJB's Late Sau. K. B. Jain College of Engineering, Chandwad  
(An Autonomous Institute Affiliated to Savitribai Phule Pune University, Pune)  
Curriculum Structure and Evaluation Scheme  
To be implemented for 2025-29 Batch

25-ESC-1-01 : Basic Electrical & Electronics Engineering		
<b>Teaching Scheme:</b> Theory: 03 Hours/Week	<b>Credit:</b> 03	<b>Evaluation Scheme:</b> <b>CIE</b> : 20 Marks <b>MSE</b> : 20 Marks <b>SEE</b> : 60 Marks
<b>Prerequisites:</b> Basic knowledge of Physics		
<b>Companion Course:</b> 25-ESC-1-05 : Basic Electrical & Electronics Engineering Lab		
<b>Course Objectives:</b> <ul style="list-style-type: none"> <li>To provide knowledge about electrical and electronic components and circuits.</li> <li>To be aware of the electrical safety devices, electrical systems &amp; electrical machines.</li> <li>To provide knowledge about sensors.</li> <li>To impart knowledge of the basic principles of communication systems.</li> </ul>		
<b>Course Outcomes:</b> After completion of the course, learners should be able to		
CO No.	CO	BL
<b>CO1</b>	Analyze the resistive circuits.	<b>4</b>
<b>CO2</b>	Use Semiconductor devices in the rectifier, switch and amplifier applications.	<b>3</b>
<b>CO3</b>	Explain the electrical systems and safety devices.	<b>2</b>
<b>CO4</b>	Explain the construction, working principle of electrical machines.	<b>2</b>
<b>CO5</b>	Select the sensors for given applications.	<b>3</b>
<b>CO6</b>	Describe the basic principles of communication systems.	<b>2</b>
Course Contents		
Unit I	Basic Circuits elements	6 Hours
Basic Circuit Elements: Active & passive electronics components and their uses in the circuits. Sources: Ideal & Practical Voltage & Current sources. Resistor & capacitor - Series and parallel connection, Voltage and current divider theorem. Ohm's law, Kirchoff's laws: Basic concepts of KVL & KCL.		

SNJB's Late Sau. K. B. Jain College of Engineering, Chandwad  
(An Autonomous Institute Affiliated to Savitribai Phule Pune University, Pune)  
Curriculum Structure and Evaluation Scheme  
To be implemented for 2025-29 Batch

<b>Exemplar/Case Studies:</b> Applications of Active & passive electronics components.		
<b>*Mapping of Course Outcomes :</b>		<b>C01</b>
<b>Unit II</b>	<b>Semiconductor Devices &amp; Circuits</b>	<b>6 Hours</b>
Diodes: PN junction diode, Biasing, V-I characteristics. Special diodes: LED, Photodiode. Rectifier Circuits: HWR, FWR (Bridge). Introduction to regulated DC power supply. Transistors: BJT - Region of operation, CE configuration, BJT as a Switch & amplifier, E-MOSFET- Switch & amplifier.		
<b>Exemplar/Case Studies:</b> Applications of diodes.		
<b>*Mapping of Course Outcomes :</b>		<b>C02</b>
<b>Unit III</b>	<b>Fundamentals of Electrical Systems and safety devices</b>	<b>6 Hours</b>
Electrical system: Single phase and three phase supply, Alternating voltage & current. Calculation & billing of energy consumption, How to reduce the power consumption. Safety devices: Fuse, MCB, MCCB, ELCB. Battery: Introduction, Lithium Ion Battery. Non Conventional Energy Source: Rooftop Solar Plant.		
<b>Exemplar/Case Studies:</b> Calculate the electric consumption of your home and suggest the ways to reduce it.		
<b>*Mapping of Course Outcomes :</b>		<b>C03</b>
<b>Unit IV</b>	<b>Electrical Machines</b>	<b>6 Hours</b>
DC Machines (Shunt and series motor) : Construction, Working principle & Application. Transformer : Working principles, types, losses, emf equation of transformer, Application. Special Machines : Introduction to Stepper motor, Servo motor.		
<b>Exemplar/Case Studies:</b> Applications of Motors.		
<b>*Mapping of Course Outcomes :</b>		<b>C04</b>
<b>Unit V</b>	<b>Sensors</b>	<b>6 Hours</b>
Sensors: Selection criterion, Active and Passive sensors. Block diagram of instrumentation system. Working Principles and applications of sensors : Temperature (RTD, Thermocouple), Force / Weight (Strain Gauge, load Cell), Motion ( LVDT), Obstacle (ultrasonic)		

SNJB's Late Sau. K. B. Jain College of Engineering, Chandwad  
(An Autonomous Institute Affiliated to Savitribai Phule Pune University, Pune)  
Curriculum Structure and Evaluation Scheme  
To be implemented for 2025-29 Batch

<b>Exemplar/Case Studies:</b> Applications of Sensors.		
<b>*Mapping of Course Outcomes :</b>		<b>C05</b>
<b>Unit VI</b>	<b>Basic Communication System</b>	<b>6 Hours</b>
Communication System : Block Diagram of Communication System. Communication Media: Wired and Wireless. Electromagnetic spectrum (IEEE spectrum). Modulation- Need, Amplitude & Frequency Modulation. Mobile Communication System : Cellular Network, GSM, Introduction to 5G.		
<b>Exemplar/Case Studies:</b> Applications of different media (wired, wireless) used for communication.		
<b>*Mapping of Course Outcomes :</b>		<b>C06</b>
<b>Learning Resources</b>		
<b>Text Books</b>		
T1. B.L. Theraja, "A Textbook of Electrical Technology", S. Chand Publication T2. R.S. Sedha, "Applied Electronics", S. Chand T3. D.P. Kothari, I. J. Nagrath, "Electric Machines", McGraw Hill		
<b>Reference Books</b>		
R1. V. K. Mehta, Rohit Mehta, "Basic Electrical Engineering", S Chand Publications R2. Van Valkenburgh, "Solid State Electronics", Cengage Learning R3. Srinivas, "Basic Electrical Engineering", I. K. International R4. Abhijit Chakrabarti, "Electrical Machines", McGraw Hill R5. D.V.S. Murty, "Transducers and Instrumentation", PHI, 2nd Edition R6. J. Schiller, "Mobile Communication", Pearson, 2nd Edition		
<b>Additional Resources: (Books, e-Resources)</b> <a href="https://en.wikipedia.org/wiki/Lithium-ion_battery">https://en.wikipedia.org/wiki/Lithium-ion_battery</a>		
<b>MOOC Courses links :</b> <a href="https://onlinecourses.nptel.ac.in/noc24_ee53/preview">https://onlinecourses.nptel.ac.in/noc24_ee53/preview</a> <a href="https://onlinecourses.nptel.ac.in/noc24_mm10/preview">https://onlinecourses.nptel.ac.in/noc24_mm10/preview</a>		



SNJB's Late Sau. K. B. Jain College of Engineering, Chandwad  
(An Autonomous Institute Affiliated to Savitribai Phule Pune University, Pune)  
Curriculum Structure and Evaluation Scheme  
To be implemented for 2025-29 Batch

25-ESC-1-06: Programming and Problem Solving using Python		
<b>Teaching Scheme:</b> Theory: 02 Hours/Week	<b>Credit:</b> 02	<b>Evaluation Scheme:</b> <b>CIE :</b> 20 Marks <b>MSE:</b> 20 Marks <b>SEE :</b> 60 Marks
<b>Prerequisite Courses:</b> Basic Computer Skills, Logical Thinking and Problem-Solving Skills.		
<b>Companion Course:</b> 25-ESC-1-10: Python Programming Lab		
<b>Course Objectives:</b> <ul style="list-style-type: none"> <li>To develop proficiency in algorithmic thinking and problem-solving using computers.</li> <li>To gain a knowledge of fundamental programming paradigms.</li> <li>To cultivate logical thinking skills to analyze code, identify logical errors.</li> <li>To introduce Object-Oriented principles and concepts to design effective solutions.</li> <li>To elaborate principles of code reusability, flexibility, extensibility, and scalability.</li> <li>To comprehend the concept of file handling within programming environments.</li> </ul>		
<b>Course Outcomes:</b> After completion of the course, learners should be able to		
CONo	CO	BL
C01	<b>Develop</b> algorithmic solutions to simple computational problems.	3
C02	<b>Develop</b> simple Python programs for solving problems	3
C03	<b>Understand</b> the significance of conditional branching and iteration .	2
C04	<b>Understand</b> the Object-Oriented principles and concepts and <b>utilize</b> it to design solutions using Python.	2
C05	<b>Apply</b> code reusability, flexibility, extensibility, and scalability using Object-Oriented principles.	3
C06	<b>Understand</b> the concept of file handling and <b>demonstrate</b> its significance in programming environments.	3

SNJB's Late Sau. K. B. Jain College of Engineering, Chandwad  
(An Autonomous Institute Affiliated to Savitribai Phule Pune University, Pune)  
Curriculum Structure and Evaluation Scheme  
To be implemented for 2025-29 Batch

Course Contents		
Unit I	Introduction of programming design tools and Basics of Python programming	5 Hours
<p><b>Program Design Tools :</b> Algorithms, Flowchart and Pseudo code , Programming Language Introduction and Paradigms.</p> <p><b>Introduction to Python Programming:</b> Features , History , Application, Python Program Structure, Identifiers, Data Types, Constants, Variables,Reserved words, Type casting operator, Input and output functions, Indentations and comments,Operators and Expressions.</p> <p><b>#Exemplar/Case Studies</b> Cooking Adventures: A Delicious Journey into Python Programming.</p> <ul style="list-style-type: none"> <li>● <b>Ingredients (Data Types):</b> Introduction to essential ingredients such as integers, floats, strings, and lists. Understanding the flavor and characteristics of each data type through culinary analogies.</li> <li>● <b>Recipes (Variables and Operations):</b> Learning how to create variables to store ingredients and manipulate them using basic operations. Crafting recipes (code snippets) to combine ingredients and perform calculations, akin to cooking up a delicious dish.</li> </ul>		
*Mapping of Course Outcomes		C01,C02
Unit II	Control Statements in Python Programming	5 Hours
<p><b>Decision Control Statements :</b> if, if-else , nested if, if-elif-else statements .</p> <p><b>Basic Loop Structure / Iterative Statements :</b> while loop , for loop , nested loops, break, continue, pass statement, else statements using loop.</p> <p><b>Decision Controls with Other Data Types:</b> List, Tuple Dictionary.</p> <p><b>#Exemplar/Case Studies</b> "Vending Machine Simulator" is an innovative Python program designed to replicate the functionalities of a real vending machine in a virtual environment.</p> <ul style="list-style-type: none"> <li>● <b>Menu Display and item selection (Using if-elif-else).</b></li> <li>● <b>Payment Calculation.</b></li> <li>● <b>Store data in sequential data type.</b></li> </ul>		
*Mapping of Course Outcomes		C02,C03
Unit III	Modular Programming	5 Hours

SNJB's Late Sau. K. B. Jain College of Engineering, Chandwad  
(An Autonomous Institute Affiliated to Savitribai Phule Pune University, Pune)  
Curriculum Structure and Evaluation Scheme  
To be implemented for 2025-29 Batch

<b>Function: Need of Function</b> , Function definition, Function call, Function arguments, Passing arguments to functions, Variable scope and lifetime, Local and Global variable, return statement, Lambda Function. <b>Modules:</b> Introduction of modules, Making own module, import and from...import statement, Introduction of standard library module , Introduction of Packages in Python.		
<b>#Exemplar/Case Studies</b> The "Smart Home Automation System" project exemplifies the principles of functions and modular programming in Python, demonstrating how breaking down complex tasks into smaller, manageable modules enhances code readability, maintainability, and reusability. <ul style="list-style-type: none"> <li>• <b>Modular Design:</b> The Smart Home Automation System separate modules for controlling lights, adjusting thermostats, and activating security alarms.</li> <li>• <b>Function Parameters:</b> Modules accept parameters to the light control module may accept parameters such as brightness level, color, and duration.</li> <li>• <b>Function Return Values:</b> Modules return status codes or error messages to indicate the success or failure of operations.</li> </ul>		
<b>*Mapping of Course Outcomes</b>		<b>CO5</b>
<b>Unit IV</b>	<b>Introduction of Object oriented programming</b>	<b>5 Hours</b>
<b>Introduction of Object oriented programming:</b> Features of object oriented programming. <b>Classes and Objects:</b> Defining classes , creating objects, Class method and self argument, __init__() method, __del__() method, Class variable and Object variable, Public and Private data members, Private method, Class method.		
<b>#Exemplar/Case Studies</b> <b>Develop a digital Car Management System for ABC Car Rentals to streamline their operations.</b> <ul style="list-style-type: none"> <li>• <b>Create Car Class:</b> With attributes (properties) like make, model, year, and mileage, and methods (functions) that represent car functionalities like accelerate, brake, and display_info.</li> <li>• <b>Creating Car Objects:</b> create instances (objects) that represent specific cars.</li> <li>• <b>Display the Car information :</b> create class method to display car information.</li> </ul>		
<b>*Mapping of Course Outcomes</b>		<b>CO4,CO5</b>
<b>Unit V</b>	<b>Abstraction, Inheritance and Polymorphism</b>	<b>5 Hours</b>
<b>Concept of Inheritance:</b> Parent class, derived class. <b>Types of inheritance:</b> Single, Multiple, Multilevel, Multipath Inheritance. <b>Dynamic Polymorphism:</b> Method overloading, <b>Runtime Polymorphism:</b> Method overriding.		

SNJB's Late Sau. K. B. Jain College of Engineering, Chandwad  
(An Autonomous Institute Affiliated to Savitribai Phule Pune University, Pune)  
Curriculum Structure and Evaluation Scheme  
To be implemented for 2025-29 Batch

<b>Introduction of other features:</b> Data abstraction and Hiding through classes.		
<b>#Exemplar/Case Studies</b> Our computer store needs a robust management system to keep track of its inventory of peripherals. <ul style="list-style-type: none"> <li>Design a Python program that uses the concept of inheritance to represent different types of peripherals. Each peripheral type will be a subclass of a base class, allowing us to organize and manage them uniformly.</li> </ul>		
<b>*Mapping of Course Outcomes</b>		<b>CO4,CO5</b>
<b>Unit VI</b>	<b>File Handling</b>	<b>5 Hours</b>
<b>Files:</b> Introduction of files, File path, Types of files, Opening and Closing files. <b>File Operations:</b> write() and writelines() method, read() and readline() method, append() method, Opening file using with keyword, rename and deleting the files. <b>Dictionary method:</b> mkdir(), getcwd(), chdir(), rmdir(), listdir(), Methods from the OS module.		
<b>#Exemplar/Case Studies</b> The "Word Search Engine" project showcases the practical application of file handling in Python programming by creating a tool to search for specific words within text files. <ul style="list-style-type: none"> <li><b>File Opening:</b> The program allows users to specify the file they want to search by providing the file path as input.</li> <li><b>Word Search:</b> Learners implement algorithms to search for a target word within the text file.</li> <li><b>Search Results:</b> Upon finding occurrences of the target word, the program displays the line numbers or positions where the word is found within the file.</li> </ul>		
<b>*Mapping of Course Outcomes</b>		<b>CO6</b>
<b>Learning Resources</b>		
<b>Text Books</b>		
<b>T1.</b> Reema Thareja, "Python Programming Using Problem Solving Approach", Oxford University Press, ISBN 13: 978-0-19-948017-6 <b>T2.</b> R. Nageswara Rao, "Core Python Programming", Dreamtech Press; Second edition ISBN-13: 978-9386052308		
<b>Reference Books :</b>		
<b>R1:</b> Romano Fabrizio, "Learning Python", Packt Publishing Limited, ISBN: 9781783551712, 1783551712 <b>R2:</b> Paul Barry, "Head First Python- A Brain Friendly Guide", SPD O'Reilly, 2nd Edition, ISBN:978-93-5213-482-3		

SNJB's Late Sau. K. B. Jain College of Engineering, Chandwad  
(An Autonomous Institute Affiliated to Savitribai Phule Pune University, Pune)  
Curriculum Structure and Evaluation Scheme  
To be implemented for 2025-29 Batch

**R3:** Martin C. Brown, "Python: The Complete Reference", McGraw Hill Education, ISBN-10: 9789387572942, ISBN-13: 978-9387572942, ASIN: 9387572943

**R4:** Jeeva Jose, P. Sojan Lal, "Introduction to Computing & Problem Solving with Python", Khanna Computer Book Store; First edition, ISBN-10: 9789382609810, ISBN-13: 978-9382609810

**Additional Resources: (Books, e-Resources)**

- <https://wiki.python.org/moin/PythonBooks>
- <https://docs.python.org/3/>

**MOOC Courses links :**

**1. Python for Data Science**

[https://onlinecourses.nptel.ac.in/noc22\\_cs32/preview](https://onlinecourses.nptel.ac.in/noc22_cs32/preview)

**2. The Joy of Computing using Python**

[https://onlinecourses.nptel.ac.in/noc21\\_cs32/preview](https://onlinecourses.nptel.ac.in/noc21_cs32/preview)



SNJB's Late Sau. K. B. Jain College of Engineering, Chandwad  
(An Autonomous Institute Affiliated to Savitribai Phule Pune University, Pune)  
Curriculum Structure and Evaluation Scheme  
To be implemented for 2025-29 Batch

25-PCC-CE-1-01 : Engineering Mechanics		
<b>Teaching Scheme:</b> Theory: 2 Hours/Week	<b>Credit:</b> 2	<b>Evaluation Scheme:</b> <b>CIE :</b> 20 Marks <b>SEE :</b> 30 Marks
<b>Prerequisites :</b> Trigonometry, Derivation and integration, Basic concepts of linear motion of particles.		
<b>Companion Course:</b> 25-PCC-CE-1-02 : Engineering Mechanics Lab		
<b>Course Objectives:</b> <ul style="list-style-type: none"> <li>To impart knowledge about force systems and methods to determine resultant.</li> <li>To teach methods to calculate centroid and friction coefficient.</li> <li>To impart knowledge to determine reaction of beams, calculate member forces in trusses.</li> <li>To train students to solve problems related to particle mechanics using principles of kinematics, kinetics of rectilinear motion and work power energy.</li> </ul>		
<b>Course Outcomes:</b> After completion of the course, learners should be able to		
CONo	CO	BL
CO1	Select appropriate method to solve problems of rigid body.	3
CO2	Determine centroid and solve problems related to friction.	3
CO3	Ascertain reactions of beams, Solve trusses by applying conditions of equilibrium.	3
CO4	Calculate position, velocity and acceleration of particles using principles of kinematics and kinetics. Apply the concept of work, power, energy to solve engineering problems.	3
Course Contents		
Unit I	Resolution and Composition of Forces	7 Hours
Principle of statics, Force system, Resolution and composition of forces, Resultant of concurrent forces. Moment of a force, Varignon's theorem, resultant of parallel force system, Couple, Equivalent force		

SNJB's Late Sau. K. B. Jain College of Engineering, Chandwad  
(An Autonomous Institute Affiliated to Savitribai Phule Pune University, Pune)  
Curriculum Structure and Evaluation Scheme  
To be implemented for 2025-29 Batch

couple system.		
<b>Exemplar/Case Studies</b> - Find the application of a concurrent force system.		
<b>Mapping of Course Outcomes</b>		CO1, CO3
<b>Unit II</b>	<b>Distributed Forces and Friction</b>	<b>7 Hours</b>
<b>Centroid</b> of plane lamina and wire bends. <b>Friction</b> - Laws of friction, application of friction on inclined planes Wedges and ladders friction.		
<b>Exemplar/Case Studies</b> - Describe applications of Friction with the help of case study.		
<b>Mapping of Course Outcomes</b>		CO2
<b>Unit III</b>	<b>Equilibrium</b>	<b>7 Hours</b>
Free body diagram, Equilibrium of concurrent, parallel forces in a plane, Equilibrium of three forces in a plane, Type of supports and reaction, Types of beams, simple and compound beams. Two force members, Analysis of plane trusses by Method of joints, Analysis of plane trusses by method of section.		
<b>Exemplar/Case Studies</b> - Evaluate the types of the beam from a given plan.		
<b>Mapping of Course Outcomes</b>		CO1, CO3
<b>Unit IV</b>	<b>Kinematics and Kinetics of Rectilinear motion, Conservation of energy</b>	<b>7 Hours</b>
<b>Kinematics of linear motion</b> - Basic concepts Equation of motion for constant acceleration Motion under gravity, Variable acceleration motion curves. <b>Kinetics of linear motion</b> - Newton's Second Law of motion, Application of Newton's Second Law Work, power, energy, conservative and non-conservative forces, <b>Conservation of energy</b> for motion of particles.		
<b>Exemplar/Case Studies</b> - Discuss a case study on conservation of energy.		
<b>Mapping of Course Outcomes</b>		CO4
<b>Learning Resources</b>		
<b>Text Books</b>		

SNJB's Late Sau. K. B. Jain College of Engineering, Chandwad  
(An Autonomous Institute Affiliated to Savitribai Phule Pune University, Pune)  
Curriculum Structure and Evaluation Scheme  
To be implemented for 2025-29 Batch

**T1.** F. P. Beer and E. R. Johnson, "Vector Mechanics for Engineers", McGraw-Hill Publication, Vol-3  
**T2.** R. C. Hibbeler, "Engineering Mechanics", Pearson Education, Vol- 1

**Reference Books :**

**R1.** S. P. Timoshenko and D. H. Young, "Engineering Mechanics", McGraw- Hill publication, Vol-5  
**R2.** J. L. Meriam and Craige, "Engineering Mechanics", John Willey, Vol-5  
**R3.** A. P. Boresi and R. J. Schmidt, "Engineering Mechanics", Brooks/Cole Publication, Vol-1

**Additional Resources: (Books, e-Resources)**

- A Textbook of Engineering Mechanics by R.S. Khurmi and N Khurmi, S Chand and company limited

**MOOC Courses links :**

- <https://nptel.ac.in/courses/112106180>
- <https://nptel.ac.in/courses/112103109>





SNJB's Late Sau. K. B. Jain College of Engineering, Chandwad  
(An Autonomous Institute Affiliated to Savitribai Phule Pune University, Pune)  
Curriculum Structure and Evaluation Scheme  
To be implemented for 2025-29 Batch

25-BSC-1-05 : Engineering Physics Lab		
Teaching Scheme: PR: 02 Hours/week	Credit: 01	Evaluation Scheme: Termwork (TW) : 25 Marks
<b>Prerequisites :</b> <b>Useful Concepts:</b> Band theory of solids, Classification of solids, Study of Atoms, Molecules and atomic theory and Rutherford Expt, Photoelectric effect, Transducer, Meaning of calibration, Piezoelectric effect, Polarisation, Properties of Matter, Electric field, Magnetic Field.		
<b>Companion Course:</b> 25-BSC-1-01 Engineering Physics		
<b>Course Objectives:</b> <ul style="list-style-type: none"> <li>To gain practical knowledge by applying experimental methods to correlate with the theory.</li> <li>To develop intellectual communication skills and discuss the basic understanding of various experimental principles involved.</li> </ul>		
<b>Course Outcomes:</b> After completion of the course, learners should be able to		
CONo	CO	BL
CO1	<b>Demonstrate</b> understanding of optoelectronic devices and their characteristics.	3
CO2	<b>Apply</b> scientific principles to analyze and measure physical properties	3
CO3	<b>Utilize</b> experimental techniques for characterization and analysis	3
CO4	<b>Evaluate</b> and interpret data to determine material properties and functionalities.	3
CO5	<b>Demonstrate</b> familiarity with basic electronic components and use them to design simple electronic circuits.	3
CO6	<b>Proficiently</b> perform various NDT techniques including but not limited to Visual Inspection, Ultrasonic Testing and Radiography Testing.	3
<b>Guidelines for Instructor's Manual</b>		

SNJB's Late Sau. K. B. Jain College of Engineering, Chandwad  
(An Autonomous Institute Affiliated to Savitribai Phule Pune University, Pune)  
Curriculum Structure and Evaluation Scheme  
To be implemented for 2025-29 Batch

The instructor's manual is to be developed as a reference and hands-on resource. It should include prologue (about University/program/ institute/ department/foreword/ preface), curriculum of the course, conduction and Assessment guidelines, topics under consideration, concept, objectives, outcomes, set of typical applications/assignments/ guidelines, and references.		
<b>Guidelines for Student's Laboratory Journal/Manual</b>		
The laboratory assignments are to be submitted by students in the form of a journal. Journal consists of Certificate, table of contents, and handwritten write-up of each assignment (Title, Date of Completion, Objectives, Problem Statement, , Assessment grade/marks and assessor's sign, Theory- Concept in brief, (if applicable), conclusion/analysis.		
<b>Guidelines for Laboratory /Term Work Assessment</b>		
Continuous assessment of laboratory work should be based on overall performance of Laboratory assignments by a student. Each Laboratory assignment assessment will assign grade/marks based on parameters, such as Team work, Understanding, Lab report and interpretation of result and conclusion.		
<b>Guidelines for Laboratory Conduction &amp; Safety</b>		
<ul style="list-style-type: none"> <li>Do not come into the lab early unless the instructor is present.</li> <li>Do not set equipment too close to the edge of the table.</li> <li>Do not activate any circuit or apparatus until the instructor inspects it.</li> <li>Never touch a possibly live circuit and do not touch electrical equipment with wet hands.</li> <li>No food or drink is to be consumed in the laboratory.</li> <li>Any food or drink brought to the lab must remain in the students carrying bag until they leave.</li> </ul>		
<b>Virtual Laboratory: (If Any):</b>		
<ul style="list-style-type: none"> <li>Study of Bragg's law.</li> <li>Simulation Experiments on Sensors.</li> </ul>		
<b>Suggested List of Laboratory Experiments/Assignments(Any 8)</b>		
Sr No	Assignment Title	*Mapping of Course Outcomes
1.	Analyze the light sensitivity of solar cells: Measure the current-voltage (I-V) characteristics of a solar cell to understand its efficiency in converting light energy into electricity.	C01, C04

SNJB's Late Sau. K. B. Jain College of Engineering, Chandwad  
(An Autonomous Institute Affiliated to Savitribai Phule Pune University, Pune)  
Curriculum Structure and Evaluation Scheme  
To be implemented for 2025-29 Batch

2.	Calculate the energy gap in a semiconductor: Determine the forbidden energy gap of a semiconductor material, a crucial parameter for its applications in electronics and optoelectronics.	C02
3.	Measure the angle of polarization with a half-shade polarimeter: Utilize a half-shade polarimeter to analyze the polarization of light, a technique used in various applications like 3D glasses and glare reduction.	C01, C03
4.	Characterize a diffraction grating using a laser: Employ a laser and a diffraction grating to determine the number of lines per unit length on the grating. This knowledge is essential for designing optical instruments like spectrometers.	C02
5	Simulate sensor behavior: Through simulations, investigate the response of various sensors to different stimuli, allowing for the optimization of sensor design for specific applications.	C03
6	Determine the velocity of a liquid using an ultrasonic interferometer: Measure the velocity of a liquid with an ultrasonic interferometer, a non-invasive technique used in industrial processes and medical diagnostics.	C02
7	Measure the numerical aperture of an optical fiber: Determine the numerical aperture of an optical fiber, a parameter defining its light-gathering ability, which is critical for communication and sensing applications.	C02
8	Investigate a phenomenon related to double refraction: Conduct an experiment based on double refraction to determine the refractive indices of a material or identify the type of crystal. Double refraction has applications in optical components like waveplates and polarization filters.	C02, C03, C04
9	Analyze the impact of light on sensor response: Study the dependence of a sensor's output on the intensity or wavelength of light. This understanding is crucial for designing light-based sensors for various applications.	C01
10	Explore the switching behavior of transistors: Analyze the operation of a transistor as a switch, a fundamental building block in digital circuits.	C05
11	Evaluate Non-Destructive Testing (NDT) methods: Study various NDT techniques for material characterization without damaging the sample.	C06

SNJB's Late Sau. K. B. Jain College of Engineering, Chandwad  
(An Autonomous Institute Affiliated to Savitribai Phule Pune University, Pune)  
Curriculum Structure and Evaluation Scheme  
To be implemented for 2025-29 Batch

Learning Resources
<b>Text Books</b>
T1. Avadhanulu & Kshirsagar "A textbook of Engineering Physics"-S. Chand Publication 2023. T2. S. O. Pillai "A textbook of Engineering Physics", New Age International Publishers 2023.
<b>Reference Books :</b>
R1. A.K. Katiyar, C.K. Pandey. Katiyar, C.K. Pandey "Engineering Physics: Theory and Practical, 2ed-Wiley Book Series.
<b>Additional Resources: (Books, e-Resources)</b> 1. <a href="https://www.arvindguptatoys.com/toys.html">https://www.arvindguptatoys.com/toys.html</a>



SNJB's Late Sau. K. B. Jain College of Engineering, Chandwad  
(An Autonomous Institute Affiliated to Savitribai Phule Pune University, Pune)  
Curriculum Structure and Evaluation Scheme  
To be implemented for 2025-29 Batch

<b>25-ESC-1-05: Basic Electrical and Electronics Engineering Lab</b>		
<b>Teaching Scheme:</b> Practical: 02 hrs/Week	<b>Credit:</b> 1	<b>Evaluation Scheme:</b> Termwork (TW) : 25 Marks
<b>Prerequisite Courses:</b> Basic knowledge of Physics		
<b>Companion Course:</b> 25-ESC-1-01: Basic Electrical and Electronics Engineering		
<b>Course Objectives:</b> <ul style="list-style-type: none"> <li>To provide practical demonstration of electrical components and basic laws.</li> <li>To provide practical demonstration of semiconductor devices and their applications.</li> <li>To provide practical demonstration of electrical safety devices &amp; electrical machines.</li> <li>To provide knowledge of batteries, cables &amp; sensors.</li> </ul>		
<b>Course Outcomes:</b> After completion of the course, learner should be able to		
CO No.	CO	BL
<b>CO1</b>	Analyze resistive circuits using KVL, KCL under DC supply	<b>4</b>
<b>CO2</b>	Build and test power supply, LED biasing, transistor application as a switch and amplifier	<b>3</b>
<b>CO3</b>	Demonstrate the electrical safety devices & electrical machines	<b>3</b>
<b>CO4</b>	Explain applications of batteries, cables & sensors	<b>2</b>
<p style="text-align: center;"><b>Guidelines for Instructor's Manual</b></p> <p>The instructor's manual is to be developed as a reference and hands-on resource. It should include rubric for the assessment and practical conduction plan. The Instructor's Manual should contain the following related to every experiment – Aim , objectives, Brief theory related to the experiment, Apparatus with their detailed specifications, Connection diagram /circuit diagram, Observation table/ simulation waveforms, Sample calculations for one/two readings, Result table, Graph and Conclusions, Few questions related to the experiment, Relevance of practical in real life /industry.</p>		
<b>Guidelines for Student's Laboratory Journal</b>		

SNJB's Late Sau. K. B. Jain College of Engineering, Chandwad  
(An Autonomous Institute Affiliated to Savitribai Phule Pune University, Pune)  
Curriculum Structure and Evaluation Scheme  
To be implemented for 2025-29 Batch

The laboratory assignments are to be submitted by students in the form of a journal. Journal consists of Certificate, table of contents, and printed write-up of each assignment (Title, Date of Completion, Objectives, Problem Statement, Hardware requirements, Assessment grade/marks and assessor's sign, Theory- Concept in brief, test cases, Test Data Set (if applicable), mathematical model (if applicable), conclusion/analysis. For reference one or two journals may be maintained in the Laboratory.

**Guidelines for Laboratory /Term Work Assessment**

There should be continuous assessment for the TW. Continuous assessment of laboratory work should be based on overall performance of Laboratory assignments by a student. Each Laboratory assignment assessment will assign grade/marks based on parameters, such as timely completion, performance, punctuality and neatness etc. or as per the defined rubrics.

**Guidelines for Laboratory Conduction**

All the experiments mentioned in the syllabus are compulsory. Use of open source software and recent versions are to be encouraged.

**Virtual Laboratory: (If Any):**

1. <https://be-iitkgp.vlabs.ac.in/List%20of%20experiments.html>
2. <https://sl-coep.vlabs.ac.in/List%20of%20experiments.html>

**Suggested List of Laboratory Experiments/Assignments**

**Group A: Assignments (Compulsory Assignment)**

Sr No	Assignment Title	Mapping of Course Outcomes
1.	Demonstration of electrical safety devices.	C03
2.	Identify & test different types of active & passive electronic components.	C01
3.	Demonstration of Ohm's, KVL, KCL.	C01
4.	Design & build LED biasing circuit.	C02
5.	Design & build transistor as a switch/amplifier.	C02
6.	Build & test regulated DC power supply.	C02

SNJB's Late Sau. K. B. Jain College of Engineering, Chandwad  
(An Autonomous Institute Affiliated to Savitribai Phule Pune University, Pune)  
Curriculum Structure and Evaluation Scheme  
To be implemented for 2025-29 Batch

Group B: Assignments (Any 2)		
Sr No	Assignment Title	Mapping of Course Outcomes
1.	Understanding the battery parts & its specification.	C03
2.	Determine efficiency and regulation of single phase transformer.	C04
3.	Study of different types of sensors & their applications.	C05
4	Study of different types of Cables & their applications.	C06
Group C: Assignments (optional)		
Sr No	Assignment Title	Mapping of Course Outcomes
1.	Visit to rooftop solar power plant.	C03
Learning Resources		
<b>Text Books</b>		
T1. D.C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill		
<b>Reference Books :</b>		
R1. S. K. Bhattacharya, "Basic Electrical and Electronics Engineering", Pearson		
<b>Additional Resources: (Books, e-Resources):</b>		
1. <a href="https://www.tinkercad.com">https://www.tinkercad.com</a>		
<b>MOOC Courses links :</b>		
1. <a href="https://onlinecourses.swayam2.ac.in/nou24_ec02/preview">https://onlinecourses.swayam2.ac.in/nou24_ec02/preview</a>		
2. <a href="https://onlinecourses.nptel.ac.in/noc24_ee12/preview">https://onlinecourses.nptel.ac.in/noc24_ee12/preview</a>		

SNJB's Late Sau. K. B. Jain College of Engineering, Chandwad  
(An Autonomous Institute Affiliated to Savitribai Phule Pune University, Pune)  
Curriculum Structure and Evaluation Scheme  
To be implemented for 2025-29 Batch

25-ESC-1-10: Python Programming Lab		
<b>Teaching Scheme:</b> Practical: 02 Hours/Week	<b>Credit:</b> 01	<b>Evaluation Scheme:</b> Termwork (TW) : 25 Marks
<b>Prerequisite Courses:</b> Basic Computer Skills, Logical Thinking and Problem-Solving Skills.		
<b>Companion Course:</b> 25-ESC-1-06 : Programming and Problem Solving Using Python.		
<b>Course Objectives:</b> <ul style="list-style-type: none"> <li>Enhance proficiency in algorithmic thinking and efficient problem-solving.</li> <li>Acquire a thorough understanding of fundamental programming concepts through effective study.</li> <li>Elaborate principles of code reusability, flexibility, extensibility, and scalability, data abstraction to develop solutions that are efficient and adaptable to varying requirements.</li> </ul>		
<b>Course Outcomes:</b> After completion of the course, learners should be able to		
CO No	CO	BL
CO1	<b>Apply</b> fundamental programming principles of Python to solve given problems.	3
CO2	<b>Demonstrate</b> control and iterative statements in python.	2
CO3	<b>Develop</b> the skills to <b>utilize</b> python data structures like Lists, Tuples, Sets and dictionaries.	3
CO4	<b>Design</b> user defined functions, modules.	3
CO5	<b>Apply</b> object -oriented programming principles in python.	3
CO6	<b>Develop</b> Python applications for manipulating files.	3
<b>Guidelines for Instructor's Manual</b> The instructor's manual is to be developed as a reference and hands-on resource. It should include		



SNJB's Late Sau. K. B. Jain College of Engineering, Chandwad  
(An Autonomous Institute Affiliated to Savitribai Phule Pune University, Pune)  
Curriculum Structure and Evaluation Scheme  
To be implemented for 2025-29 Batch

prologue (about institute/ department), curriculum of the course, conduction and Assessment guidelines, topics under consideration, concept, objectives, outcomes, set of typical applications/assignments/ guidelines, and references.		
<p style="text-align: center;"><b>Guidelines for Student's Laboratory Journal</b></p> <p>The laboratory assignments are to be submitted by students in the form of a journal. Journal consists of Certificate, table of contents, and handwritten write-up of each assignment (Title, Date of Completion, Objectives, Problem Statement, Software and Hardware requirements, Assessment grade/marks and assessor's sign, Theory- Concept in brief, algorithm, flowchart), conclusion/analysis. Program codes with sample output of all performed assignments are to be submitted as softcopy. As a conscious effort and little contribution towards Green IT and environment awareness, attaching printed papers as part of write-ups and program listing to journals must be avoided. Use of CD containing student programs maintained by Laboratory In-charge is highly encouraged. For reference one or two journals may be maintained with program prints in the Laboratory.</p>		
<p style="text-align: center;"><b>Guidelines for Laboratory /Term Work Assessment</b></p> <p>Continuous assessment of laboratory work should be based on overall performance of Laboratory assignments by a student. Each Laboratory assignment assessment will assign grade/marks based on parameters, such as Write-up, Correctness and Documentation of Program, Viva, Timely Completion.</p>		
<p style="text-align: center;"><b>Guidelines for Laboratory Conduction</b></p> <p>List of laboratory assignments is provided below . The instructor is expected to conduct the assignments by understanding the prerequisites, technological aspects, utility and recent trends related to the topic. Encourage students for appropriate use of coding style, proper indentation and comments. Use of open source software and recent versions is to be encouraged.</p>		
<b>Suggested List of Laboratory Experiments/Assignments</b>		
<b>Group A: Assignments (Any 8 Assignment)</b>		
Sr No	Assignment Title	Mapping of Course Outcomes
1.	Write a Python program to calculate the bill amount for an item given its quantity, sold , value , 10% discount and 5% tax.	CO1
2.	Write a Python program to calculate the electricity bill based on following	CO2



SNJB's Late Sau. K. B. Jain College of Engineering, Chandwad  
(An Autonomous Institute Affiliated to Savitribai Phule Pune University, Pune)  
Curriculum Structure and Evaluation Scheme  
To be implemented for 2025-29 Batch

	<p>information .</p> <table><tr><td>Consumption Unit</td><td>Rate of charge</td></tr><tr><td>0-150</td><td>Rs. 3 per Unit</td></tr><tr><td>151-350</td><td>Rs. 100 plus Rs. 3.75 per unit exceeding 150 units</td></tr><tr><td>301-450</td><td>Rs. 200 plus Rs. 4 per unit exceeding 350 units</td></tr><tr><td>451-600</td><td>Rs. 300 plus Rs. 4.25 per unit exceeding 450 units</td></tr><tr><td>Above 600</td><td>Rs. 400 plus Rs. 5 per Unit exceeding 600</td></tr></table>	Consumption Unit	Rate of charge	0-150	Rs. 3 per Unit	151-350	Rs. 100 plus Rs. 3.75 per unit exceeding 150 units	301-450	Rs. 200 plus Rs. 4 per unit exceeding 350 units	451-600	Rs. 300 plus Rs. 4.25 per unit exceeding 450 units	Above 600	Rs. 400 plus Rs. 5 per Unit exceeding 600	
Consumption Unit	Rate of charge													
0-150	Rs. 3 per Unit													
151-350	Rs. 100 plus Rs. 3.75 per unit exceeding 150 units													
301-450	Rs. 200 plus Rs. 4 per unit exceeding 350 units													
451-600	Rs. 300 plus Rs. 4.25 per unit exceeding 450 units													
Above 600	Rs. 400 plus Rs. 5 per Unit exceeding 600													
3.	<p>Write a Python program to perform various tasks such as adding books, displaying available books, searching for books by title, borrowing books, and returning books. To achieve this, you need to implement several functions:</p> <ul style="list-style-type: none"><li>● Add a book</li><li>● Display available books</li><li>● Search for a book</li><li>● Borrow a book</li><li>● Return a book</li><li>● Exit the program</li></ul>	CO2												
4	<p>Write a Python program to accept N numbers from users and store it in a sequential data type variable. Compute and display maximum, minimum, sum and average of numbers.</p>	CO3												
5.	<p>Write a Python program to check whether a given integer is an Armstrong number or not. An Armstrong number is an integer with three digits such that the sum of the cubes of its digits is equal to the number itself. For example, 371 is an Armstrong number because <math>3^3+7^3+1^3=371</math></p>	CO2, CO3												
6.	<p>Write a Python program that accepts a number from the user and prints the digits of the number in reverse order.</p>	CO3												
7.	<p>Write a Python program to accept a number from the user and generate the Fibonacci series up to that number.</p> <p>The Fibonacci series is a sequence of numbers where each number is the</p>	CO3 , CO4												

SNJB's Late Sau. K. B. Jain College of Engineering, Chandwad  
(An Autonomous Institute Affiliated to Savitribai Phule Pune University, Pune)  
Curriculum Structure and Evaluation Scheme  
To be implemented for 2025-29 Batch

	sum of the two preceding ones, usually starting with 0 and 1.	
8.	<p>Write a Python Program to Declare the class of employee to display Names, employee_id, salary of employees.</p> <p><b>Employee Class Declaration:</b> Declares a class named "Employee". The class includes private member variables for employee names, IDs, and salaries, as well as public member functions for accessing and displaying this information.</p> <p><b>Display Functionality:</b> The Employee class provides member functions to display employee names, IDs, and salaries.</p>	CO5
9.	<p>Implement a Python program for ATM money withdrawal functionality with private data members 'AccountNo' and 'balance'. include a withdrawal function that deducts the withdrawal amount from the balance and returns the remaining balance. If the withdrawal amount exceeds the balance, it should display a 'Not enough balance' message</p> <ul style="list-style-type: none"> <li>● <b>Class Definition:</b> The system defines a class named 'ATM' to represent the ATM money withdrawal functionality.</li> <li>● <b>Withdrawal Function:</b> The 'ATM' class provides a withdrawal function that accepts the withdrawal amount as a parameter.</li> <li>● <b>Encapsulation:</b> The 'AccountNo' and 'balance' data members are declared as private to encapsulate them within the class.</li> <li>● <b>Error Handling:</b> The withdrawal function includes error handling to detect cases where the withdrawal amount exceeds the available balance.</li> </ul>	CO5
10.	<p>Develop a Python program that demonstrates these fundamental concepts by modeling various geometric shapes and their interactions.</p> <ul style="list-style-type: none"> <li>● <b>Class Declaration:</b> define class Shape and class methods to calculate area and perimeter of shape.</li> <li>● <b>Constructor and Destructor:</b> initial the value for class.</li> <li>● <b>Inheritance:</b> inherit class Shape in child class Rectangle,Circle</li> </ul>	CO5
11.	<p>Write a Python program to copy the contents of one file into another file.</p> <p><b>File Input and Output:</b> The system prompts users to specify the source and destination files for content replication.</p>	CO6

SNJB's Late Sau. K. B. Jain College of Engineering, Chandwad  
(An Autonomous Institute Affiliated to Savitribai Phule Pune University, Pune)  
Curriculum Structure and Evaluation Scheme  
To be implemented for 2025-29 Batch

12.	<p>Write Python programming by to search for specific words within text files</p> <p><b>File Opening:</b> The program allows users to specify the file they want to search by providing the file path as input.</p> <p><b>Word Search:</b> implement the logic to search for a target word within the text file.</p> <p><b>Search Results:</b> Upon finding occurrences of the target word, the program displays the line numbers or positions where the word is found within the file.</p>	CO6
<b>Learning Resources</b>		
<b>Text Books</b>		
<p><b>T1.</b> Reema Thareja, "Python Programming Using Problem Solving Approach", Oxford University Press, ISBN 13: 978-0-19-948017-6</p> <p><b>T2.</b> R. Nageswara Rao, "Core Python Programming", Dreamtech Press; Second edition ISBN-13: 978-9386052308</p>		
<b>Reference Books :</b>		
<p><b>R1:</b> Romano Fabrizio, "Learning Python", Packt Publishing Limited, ISBN: 9781783551712, 1783551712</p> <p><b>R2:</b> Paul Barry, "Head First Python- A Brain Friendly Guide", SPD O'Reilly, 2nd Edition, ISBN:978-93-5213-482-3</p> <p><b>R3:</b> Martin C. Brown, "Python: The Complete Reference", McGraw Hill Education, ISBN-10: 9789387572942, ISBN-13: 978-9387572942, ASIN: 9387572943</p> <p><b>R4:</b> Jeeva Jose, P. Sojan Lal, "Introduction to Computing &amp; Problem Solving with Python", Khanna Computer Book Store; First edition, ISBN-10: 9789382609810, ISBN-13: 978-9382609810</p>		
<p><b>Virtual Lab:</b>  <a href="https://python-iitk.vlabs.ac.in/">https://python-iitk.vlabs.ac.in/</a> </p>		
<p><b>MOOC Courses links :</b></p> <ol style="list-style-type: none"> <li><b>Python for Data Science</b>  <a href="https://onlinecourses.nptel.ac.in/noc22_cs32/preview">https://onlinecourses.nptel.ac.in/noc22_cs32/preview</a> </li> <li><b>The Joy of Computing using Python</b>  <a href="https://onlinecourses.nptel.ac.in/noc21_cs32/preview">https://onlinecourses.nptel.ac.in/noc21_cs32/preview</a> </li> </ol>		

SNJB's Late Sau. K. B. Jain College of Engineering, Chandwad  
(An Autonomous Institute Affiliated to Savitribai Phule Pune University, Pune)  
Curriculum Structure and Evaluation Scheme  
To be implemented for 2025-29 Batch

25-PCC-CE-1-02 : Engineering Mechanics Lab																				
<b>Teaching Scheme:</b> Practical: 2 Hours/Week	<b>Credit:</b> 1	<b>Evaluation Scheme:</b> Termwork (TW) : 25 Marks Oral/Practical (PR) : 25 Marks																		
<b>Prerequisites:</b> Trigonometry, Derivation and integration, Basic concepts of linear motion of particles.																				
<b>Companion Course:</b> 25-PCC-CE-1-01 : Engineering Mechanics																				
<b>Course Objectives:</b> <ul style="list-style-type: none"> <li>To impart knowledge about force systems and find results by polygon law.</li> <li>To determine support reactions of beams for parallel force systems.</li> <li>To study belt friction method to calculate coefficient of friction.</li> <li>Calculate position, velocity and acceleration of particles using principles of kinematics.</li> </ul>																				
<b>Course Outcomes:</b> After completion of the course, learners should be able to: <table border="1"> <thead> <tr> <th>CO No.</th><th>CO</th><th>BL</th></tr> </thead> <tbody> <tr> <td>CO1</td><td>Determine resultant of concurrent force system by polygon law.</td><td>3</td></tr> <tr> <td>CO2</td><td>Ascertain support reactions of simply supported beams for parallel force systems.</td><td>3</td></tr> <tr> <td>CO3</td><td>Determine coefficient of friction by belt friction apparatus / inclined plane.</td><td>3</td></tr> <tr> <td>CO4</td><td>Apply conditions of equilibrium for non-concurrent non-parallel force systems.</td><td>3</td></tr> <tr> <td>CO5</td><td>Calculate position, velocity and acceleration of particles using principles of kinematics.</td><td>3</td></tr> </tbody> </table>			CO No.	CO	BL	CO1	Determine resultant of concurrent force system by polygon law.	3	CO2	Ascertain support reactions of simply supported beams for parallel force systems.	3	CO3	Determine coefficient of friction by belt friction apparatus / inclined plane.	3	CO4	Apply conditions of equilibrium for non-concurrent non-parallel force systems.	3	CO5	Calculate position, velocity and acceleration of particles using principles of kinematics.	3
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<b>Guidelines for Instructor's Manual</b> The instructor's manual is to be developed as a reference and hands-on resource. It should include prologue (about University/program/ institute/ department/foreword/ preface), curriculum of the course, conduction and Assessment guidelines, topics under consideration, concept, objectives, outcomes, set of typical																				

SNJB's Late Sau. K. B. Jain College of Engineering, Chandwad  
(An Autonomous Institute Affiliated to Savitribai Phule Pune University, Pune)  
Curriculum Structure and Evaluation Scheme  
To be implemented for 2025-29 Batch

applications/assignments/ guidelines, and references.		
<p style="text-align: center;"><b>Guidelines for Student's Laboratory Journal</b></p> <p>The laboratory assignments are to be submitted by students in the form of a journal. Journal consists of Certificate, table of contents, and handwritten write-up of each assignment (Title, Date of Completion, Objectives, Theory- Concept in brief, Procedure, Instrument requirements, calculations, Assessment grade/marks and assessor's sign, conclusion/analysis).</p>		
<p style="text-align: center;"><b>Guidelines for Laboratory /Term Work Assessment</b></p> <p>Continuous assessment of laboratory work should be based on overall performance of Laboratory assignments by a student. Each Laboratory assignment assessment will assign grade/marks based on parameters, such as Team work, understanding, Regularity, Lab report, Interpretation and quiz.</p>		
<p style="text-align: center;"><b>Guidelines for Practical Examination</b></p> <p>Experiments must be decided jointly by the internal examiner or external examiner. During practical assessment, maximum weightage should be given to satisfactory implementation of the experiment. Relevant questions may be asked at the time of evaluation to test the student's understanding of the fundamentals, effective and efficient implementation. This will encourage, transparent evaluation and fair approach, and hence will not create any uncertainty or doubt in the minds of the students. So, adhering to these principles will consummate our team efforts to the promising start of student's academics.</p>		
<p style="text-align: center;"><b>Guidelines for Laboratory Conduction</b></p> <ol style="list-style-type: none"> <li>1. All the experiments mentioned in the syllabus are compulsory.</li> <li>2. Divide the students of a batch in groups of not more than 5 students and ask each group to take reading separately followed by calculations for each experiment. After every experiment faculty should sign the lab manual.</li> <li>3. Use of open source software and recent versions is to be encouraged.</li> </ol>		
<b>Suggested List of Laboratory Experiments/Assignments</b>		
<b>Group A: Laboratory Experiments</b>		
Sr No	Assignment Title	Mapping of Course Outcomes
1.	Verification of law of parallelogram of forces/polygon of forces.	CO1
2.	To determine the support reaction of simple/compound beams.	CO2, CO4
3.	Determination of coefficient friction of belt/inclined plane.	CO3

SNJB's Late Sau. K. B. Jain College of Engineering, Chandwad  
(An Autonomous Institute Affiliated to Savitribai Phule Pune University, Pune)  
Curriculum Structure and Evaluation Scheme  
To be implemented for 2025-29 Batch

4.	Determine the X and R ratio of the curvilinear motion.	C05
5.	Determination of coefficient of restitution.	C05
<b>Group B: Assignments (Out of List perform any 3)</b>		
Sr No	Assignment Title	Mapping of Course Outcomes
1.	To determine the resultant of the general force system (using any drafting software)	C01
2.	To determine unknown forces of a concurrent force system (using any drafting software)	C01
3.	To determine the support reaction of beams.	C02
4.	Use the conditions of equilibrium for a non-concurrent non-parallel force system and draw the force polygon.	C01, C04
5.	To determine velocity, acceleration displacement and time of projectile motion.	C05
<b>Learning Resources</b>		
<b>Text Books :</b>		
<b>T1.</b> F. P. Beer and E. R. Johnson, "Vector Mechanics for Engineers", McGraw-Hill Publication, Vol-3 <b>T2.</b> R. C. Hibbeler, "Engineering Mechanics", Pearson Education, Vol- 1		
<b>Reference Books :</b>		
<b>R1.</b> S. P. Timoshenko and D. H. Young, "Engineering Mechanics", McGraw- Hill publication, Vol-5 <b>R2.</b> J. L. Meriam and Craige, "Engineering Mechanics", John Willey, Vol-5 <b>R3.</b> A. P. Boresi and R. J. Schmidt, "Engineering Mechanics", Brooks/Cole Publication, Vol-1		
<b>MOOC Courses links :</b>		
<ul style="list-style-type: none"> <li><a href="https://nptel.ac.in/courses/112106180">https://nptel.ac.in/courses/112106180</a></li> </ul>		

SNJB's Late Sau. K. B. Jain College of Engineering, Chandwad  
(An Autonomous Institute Affiliated to Savitribai Phule Pune University, Pune)  
Curriculum Structure and Evaluation Scheme  
To be implemented for 2025-29 Batch

25-VSC-1-01 : Techskill		
<b>Teaching Scheme:</b> Practical: 04 Hours/Week	<b>Credit: 2</b>	<b>Evaluation Scheme:</b> Termwork (TW) : 50 Marks
<b>Prerequisite Courses:</b> Basic understanding of terms : computer, mobile device components and electrical devices.		
<b>Course Objectives:</b> <b>Module I</b> <ul style="list-style-type: none"> <li>To understand mobile phone and surveillance system components, their functions, and how they work together.</li> <li>To Develop skills to repair Mobile and troubleshoot CCTV System</li> </ul> <b>Module II</b> <ul style="list-style-type: none"> <li>To familiarize learners with the computer hardware and software components, their functionality.</li> <li>To introduce the computer network, internet and its configuration.</li> </ul> <b>Module III</b> <ul style="list-style-type: none"> <li>To enable students to operate basic electronic instruments and perform accurate soldering on PCBs.</li> <li>To develop skills for analyzing wiring and troubleshooting household electrical appliances safely.</li> </ul>		
<b>Course Outcomes:</b> After completion of the course, learners should be able to		
CO No.	CO	BL
	Module - I (AIDS)	





SNJB's Late Sau. K. B. Jain College of Engineering, Chandwad  
(An Autonomous Institute Affiliated to Savitribai Phule Pune University, Pune)  
Curriculum Structure and Evaluation Scheme  
To be implemented for 2025-29 Batch

CO1	<b>Understand</b> and troubleshoot hardware and software issues in mobile devices	2
CO2	<b>Apply</b> fundamental concepts, components, and working principles of CCTV systems and evaluate their application in surveillance and security environments.	3
<b>Module - II (Computer)</b>		
CO3	<b>Understand</b> the basic concept and structure of computer hardware and networking.	2
CO4	<b>Integrated</b> PC's into LAN & reinstall operating system and <b>Study</b> various application programs.	3
<b>Module - III (E&amp;Tc)</b>		
CO5	<b>Demonstrate</b> the use of basic electronic instruments and perform precise soldering of electronic components on a PCB.	3
CO6	<b>Analyze</b> wiring connections and troubleshoot basic faults in electrical home appliances by following standard safety practices.	4
<b>Guidelines for Instructor's Manual</b>		
The instructor's manual is to be developed as a reference and hands-on resource. It should include prologue (about institute/ department), curriculum of the course, conduction and Assessment guidelines, topics under consideration, concept, objectives, outcomes, set of typical applications/assignments/ guidelines, and references.		
<b>Guidelines for Laboratory /Term Work Assessment</b>		
Continuous assessment of laboratory work should be based on overall performance of Laboratory assignments by a student. Each Laboratory assignment assessment will assign grade/marks based on parameters, such as Write-up, Viva, Timely Completion.		
<b>Guidelines for Practical Examination</b>		
Problem statements must be decided jointly by the internal examiner and external examiner. During practical assessment, maximum weightage should be given to satisfactory implementation of the problem statement. Relevant questions may be asked at the time of evaluation to test the student's understanding of the fundamentals, effective and efficient implementation. This will encourage, transparent evaluation and fair approach, and hence will not create any uncertainty or doubt in the minds of the students. So, adhering to these principles will consummate our team efforts to the promising start of student's academics.		



SNJB's Late Sau. K. B. Jain College of Engineering, Chandwad  
(An Autonomous Institute Affiliated to Savitribai Phule Pune University, Pune)  
Curriculum Structure and Evaluation Scheme  
To be implemented for 2025-29 Batch

<b>Guidelines for Laboratory Conduction</b>		
List of laboratory assignments is provided below . The instructor is expected to conduct the assignments by understanding the prerequisites, technological aspects, utility and recent trends related to the topic. Use of open source software and recent versions are to be encouraged.		
<b>Suggested List of Laboratory Experiments/Assignments</b>		
<b>Module I</b>	<b>MobiTech</b>	<b>12 Hours</b>
<b>Sr No</b>	<b>Assignment Title</b>	<b>Mapping of COs</b>
1.	<b>Disassemble and reassemble</b> the mobile device using mobile repairing tools.	CO1
2.	<b>Disassemble a water-damaged phone</b> , clean the components using appropriate methods, and replace any damaged parts.	CO1
3.	Troubleshooting of <b>mobile screen display</b> .	CO1
4.	Demonstrate procedures for <b>backing up</b> and <b>restoring</b> data on mobile devices.	CO1
5.	Study of different types of <b>CCTV cameras, their functions, types of cables used in CCTV surveillance systems</b> .	<b>CO2</b>
6.	Demonstrate <b>CCTV Camera Installation and configuration</b> .	<b>CO2</b>
<b>Module II</b>	<b>Crafting Your Digital World</b>	<b>12 Hours</b>
<b>Sr No</b>	<b>Assignment Title</b>	<b>Mapping of COs</b>
1.	Study of hardware peripherals of Desktop and Laptop Computer, Assembly of Computer system.	CO3
2.	Installation and configuration of internal or external peripherals, basic fault finding and troubleshooting of hardware peripherals.	CO3



SNJB's Late Sau. K. B. Jain College of Engineering, Chandwad  
(An Autonomous Institute Affiliated to Savitribai Phule Pune University, Pune)  
Curriculum Structure and Evaluation Scheme  
To be implemented for 2025-29 Batch

3.	Study of operating systems. Types of operating system, Installation and configuration of Operating Systems like Windows and Linux.	CO3
4.	Installation and configuration of System Software and Application Software, basic fault finding and troubleshooting of software.	CO3
5.	Introduction to computer networks. Study of various topologies. Understanding the working of networking devices, Preparing the network cable using crimping tools and connectors.	CO4
6.	Study various internet based services and understand basic networking commands. <b>Case study:</b> Installation and configuration of computer network in Lab using network switch.	CO4
<b>Module III</b>	<b>Electronics Repair Hub</b>	<b>12 Hours</b>
<b>Sr No</b>	<b>Assignment Title</b>	<b>Mapping of COs</b>
1.	Handling of electronic instruments: Voltmeter, Ammeter, Multimeter, CRO etc.	CO5
2.	Soldering & desoldering practice of electronic components.	CO5
3.	Study of different types of electrical wires, their applications & wiring standards like fire safety etc.	CO6
4.	Hands on practice of residential wiring & wiring board.	CO6
5.	Troubleshooting of clothes Iron.	CO6
6.	Troubleshooting of mixer grinder.	CO6
<b>Learning Resources</b>		
<b>Text Books</b>		
T1. Chukky Oparandu, "Mobile Phones and Tablets Repairs: A Complete Guide for Beginners and Professionals", ISBN 9789534116		

SNJB's Late Sau. K. B. Jain College of Engineering, Chandwad  
(An Autonomous Institute Affiliated to Savitribai Phule Pune University, Pune)  
Curriculum Structure and Evaluation Scheme  
To be implemented for 2025-29 Batch

- T2. Scott Mueller, "Upgrading and Repairing PCs", 16th Edition, BPB Publication, ISBN 81-7635-737-5  
T3. Manahar Lotia, Pradeep Nair, Payal Lotia, "Modern Computer Hardware Course", BPB Publication, ISBN: 9788183331678  
T4. J. A. Sam Wilson, "Electronic Troubleshooting & Servicing Techniques", Thomson Delmar Learning

**Reference Books :**

- R1. Lotia M, "Modern Mobile Phone Service Diagram & Troubleshooting", Vol. I, BPB Publication, ISBN 8176563366  
R2. Mark Edward Soper, "PC REPAIR AND TROUBLESHOOTING GUIDE", BPB Publication, ISBN: 9788183335096  
R3. S. P. Bali, "Consumer Electronics", Pearson Education, 2nd Edition

**Additional Resources: (Books, e-Resources)**

**Module I**

- [https://www.nsdcindia.org/scmp/assets/image/1179656187-CCTV\\_Installation\\_Technician\\_\\_English.pdf](https://www.nsdcindia.org/scmp/assets/image/1179656187-CCTV_Installation_Technician__English.pdf)

**Module II**

- <https://github.com/com-puter-tips/Technical-eBooks/blob/master/The%20Ultimate%20Computer%20Repair%20Guide-slicer.pdf>

**Module III**

- <https://www.electrorecycle.ca/blog/repair-resources-for-small-appliances/>
- <https://home.howstuffworks.com/how-to-repair-small-appliances.htm>

**MOOC Courses links :**

**Module II**

- <https://cursa.app/free-courses-maintenance-of-computers-and-notebooks-online>
- <https://nptel.ac.in/courses/106105084>



SNJB's Late Sau. K. B. Jain College of Engineering, Chandwad  
(An Autonomous Institute Affiliated to Savitribai Phule Pune University, Pune)  
Curriculum Structure and Evaluation Scheme  
To be implemented for 2025-29 Batch

25-CCC-1-05: Co-curricular Course -II														
<b>Teaching Scheme:</b> Practical: 04 Hours/Week.	<b>Credit: 02</b>	<b>Evaluation Scheme:</b> Term work (TW) : 25 Marks												
<b>Prerequisites Courses:</b> 25-BSC-1-01: Engineering Physics, 25-BSC-1-03: Linear Algebra And Differential Calculus, 25-ESC-1-01: Basic Electrical and Electronics Engineering, 25-ESC-1-02: Programming and Problem Solving, 25-VSC-1-01: TechSkill.														
<b>Companion Course:</b> 25-BSC-1-02: Engineering Chemistry, 25-BSC-1-04: Statistics Probability and Integral Calculus, 25-ESC-1-03: Engineering Graphics , 25-ESC-1-04: Smart Building and Materials, 25-PCC-CS-1-01: Object Oriented Programming using Java, 25-VSC-1-02: TechShop														
<b>Course Objectives:</b> <ul style="list-style-type: none"> <li>To emphasize learning activities that are long-term, interdisciplinary and student-centric.</li> <li>To inculcate independent learning by problem solving with social context.</li> <li>To provide the new ways of creative thinking and Learn the innovation cycle of Design Thinking process for developing innovative products which are useful for a student in preparing for an engineering career.</li> <li>To provide every student the opportunity to get involved either individually or as a group to develop team skills and learn professionalism.</li> </ul>														
<b>Course Outcomes:</b> After completion of the course, learners should be able to <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 10%;">CO No.</th><th style="width: 60%;">CO</th><th style="width: 30%;">BL</th></tr> </thead> <tbody> <tr> <td style="text-align: center;">1</td><td>Develop creative thinking and learn the innovation cycle of design thinking process for Developing innovative products/models.</td><td style="text-align: center;">6</td></tr> <tr> <td style="text-align: center;">2</td><td>Work effectively in teams, communicate well with others, and collaborate on group projects.</td><td style="text-align: center;">3</td></tr> <tr> <td style="text-align: center;">3</td><td>Apply theoretical knowledge to practical settings and develop proficient technical skills Relevant to their chosen hobby or interest.</td><td style="text-align: center;">3</td></tr> </tbody> </table>			CO No.	CO	BL	1	Develop creative thinking and learn the innovation cycle of design thinking process for Developing innovative products/models.	6	2	Work effectively in teams, communicate well with others, and collaborate on group projects.	3	3	Apply theoretical knowledge to practical settings and develop proficient technical skills Relevant to their chosen hobby or interest.	3
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<b>Group Structure:</b> <ul style="list-style-type: none"> <li>Students will work in monitored groups under the guidance of assigned mentors to plan, manage, and complete a task, project, or activity based on a specific problem.</li> <li>Each group will consist of 5 to 6 students.</li> <li>A mentor is assigned to oversee each individual group.</li> </ul>														



SNJB's Late Sau. K. B. Jain College of Engineering, Chandwad  
(An Autonomous Institute Affiliated to Savitribai Phule Pune University, Pune)  
Curriculum Structure and Evaluation Scheme  
To be implemented for 2025-29 Batch

**Guidelines for Mentor:**

**1. Initiate Design Thinking Mindset**

- Encourage creative problem-solving with a strong emphasis on societal needs.
- Help students understand that innovation starts with empathy and real-world relevance.

**2. Defining Objectives – Innovation for Social Impact**

- Guide students to frame clear, focused problem statements.
- Ensure the projects are oriented toward solving relevant social issues or local community problems.

**3. Brainstorming and Idea Generation**

- Let students share ideas freely in groups.
- Encourage creative thinking and respect all ideas – big or small.
- Help them select the best and most useful ideas.

**4. Think Creatively to Solve the Problem**

- Teach students to think in new and different ways.
- Help them explore multiple solutions, not just one.

**5. Build Prototypes and Test Ideas**

- Guide students to make simple models or prototypes.
- Let them test the ideas, get feedback, and improve their work.
- Teach them that failure is part of learning.

**Selection of Project/Problem/Theme :**

- Begin by selecting a problem or topic based on interest or curiosity.
- The problem may relate to daily life, science, society, or technology.
- It should align with a subject area and support learning or knowledge application.
- Problems that connect two or more subjects (multidisciplinary) are encouraged.
- The problem should be examined from different perspectives.
- Projects may range from simple to complex but must support specific learning goals.
- Hands-on activities such as building models, creating designs, or conducting experiments are recommended.
- Ideas and skills from various subjects should be integrated wherever possible.
- Technology, such as internet resources, software, and digital tools, should be used for research, collaboration, and presentations.
- Real-life problems may be addressed, or real situations explored through fieldwork or surveys.
- Reports or summaries should be prepared based on the work completed and the knowledge gained.
- Participation in hobby club contests provides an opportunity to showcase work and gain insights from peers.
- Competitions help foster innovation, teamwork, and confidence.



SNJB's Late Sau. K. B. Jain College of Engineering, Chandwad  
(An Autonomous Institute Affiliated to Savitribai Phule Pune University, Pune)  
Curriculum Structure and Evaluation Scheme  
To be implemented for 2025-29 Batch

**Assessment:**

- The college, department, and mentors regularly check student progress and how well the program is working.
- The Co-curricular Course-II is reviewed from time to time to ensure quality work.
- Both individual and group performance are observed during the course.
- Mentors and college authorities keep an eye on all activities and do regular assessments.
- Students should show teamwork, self-motivation, and take responsibility for their learning.
- The department supports students by giving proper guidance, orientation, and required resources.
- Mentors and students both take part in the assessment process.
- Students can show their learning through presentations, reports, or models.
- Assessment looks at each student's role, involvement, and performance in the group.
- Group work is also assessed based on teamwork, communication, task sharing, and cooperation.
- Proper documentation and clear presentations are an important part of the evaluation.

**Evaluation and Continuous Assessment:**

It's suggested that all activities are recorded, and regular assessments are conducted, with proper documentation maintained by both students and mentors in a "Co-curricular Course -II Work Book." Each mentor should maintain a Continuous Assessment Sheet. The recommended assessment parameters and weightage are as follows:

- Idea Inception (10%)
- Awareness / Consideration of Environment / Social / Ethical / Safety Measures / Legal Aspects (10%)
- Provided Solutions / Final Product Outcomes (20%) - assessed individually and as a team.
- Documentation (20%) - Project report and Co-curricular Course -II workbook.
- Demonstration (40%) - assessed based on presentation, user interface, usability etc.
- The Co-curricular Course -II workbook will serve to facilitate students, mentors, and project coordinators, reflecting accountability, punctuality, technical writing ability, and the workflow of undertaken tasks

