

**SONA COLLEGE OF TECHNOLOGY, SALEM-5**

**(An Autonomous Institution)**

**B.E- Mechanical Engineering**

**CURRICULUM and SYLLABI**

**[For students admitted in 2024-2025]**

**B.E / B.Tech Regulations 2023**

**Approved by BOS and Academic Council meetings**

**Sona College of Technology, Salem**  
(An Autonomous Institution)  
**Courses of Study for B.E/B.Tech. Semester I under Regulations 2023 (CBCS)**  
**Branch: Mechanical Engineering**

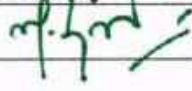
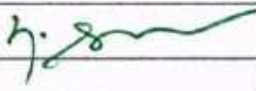
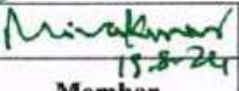
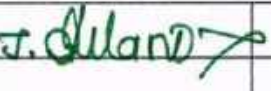

S.No	Course Code	Course Title	L	T	P	J	C	Category	Total Contact Hours	Course Type*
<b>Theory Courses</b>										
1.	U23ENG101B	Technical English	2	0	0	0	2	HS	30	T
2.	U23MAT102A	Linear Algebra and Calculus with MATLAB	3	0	2	0	4	BS	75	TL
3.	U23CHE104D	Chemistry For Mechanical Engineering	3	0	0	0	3	BS	45	T
4.	U23PPR105	Problem Solving Using Python Programming	3	0	0	0	3	ES	45	T
5.	U23BEE106B	Basics of Electrical and Electronics for Mechanical Engineering	2	0	2	0	3	ES	60	TL
6.	U23EGR107	Engineering Graphics	3	0	0	0	3	ES	45	T
7.	U23TAM101	தமிழர் மரபு / Heritage of Tamils	1	0	0	0	1	HS	15	T
8.	U23GE101	Basic Aptitude I	2	0	0	0	0	AC	30	T
<b>Practical Courses</b>										
9.	U23CHL111B	Chemistry Laboratory	0	0	2	0	1	BS	30	L
10.	U23PPL112	Python Programming Laboratory	0	0	2	0	1	ES	30	L
<b>Total Credits</b>							<b>21</b>			
<b>Optional Language Courses**</b>										
11.	U23OL1101	French	1	0	0	0	1	OL	15	T
12.	U23OL1102	German							15	T
13.	U23OL1103	Japanese							15	T
14.	U23OL1104	Korean							15	T
15.	U23OL1105	Hindi							15	T

\*T- Theory, TT- Theory with Tutorial, TL- Theory with Laboratory, TP- Theory with Project, TLP- Theory with Laboratory and Project, L-Laboratory, LT- Laboratory with Theory, LP- Laboratory with Project

\*\*Students may opt for foreign languages viz., German/French/Japanese/Korean/Hindi with additional one credit

(Not accounted for CGPA calculation)

Approved By

				
<b>Chairperson, Science and Humanities BoS</b>	<b>Chairperson, Mechanical BoS</b>	<b>Member Secretary, Academic Council</b>	<b>Dean-Academics</b>	<b>Chairperson, Academic Council &amp; Principal</b>
<b>Dr. M. Renuga</b>	<b>Dr. D. Senthilkumar</b>	<b>Dr. R. Shivakumar</b>	<b>Dr. J. Akilandeswari</b>	<b>Dr. S. R. R. Senthil Kumar</b>

Copy to:- HOD/ Mechanical Engineering, First Semester B.E. Mech, Students and Staff, COE

**Sona College of Technology, Salem**  
(An Autonomous Institution)  
**Courses of Study for B.E/B.Tech. Semester II under Regulations 2023 (CBCS)**  
**Branch: Mechanical Engineering**

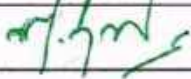
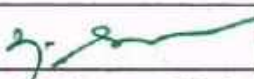
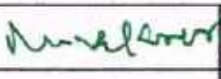
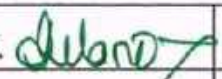

S.No	Course Code	Course Title	L	T	P	J	C	Category	Total Contact Hours	Course Type*
<b>Theory courses</b>										
1.	U23ENG201B	Communication Skills in English	2	0	2	0	3	HS	60	TL
2.	U23MAT202C	Vector Calculus and Differential Equations	3	1	0	0	4	BS	60	TT
3.	U23PHY203F	Physics for Mechanical Engineering	3	0	0	0	3	BS	45	T
4.	U23ME201	Engineering Mechanics for Mechanical Engineering	3	1	0	0	4	ES	60	TT
5.	U23ME202	Manufacturing Process	3	0	0	0	3	PC	45	T
6.	U23TAM201	தமிழரும் தொழில்நுட்பமும்/ Tamil and Technology	1	0	0	0	1	HS	15	T
7.	U23GE201	Basic Aptitude- II	2	0	0	0	0	AC	30	T
<b>Practical courses</b>										
8.	U23PHL210A	Physics Laboratory	0	0	2	0	1	BS	30	L
9.	U23ME203	Workshop Practices for Mechanical Engineering	0	0	2	0	1	PC	30	L
<b>Total Credits</b>							<b>20</b>			
<b>Optional Language Courses**</b>										
10.	U23OL1201	French - II	1	0	0	0	1	OL	15	T
11.	U23OL1202	German - II							15	T
12.	U23OL1203	Japanese - II							15	T
13.	U23OL1204	Korean - II							15	T
14.	U23OL1205	Hindi - II							15	T

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Dr.M.Renuga	Dr. D.Senthilkumar	Dr.R.Shivakumar	Dr.J.Akilandeswari	Dr.S.R.R.Senthil Kumar

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HOD/ Mechanical Engineering, Second Semester B.E. Mech. Students and Staff, COE


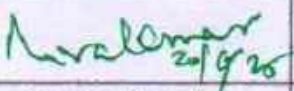


Mech  
III

**Sona College of Technology, Salem**  
(An Autonomous Institution)  
**Courses of Study for B.E/B.Tech. Semester III under Regulations 2023 (CBCS)**  
**Branch: Mechanical Engineering**

S.No	Course Code	Course Title	L	T	P	J	C	Category	Total Contact hours	Course Type*
<b>Theory courses</b>										
1.	U23MAT301D	Probability and Statistics	3	1	0	0	4	BS	60	TT
2.	U23ME301	Engineering Thermodynamics	3	0	0	0	3	PC	45	T
3.	U23ME302	Fluid Mechanics and Machinery	3	0	2	0	4	PC	75	TL
4.	U23ME303	Conventional and Modern Manufacturing	3	0	2	0	4	PC	75	TL
5.	U23ME304	Instrumentation and Control Systems	3	0	0	0	3	ES	45	T
6.	U23ME305	Kinematics of Machines	3	0	0	0	3	PC	45	T
7.	noc25-mg106	NPTEL Design Thinking - A Primer	1	0	0	0	1	ES	15	T
8.	U23GE302	<b>Audit Course:</b> Environment and Climate Science	2	0	0	0	0	AC	30	T
<b>Practical courses</b>										
9.	U23GE301	Soft Skills and Aptitude-I	0	0	2	0	1	EEC	30	L
<b>Total Credits</b>							23			

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Approved By

			
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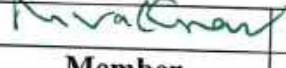
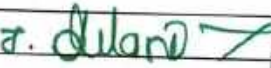

HOD/ Mechanical Engineering, Third Semester B.E. Mechanical Students and Staff, COE

**Sona College of Technology, Salem**  
(An Autonomous Institution)  
**Courses of Study for B.E/B.Tech. Semester IV under Regulations 2023 (CBCS)**  
**Branch: Mechanical Engineering**

S.No	Course Code	Course Title	L	T	P	J	C	Category	Total Contact Hours	Course Type*
<b>Theory courses</b>										
1.	U23ME401	Thermal Engineering	3	0	0	0	3	PC	45	T
2.	U23ME402	Strength of Materials	3	0	0	0	3	PC	45	T
3.	U23ME403	Engineering Materials and Metallurgy	3	0	0	0	3	PC	45	T
4.	U23ME404	Machine Learning	3	0	0	0	3	ES	45	T
5.	U23ME405	Dynamics of Machinery	3	0	2	0	4	PC	75	TL
6.	U23ME406	Metrology, Inspection and Quality Control	3	0	2	0	4	ES	75	TL
7.	U23GE402	<b>Audit Course:</b> Essence of Indian Traditional Knowledge	2	0	0	0	0	AC	30	T
<b>Practical courses</b>										
8.	U23ME407	Thermal Engineering Laboratory	0	0	3	0	1.5	PC	45	L
9.	U23ME408	Strength of Materials Laboratory	0	0	3	0	1.5	PC	45	L
10.	U23ME409	Machine Learning Laboratory	0	0	2	0	1	ES	30	L
11.	U23GE401	Soft Skills and Aptitude-II	0	0	2	0	1	EEC	30	L
<b>Total Credits</b>							25			

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Approved By

			
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Dr.D.Senthilkumar	Dr.R.Shivakumar	Dr.J.Akilandeswari	Dr.S.R.R.Senthil Kumar

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HOD/ Mechanical Engineering, Fourth Semester B.E. Mechanical Students and Staff,  
COE

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**Courses of Study for B.E/B.Tech. Semester I under Regulations 2023 (CBCS)**  
**Branch: Mechanical Engineering**

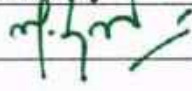
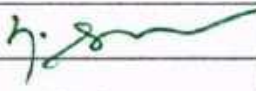
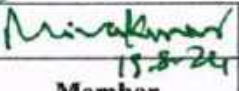
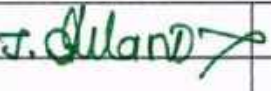

S.No	Course Code	Course Title	L	T	P	J	C	Category	Total Contact Hours	Course Type*
<b>Theory Courses</b>										
1.	U23ENG101B	Technical English	2	0	0	0	2	HS	30	T
2.	U23MAT102A	Linear Algebra and Calculus with MATLAB	3	0	2	0	4	BS	75	TL
3.	U23CHE104D	Chemistry For Mechanical Engineering	3	0	0	0	3	BS	45	T
4.	U23PPR105	Problem Solving Using Python Programming	3	0	0	0	3	ES	45	T
5.	U23BEE106B	Basics of Electrical and Electronics for Mechanical Engineering	2	0	2	0	3	ES	60	TL
6.	U23EGR107	Engineering Graphics	3	0	0	0	3	ES	45	T
7.	U23TAM101	தமிழர் மரபு / Heritage of Tamils	1	0	0	0	1	HS	15	T
8.	U23GE101	Basic Aptitude I	2	0	0	0	0	AC	30	T
<b>Practical Courses</b>										
9.	U23CHL111B	Chemistry Laboratory	0	0	2	0	1	BS	30	L
10.	U23PPL112	Python Programming Laboratory	0	0	2	0	1	ES	30	L
<b>Total Credits</b>							<b>21</b>			
<b>Optional Language Courses**</b>										
11.	U23OL1101	French	1	0	0	0	1	OL	15	T
12.	U23OL1102	German							15	T
13.	U23OL1103	Japanese							15	T
14.	U23OL1104	Korean							15	T
15.	U23OL1105	Hindi							15	T

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U23ENG101B		Technical English										L	T	P	J	C
												2	0	0	0	2
<b>Course Outcomes</b>																
At the end of the course, the student will be able to																
CO1:	Frame sentences correctly, both in written and spoken forms of language with accuracy and fluency.															
CO2:	Develop effective reading skills and reinforce language skills required for using grammar and building vocabulary															
CO3:	Organise ideas and supporting arguments logically.															
CO4:	Develop skills for writing conversations, proposals, reports and transcoding.															
CO5:	Read for understanding and interpreting information and to utilise information accordingly.															
<b>Pre-requisite:</b>																
<ul style="list-style-type: none"> <li>• Knowledge and Understanding of Grammar</li> <li>• Fundamental Language Skills (LSRW)</li> </ul>																
<b>CO/PO, PSO Mapping</b>																
(3/2/1 indicates the strength of correlation) 3-Strong, 2-Medium, 1-Weak																
COs	Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2		
CO1	1	1	2	2	2	3	3	2	3	3	3	3	3	3		
CO2	1	2	2	3	2	3	3	2	3	3	2	3	3	3		
CO3	3	3	3	3	3	3	3	3	3	3	3	3	3	3		
CO4	1	3	1	2	2	3	3	3	3	3	3	3	3	3		
CO5	3	3	3	3	3	3	3	3	3	3	3	3	3	3		
<b>Course Assessment methods</b>																
Direct										Indirect						
CIE test I (8)					Objectives Test (6)					Course end survey						
CIE test II (8)					Attendance (5)											
CIE test III (8)					Total CIE: 40 marks											
Assignment/seminar/Quiz (5)					Semester End Examination (60)											
<b>Unit 01:</b>												<b>6 Hours</b>				
<ul style="list-style-type: none"> <li>• Comparative adjectives</li> <li>• Recommendations</li> <li>• Conversation writing</li> <li>• Reading passages for specific information transfer</li> </ul>																
<b>Unit 02:</b>												<b>6 Hours</b>				
<ul style="list-style-type: none"> <li>• Prepositions, adverbs</li> <li>• Note making</li> <li>• Reading passage with multiple choice questions, reading for gist and reading for specific information</li> </ul>																
<b>Unit 03</b>												<b>6 Hours</b>				
<ul style="list-style-type: none"> <li>• Collocations, direct and indirect speech</li> </ul>																

<ul style="list-style-type: none"> <li>• Memo</li> <li>• Proposal: establishing a lab, introducing a subject in the curriculum, training programme for students</li> <li>• Short reading passage: gap-filling exercise related to grammar</li> </ul>				
<b>Unit 04:</b>				<b>6 Hours</b>
<ul style="list-style-type: none"> <li>• Cause and effect</li> <li>• Technical report writing – feasibility report, accident report, survey report</li> <li>• Short reading passages for sentence matching exercises, picking out specific information in a short text</li> </ul>				
<b>Unit 05:</b>				<b>6 Hours</b>
<ul style="list-style-type: none"> <li>• Pronouns</li> <li>• Transcoding – bar chart, pie chart, tabular column</li> </ul>				
<b>Theory: 30 Hrs</b>	<b>Tutorial: --</b>	<b>Practical: --</b>	<b>Project:--</b>	<b>Total Hours: 30 Hrs</b>
<b>TEXT BOOKS</b>				
1.	Technical English I & II, Dr. M. Renuga et al. Sonaversity, 2016			
2.	<b>Extensive Reading</b> <ol style="list-style-type: none"> <li>1. Who Moved my Cheese? – Spencer Johnson-G. P. Putnam's Sons</li> <li>2. Discover the Diamond in You – Arindham Chaudhari – Vikas Publishing House Pvt. Ltd.</li> </ol>			
<b>REFERENCES</b>				
1.	Norman Whitby, Business Benchmark – Pre-Intermediate to Intermediate, Students Book, Cambridge University Press, 2006.			
2.	A Course in Communication Skills, P. Kiranmai Dutt, Geetha Rajeevan, C. L. N. Prakash, published by Cambridge University Press India Pvt. Ltd.			

  
HOD

**Dr. M. RENUGA,**  
Professor & Head,  
Department of Humanities & Languages,  
Sona College of Technology,  
SALEM.

B. E. / MECHANICAL ENGINEERING																				
SEMESTER - I	LINEAR ALGEBRA AND CALCULUS WITH MATLAB										L	T	P	J	C					
U23MAT102A											3	0	2	0	4					
<b>Course Outcomes</b>																				
<b>At the end of the course, the student will be able to</b>																				
CO1:	find the rank of the matrix and solve linear system of equations by direct and indirect methods																			
CO2:	apply the concepts of vector spaces and linear transformations in real world applications																			
CO3:	apply the concepts of eigenvalues and eigenvectors of a real matrix and their properties to diagonalize the matrix.																			
CO4:	find the Taylor's series expansion, Jacobians and the maxima and minima of functions of two variables																			
CO5:	apply the appropriate techniques of multiple integrals to find the area and volume.																			
<b>Pre-requisites:</b>																				
<ul style="list-style-type: none"> <li>Fundamentals of elementary algebra</li> <li>Fundamentals of calculus</li> </ul>							<ul style="list-style-type: none"> <li>Fundamentals of geometry</li> <li>Fundamentals of trigonometry</li> </ul>													
<b>CO/PO, PSO Mapping</b>																				
(3/2/1 indicates the strength of correlation) 3-Strong, 2-Medium, 1-Weak																				
COs	Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)																			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2						
CO1	3		2	3							2	2		3						
CO2	3		2	3							2	2		3						
CO3	3		2	3							2	2		3						
CO4	3		2	3							2	2		3						
CO5	3		2	3							2	2		3						
<b>Course assessment methods [Theory with laboratory course]</b>																				
<b>Direct</b>							<b>Indirect</b>													
CIE test I (10) (Theory) CIE test II (10) (Theory) CIE test III (10) (Theory) CIE test IV (10) (Practical) Attendance (5) Assignment/Quiz/Seminar (5)							Total CIE: 50 marks Semester End Examination (50) [SEE- Theory (35) + Lab(15) marks]							Course end survey						
<b>Unit 01</b>	<b>LINEAR SYSTEM OF EQUATIONS</b>										<b>9 Hours</b>									
Rank of a matrix – solution of linear system of equations by matrix method, Gauss elimination, Gauss-Jordan, Gauss-Jacobi and Gauss-Seidel methods.																				
<b>Unit 02</b>	<b>VECTOR SPACES</b>										<b>9 Hours</b>									
Vector space – linear independence and dependence of vectors – basis – dimension – linear transformations (maps) – matrix associated with a linear map – range and kernel of a linear map.																				
<b>Unit 03</b>	<b>EIGENVALUES AND EIGENVECTORS</b>										<b>9 Hours</b>									
Eigenvalues and eigenvectors of real matrices – properties of eigenvalues and eigenvectors – Cayley-Hamilton theorem – diagonalization of real symmetric matrices.																				

<b>Unit 04</b>	<b>MULTIVARIABLE CALCULUS</b>	<b>9 Hours</b>
Functions of several variables – partial differentiation – total derivative – Jacobians – Taylor’s theorem for functions of two variables – maxima and minima of functions of two variables without constraints – constrained maxima and minima by Lagrange’s method of undetermined multipliers.		
<b>Unit 05</b>	<b>MULTIPLE INTEGRALS</b>	<b>9 Hours</b>
Double integrals – change of order of integration – change of variables from Cartesian to polar coordinates – area as double integrals in Cartesian coordinates – triple integrals – volume as triple integrals in Cartesian coordinates.		
<b>List of MATLAB Programs</b>		
1.	Programs based on elementary operations on matrices	
2.	Computing the rank of a matrix	
3.	Finding eigenvalues and eigenvectors of a matrix	
4.	Finding partial derivatives of functions of several variables	
5.	Computing stationary points of functions of two variables	
6.	Taylors series expansion of functions of two variables	
7.	Evaluating double integrals	
8.	Finding area as double integrals	
9.	Evaluating triple integrals	
10.	Finding volume as triple integrals	
<b>Theory: 45 Hrs</b>	<b>Tutorial: -</b>	<b>Practical: 30 Hrs</b>
		<b>Project:--</b>
<b>Total Hours: 75 Hrs</b>		
<b>TEXT BOOKS:</b>		
1.	T. Veerarajan, “Linear Algebra and Partial Differential Equations”, McGraw Hill Publishers, 1 <sup>st</sup> Edition, 2018.	
2.	T. Veerarajan, “Engineering Mathematics for Semesters I & II”, McGraw Hill Publishers, 1 <sup>st</sup> Edition, 2019.	
3.	W. Yang, Y. K. Choi, K. Jaekwon, M. C. Kim, H. J. Kim and T. Im, “Engineering Mathematics with MATLAB”, CRC Press Publishers, 1 <sup>st</sup> Edition, 2017.	
<b>REFERENCE BOOKS:</b>		
1.	S. Lipschutz and M. L. Lipson, “Linear Algebra”, McGraw Hill Publishers, 6 <sup>th</sup> Edition, 2018.	
2.	E. Kreyszig, “Advanced Engineering Mathematics”, Wiley Publishers, 10 <sup>th</sup> Edition, Reprint, 2017.	
3.	C. Prasad and R. Garg, “Advanced Engineering Mathematics”, Khanna Publishers, 1 <sup>st</sup> Edition, 2018.	
4.	B. V. Ramana, “Higher Engineering Mathematics”, McGraw Hill Publishers, 29 <sup>th</sup> Reprint, 2017.	
5.	B. S. Grewal, “Higher Engineering Mathematics”, Khanna Publishers, 44 <sup>th</sup> Edition, 2018.	
6.	D. Xu, “Calculus problem solutions with MATLAB”, Walter de Gruyter Publishers, 1 <sup>st</sup> Edition, 2020.	

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BoS Date: 08. 07. 2023

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U23CHE104D	CHEMISTRY FOR MECHANICAL ENGINEERING					L	T	P	J	C				
						3	0	0	0	3				
<b>Course Outcomes</b>														
At the end of the course, the student will be able to														
CO1:	Understand the principle, applications of electrochemistry and types of corrosion.													
CO2:	Summarize the working principle and applications of energy storage devices.													
CO3:	Describe the basic concepts and real time applications of surface chemistry and catalysis in engineering and technology.													
CO4:	Analyse the composition, calorific values, uses of natural fuels and the manufacture of synthetic and bio fuels.													
CO5:	Understand the statement, industrial importance of phase rule, types, compositions and applications of alloys.													
<b>Pre-requisite:</b> Basic knowledge on the concepts of organic, inorganic and physical chemistry.														
<b>CO/PO, PSO Mapping</b>														
(3/2/1 indicates the strength of correlation) 3-Strong, 2-Medium, 1-Weak														
COs	Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2					2							3
CO2	2	2					2							3
CO3	3	2												3
CO4	3	3					2							3
CO5	3	3												3
<b>Course Assessment methods</b>														
<b>Direct</b>							<b>Indirect</b>							
CIE test I (8) CIE test II (8) CIE test III (8) Assignment/seminar/Quiz (5)					Objectives Test (6) Attendance (5) Total CIE: 40 marks Semester End Examination (60)			Course end survey						
<b>Unit 01: ELECTROCHEMISTRY AND CORROSION</b>											<b>9 Hours</b>			
Electrode potential – Nernst Equation – derivation and problems based on single electrode potential calculation – reference electrodes – standard hydrogen electrode – calomel electrode – Ion selective electrode – glass electrode – measurement of pH – electrochemical series – significance – electrolytic and electrochemical cells – EMF – measurement of emf – potentiometric titrations (redox – Fe <sup>2+</sup> vs dichromate) – conductometric titrations (acid-base – HCl vs NaOH) – Corrosion – types – dry and wet corrosion – examples.														

<b>Unit 02: CHEMISTRY OF ENERGY STORAGE DEVICES</b>				<b>9 Hours</b>	
Reversible and Irreversible Cells – Batteries-Types of Batteries – Battery Characteristics-Voltage-Current-Capacity-Electricity Storage Density-Power-Discharge Rate-Cycle Life-Energy Efficiency and Shelf Life – Fabrication and Working of Alkaline Battery-Lead-Acid Battery-Ni-Cd - Lithium Ion Batteries and Solar cells - Fuel Cells – Hydrogen-Oxygen fuel cell – Nano Batteries- Construction-Working-Advantages and Applications.					
<b>Unit 03: SURFACE CHEMISTRY AND CATALYSIS</b>				<b>9 Hours</b>	
Adsorption – types-physical and chemical adsorption – adsorption of gases on solids- adsorption isotherms – Freundlich and Langmuir isotherms-adsorption of solutes from solution – applications of adsorption-role of adsorption in catalytic reactions – adsorption in industrial waste water treatment by activated carbon – catalysis - types – homogeneous and heterogeneous catalysis – autocatalysis – definition and examples.					
<b>Unit 04: FUELS</b>				<b>9 Hours</b>	
Fuels – calorific value – gross and net calorific values - problems based on the calculation of calorific value of a fuel – coal – proximate and ultimate analyses – metallurgical coke – manufacture by Otto-Hoffmann method – Petroleum processing and fractions – cracking – types – synthesis of petrol – Bergius process - knocking – octane number and cetane number – power alcohol – manufacture, advantages and disadvantages – biodiesel manufacture by Transesterification process – advantages and disadvantages - Gaseous fuels – Water gas, producer gas, CNG and LPG.					
<b>Unit 05: PHASE RULE AND ALLOYS</b>				<b>9 Hours</b>	
Statement and explanation of terms involved - limitations and applications of phase rule - Construction of phase diagram for one component system; water system – condensed phase rule – construction of phase diagram by thermal analysis – simple eutectic systems Construction of phase diagram for lead – silver system					
Alloys: Introduction- Definition- Properties of alloys- Significance of alloying, Functions and effect of alloying elements - ferrous alloys – nichrome and stainless steel – heat treatment of steel, non-ferrous alloys – brass and bronze.					
Theory: 45 Hrs		Tutorial: --	Practical: --	Project:--	Total Hours: 45 Hrs
<b>TEXT BOOKS</b>					
1.	P.C.Jain and Monica Jain, “Engineering Chemistry” Dhanpat Rai Pub, Co., New Delhi , 17 <sup>th</sup> edition, 2018.				
2.	Wiley Editorial Board, “Wiley Engineering Chemistry”, 2nd Edition, Wiley India Pvt.Ltd, New Delhi, Reprint 2019				
<b>REFERENCES</b>					
1.	O G Palana, “Engineering Chemistry”, Tata McGraw Hill Education (India) Private Limited, Chennai, Second Edition, 2017.				
2.	B Sivasankar, “Engineering Chemistry”, Tata McGraw-Hill Pub. Co. Ltd., New Delhi, 2008.				
3.	B.K. Sharma, “Engineering Chemistry”, Krishna Prakasan Media (P) Ltd., Meerut, 2001.				
4.	N. Krishnamurthy, K. Jeyasubramanian and P. Vallinayagam, “Applied Chemistry”, Tata McGraw-Hill Publishing Company Limited, New Delhi, 1999.				

U23CHL111B	CHEMISTRY LABORATORY (Common to Mechanical, EEE, EECE & FT branches)	L	T	P	J	C
		0	0	2	0	1

### Course Outcomes

At the end of the course, the student will be able to

CO1:	Analyse the given water sample to determine the amount of hardness, alkalinity and analyse the quality of brass by estimating copper in brass solution.
CO2:	Estimate the amount of HCl in a given sample by pH metry, conductometry and estimate the amount of iron in a sample by potentiometry and spectrophotometry.
CO3:	Determine the molecular weight of water soluble polymer and estimate the amount of chromium in waste water.

**Pre-requisite:** Capable of handling pipette, burette, standard measuring flask and conical flask.

### CO/PO, PSO Mapping

(3/2/1 indicates the strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2		1		1			1					2
CO2	3	2		1		1			1					2
CO3	3	2		1		1			1					2

### Course Assessment methods

Direct		Indirect
CIE test I (15)	RTPS (10)	Course end survey
Quiz 1 (5)	Record (10)	
CIE test II (15)	Total CIE:60 marks	
Quiz 2 (5)	Semester End Examination (40 marks)	

### LIST OF EXPERIMENTS

1	Estimation of hardness of water sample by EDTA method.
2	Estimation of alkalinity of water sample by indicator method.
3	Estimation of copper in brass by EDTA method.
4	Estimation of HCl by pH metry.
5	Estimation of HCl by conductometry. (HCl vs NaOH)
6	Estimation of mixture of acids by conductometry. (HCl + CH <sub>3</sub> COOH vs NaOH)

7	Estimation of ferrous ion by potentiometric titration.
8	Estimation of chromium prepared from electroplating sludge by Permanganometry.
9	Determination of molecular weight of a polymer by viscosity measurements.
10	Estimation of iron content in water by spectrophotometry.
	<b>TOTAL : 30 HOURS</b>

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24.7.2024

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U23PPR105	<b>PROBLEM SOLVING USING PYTHON PROGRAMMING</b> (Common to ADS, IT, CSE, CSE(AIML), CSD, CIVIL, BME, ECE, EEE, MECH and MCT Branches)	L	T	P	J	C
		3	0	0	0	3

### Course Outcomes

At the end of the course, the student will be able to

CO1:	Develop algorithmic solutions to simple computational problems
CO2:	Write simple Python programs
CO3:	Write programs with the various control statements and handling strings in Python
CO4:	Develop Python programs using functions and files
CO5:	Analyze a problem and use appropriate data structures to solve it.

Pre-requisite: NIL

### CO/PO, PSO Mapping

(3/2/1 indicates the strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	P09	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	3	1	1									1
CO2	2	2	3	1	1									1
CO3	2	2	3	1	1									1
CO4	2	2	3	1	1									1
CO5	2	2	3	1	1									1

### Course Assessment methods

Direct		Indirect
CIE test I (8)	Objectives Test (6) Attendance (5) Total CIE: 40 marks Semester End Examination (60)	Course end survey
CIE test II (8)		
CIE test III (8)		
Assignment/seminar/Quiz (5)		

### Unit 01: ALGORITHMIC PROBLEM SOLVING

9 Hours

Need for computer languages, Algorithms, building blocks of algorithms (statements, state, control flow, functions), notation (pseudo code, flow chart, programming language), algorithmic problem solving, simple strategies for developing algorithms (iteration, recursion).

### Unit 02: BASICS OF PYTHON PROGRAMMING

9 Hours

Introduction-Python Interpreter-Interactive and script mode -Values and types, variables, operators, expressions, statements, precedence of operators, Multiple assignments, comments, input function, print function, Formatting numbers and strings, implicit/explicit type conversion.

### Unit 03: CONTROL STATEMENTS AND STRINGS

9 Hours

Conditional (if), alternative (if-else), chained conditional (if-elif-else). Iteration-while, for, infinite loop, break, continue, pass, else. Strings-String slices, immutability, string methods and operations.

<b>Unit 04: FUNCTIONS, FILES AND MODULES</b>				<b>9 Hours</b>
Functions - Introduction, inbuilt functions, user defined functions, passing parameters - positional arguments, default arguments, keyword arguments, return values, local scope, global scope and recursion. Files -Text files, reading and writing files. Modules – create – import.				
<b>Unit 05: DATA STRUCTURES: LISTS, SETS, TUPLES, DICTIONARIES</b>				<b>9 Hours</b>
Lists-creating lists, list operations, list methods, mutability list functions, searching and sorting, Sets-creating sets, set operations. Tuples-Tuple assignment, Operations on Tuples, lists and tuples, Tuple as return value- Dictionaries-operations and methods, Nested Dictionaries, Union Operation.				
<b>Theory: 45 Hrs</b>	<b>Tutorial: --</b>	<b>Practical: --</b>	<b>Project:--</b>	<b>Total Hours: 45 Hrs</b>
<b>TEXT BOOKS</b>				
1.	Reema Thareja, "Problem Solving and Programming with Python" Oxford University Press, 2 <sup>nd</sup> Edition 2023.			
<b>REFERENCES</b>				
1.	Ashok Namdev Kamthane, Amit Ashok Kamthane, "Programming and Problem Solving with Python" Mc-Graw Hill Education, 2018.			
2.	Charles Dierbach, "Introduction to Computer Science using Python: A Computational Problem Solving Focus" Wiley India Edition, 2013.			
3.	Allen Downey, "Think Python: How to Think Like a Computer Scientist" O'Reilly Media, 2nd Edition 2016.			
4.	Timothy A. Budd," Exploring Python" Mc-Graw Hill Education (India) Private Ltd., 2015.			

  
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**SALEM - 636 006**



U23PPL112	PYTHON PROGRAMMING LABORATORY						L	T	P	J	C						
	(Common to ADS, IT, CSE, CSE(AI ML), CSD, CIVIL, BME, ECE, EEE, MECH and MCT Branches)						0	0	2	0	1						
<b>Course Outcomes</b>																	
At the end of the course, the student will be able to																	
CO1:	Implement the algorithms using basic control structures in Python																
CO2:	Develop Python programs to use functions, strings and data structures to solve different types of problems																
CO3:	Implement persistent storing information through file operations																
Pre-requisite: NIL																	
<b>CO/PO, PSO Mapping</b>																	
(3/2/1 indicates the strength of correlation) 3-Strong, 2-Medium, 1-Weak																	
COs	Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)																
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2			
CO1	3	2	2	3	2	1								1			
CO2	3	3	3	3	2	2								1			
CO3	3	3	3	3	2	2								1			
<b>Course Assessment methods</b>																	
Direct						Indirect											
CIE test I (15) Quiz I- (5) CIE test II (15) Quiz II- (5)						RTPS (10) Record (10) Total CIE: 60 marks Semester End Examination (40 marks)						Course end survey					
<b>LIST OF EXPERIMENTS</b>																	
<ol style="list-style-type: none"> <li>1. Draw flowchart using any open source software.</li> <li>2. Implement programs with simple language features.</li> <li>3. Implement various branching statements in python.</li> <li>4. Implement various looping statements in python.</li> <li>5. Develop python programs to perform various string operations like concatenation, slicing, indexing.</li> <li>6. Implement user defined functions using python.</li> <li>7. Implement recursion using python.</li> <li>8. Implement python program to perform operations on file and module.</li> <li>9. Develop python programs to perform operations on list and tuples.</li> <li>10. Implement dictionary and set in python.</li> </ol>																	
Theory: --			Tutorial: --			Practical: 30Hrs			Project: --			Total Hours: 30 Hs					

U23BEE106B	BASICS OF ELECTRICAL AND ELECTRONICS FOR MECHANICAL ENGINEERING	L	T	P	J	C
		2	0	2	0	3

### Course Outcomes

At the end of the course, the student will be able to

CO1:	Analyse the various DC and AC circuits and find the circuit parameters.
CO2:	Discuss the construction and working principles of DC machines.
CO3:	Explain the construction and working principles of transformers and induction motors
CO4:	Explain the basics of semiconductor devices for various applications.
CO5:	Discuss the types of electric drive and the solid state speed control of DC motors and AC motors.

Pre-requisite: Physics

### CO/PO, PSO Mapping

(3/2/1 indicates the strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	1	-	-	-	-	-	1	1	3	3
CO2	3	3	3	3	1	-	-	-	-	-	1	1	3	3
CO3	3	3	2	3	1	-	-	-	-	-	1	1	3	3
CO4	3	3	2	3	1	-	-	-	-	-	2	3	3	3
CO5	3	3	1	3	1	-	-	-	-	-	2	3	3	3

### Course Assessment methods

Direct	Indirect
CIE test I (10) (Theory) CIE test II (10) (Theory) CIE test III (10) (Theory) CIE test IV (10) (Practical) Attendance (5) Assignment/Quiz/Seminar (5)	Total CIE: 50 marks Semester End Examination (50 marks) [SEE- Theory (25) + Lab(25)] Course end survey

### Unit 01: DC & AC FUNDAMENTALS

6 Hours

Electrical components and parameters – Resistance, Conductance – Ohm's law, Kirchhoff's law – Power – Energy – resistors in series and parallel – comparison of series and parallel circuits – standard terminologies in AC circuits – RMS and average value of Sinusoidal waveform.

<b>Unit 02: DC MACHINES</b>				<b>6 Hours</b>
DC Generator: Construction of DC generator – Working principle of DC generator – EMF equation – Types of DC generator- Applications DC Motor: Working principle of DC motor – Back EMF- Types of DC motor- Applications.				
<b>Unit 03: TRANSFORMER AND INDUCTION MOTORS</b>				<b>6 Hours</b>
Transformer: Construction and working principle of single phase transformer – EMF equation – Applications. Induction Motors: Construction and working principle of single phase & three phase induction motor- Applications.				
<b>Unit 04: SEMICONDUCTOR DEVICES AND APPLICATIONS</b>				<b>6 Hours</b>
Introduction to semiconductors - PN junction Diode– V-I characteristics- Applications: half wave rectifier, full wave rectifier- SCR- V-I characteristics of SCR.				
<b>Unit 05: ELECTRIC DRIVES</b>				<b>6 Hours</b>
Basic Elements – Types of Electric Drives – Factors influencing the choice of electric drives –Single phase half controlled and fully controlled bridge rectifier fed DC drives- voltage source inverter (VSI) and current source inverter (CSI) fed induction motor drives.				
<b>LIST OF EXPERIMENTS</b>				
<ol style="list-style-type: none"> <li>1. Verification of Ohm's law.</li> <li>2. Verification of Kirchhoff's laws.</li> <li>3. V-I characteristics of PN junction diode.</li> <li>4. V-I characteristics of SCR.</li> <li>5. Load test on DC Shunt motor.</li> <li>6. Speed control of DC shunt motor.</li> <li>7. Load test on single phase transformer.</li> <li>8. Speed control of three phase induction Motor.</li> <li>9. Single phase half controlled converter using R, RL Loads.</li> <li>10. Single phase fully controlled converter using R, RL Loads.</li> </ol>				
<b>Theory: 30 Hrs</b>	<b>Tutorial: –</b>	<b>Practical: 30 Hrs</b>	<b>Project:--</b>	<b>Total Hours: 60 Hrs</b>
<b>TEXT BOOKS</b>				
1.	B.L. Theraja, "Fundamentals of Electrical Engineering & Electronics", S. Chand & Co Ltd, 2022.			
2.	Gopal K.Dubey, "Fundamentals of Electrical Drives", 2nd Edition, Alpha Science International Ltd, 2022			
<b>REFERENCES</b>				
1.	Mehta V.K, Rohit Mehta, "Principles of Electrical Engineering & Electronics", S.Chand & Co. Ltd., 2020.			
2.	S.K. Bhattacharya, "Electrical Machines", 3 <sup>rd</sup> Edition, Tata MC Graw Hill & Co ltd, 2017			
3.	Smarajit Ghosh, "Fundamentals of Electrical and Electronics Engineering", 2 <sup>nd</sup> revised edition, PHI publications, 2010			
4.	Vedam Subrahmanyam, "Electric Drives: Concept and Applications", 2 <sup>nd</sup> Edition, Tata MC Graw Hill & Co ltd, 2017			


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U23EGR107	ENGINEERING GRAPHICS	L	T	P	J	C
		3	0	0	0	3

**Course Outcomes**

**At the end of the course, the student will be able to**

- CO1: Construct –Ellipse, Parabola, Hyperbola, Cycloids and Involutés.
- CO2: Draw the projection of Point, Line and Plane surfaces.
- CO3: Draw the projection of simple solids by rotating object method.
- CO4: Develop the section of simple solids and lateral surface of truncated solids.
- CO5: Draw the isometric view to orthographic projection.

**Pre-requisite: Nil**

**CO/PO, PSO Mapping**

(3/2/1 indicates the strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1							3		2			1	
CO2					3			2		2		2		2
CO3					3			2		2		2	1	2
CO4					3			2		2		2	1	2
CO5			2					2		2		2	1	

**Course Assessment methods**

Direct	Indirect
CIE test I (8) CIE test II (8) CIE test III (8) Assignment/seminar/Quiz (5)	Objectives Test (6) Attendance (5) Total CIE: 40 marks Semester End Examination (60)
Course end survey	

**CONCEPTS AND CONVENTIONS - (Not for Examination).**

Importance of graphics in engineering applications - Use of drafting instruments - BIS conventions and specifications – Size, layout and folding of drawing sheets – Lettering and dimensioning.


**Unit 01: PLANE CURVES - (Manual drafting).**

Basic Geometrical constructions, Curves used in engineering practices: Conics – Construction of ellipse, parabola and hyperbola by eccentricity method – Construction of cycloid – construction of Involute of circle – Drawing of tangents and normal to the above curves.

**9 Hours**

<b>Unit 02: PROJECTION OF POINTS, LINES AND PLANE SURFACES (CAD software).</b> Orthographic projection- principles-principal planes-First angle projection-projection of points. Projection of straight lines ( <b>only First angle projections</b> ) inclined to both the principal planes -Determination of true lengths and true inclinations by rotating line method. Projection of planes (polygonal and circular surfaces) inclined to one of the principal plane by rotating object method.					<b>9 Hours</b>
<b>Unit 03: PROJECTION OF SOLIDS (CAD software).</b> Projection of simple solids - prisms, pyramids, cylinder and cone, when the axis is inclined to one of the principal planes and parallel to the other by change of position method.					<b>9 Hours</b>
<b>Unit 04: PROJECTION OF SECTIONED SOLIDS AND DEVELOPMENT OF SURFACES (CAD software).</b> Section of solids in simple vertical position when the cutting plane is inclined to one of the principal planes and perpendicular to the other – ( <b>obtaining true shape of section is not required</b> ). Development of lateral surfaces of truncated solids – Prisms, pyramids cylinders and cones.					<b>9 Hours</b>
<b>Unit 05: ISOMETRIC TO ORTHOGRAPHICS PROJECTION- (Manual drafting).</b> Representation of three dimensional objects – General Principles - Need for importance of multiple views – First angle projection – layout of views – Conversion of isometric view to orthographic views.  Practicing three dimensional modelling of simple objects using CAD Software ( <b>Not for examination</b> )					<b>9 Hours</b>
Theory: 45 Hrs	Tutorial: --	Practical: --	Project:--	Total Hours: 45 Hrs	
<b>TEXT BOOKS</b>					
1.	Bhatt N.D. and Panchal V.M., “Engineering Drawing”, Charotar Publishing House, 53rd Edition, 2019.				
2.	Natrajan K.V., “A Text Book of Engineering Graphics”, Dhanalakshmi Publishers, Chennai, 2018.				
3.	Parthasarathy, N. S. and Vela Murali, “Engineering Drawing”, Oxford University Press, 2015				
4.	P.Suresh., “Engineering Graphics and Drawing”, Sonaversity, Sona College of Technology, Salem, Revised edition, 2012.				

REFERENCES	
1.	BasantAgarwal and Agarwal C.M., "Engineering Drawing", McGraw Hill, 2nd Edition, 2019.
2.	Gopalakrishna K.R., "Engineering Drawing" (Vol. I&II combined), Subhas Publications, Bangalore, 27thEdition, 2017.
3.	Luzzader, Warren.J. and Duff, John M., "Fundamentals of Engineering Drawing with an introduction to Interactive Computer Graphics for Design and Production, Eastern Economy Edition, Prentice Hall of India Pvt. Ltd, New Delhi, 2005.
4.	Parthasarathy N. S. and Vela Murali, "Engineering Graphics", Oxford University, Press, New Delhi, 2015.
5.	Shah M.B., and Rana B.C., "Engineering Drawing", Pearson Education India, 2nd Edition, 2009.
6.	Venugopal K. and Prabhu Raja V., "Engineering Graphics", New Age International (P) Limited, 2008.



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U23TAM101	தமிழர் மரபு / Heritage of Tamils	L	T	P	J	C
		1	0	0	0	1
<b>Course Outcomes</b>						
At the end of the course, the student will be able to						
CO1:	Describe Tamil Language and Literature					
CO2:	Analyse Heritage - Rock Art Paintings To Modern Art – Sculpture					
CO3:	Explain Folk and Martial Arts					
CO4:	Describe Thinaï Concept of Tamils					
CO5:	Analyse Contribution of Tamils to Indian National Movement and Indian Culture					
<b>Course Assessment methods</b>						
Direct				Indirect		
CIE test I (30)		Total CIE: 100 marks		Course end survey		
CIE test II (30)		Semester End Examination: NIL				
CIE test III (40)						
<b>அலகு 1 : மொழி மற்றும் இலக்கியம்</b>					3 Hours	
இந்திய மொழிக் குடும்பங்கள் - திராவிட மொழிகள் - தமிழ் ஒரு செம்மொழி -தமிழ் செவ்விலக்கியங்கள் - சங்க இலக்கியத்தின் சமயச் சார்பற்ற தன்மை - சங்க இலக்கியத்தில் பகிர்தல் அறம் - திருக்குறளில் மேலாண்மைக் கருத்துக்கள் - தமிழ்க் காப்பியங்கள், தமிழகத்தில் சமண பௌத்த சமயங்களின் தாக்கம் - பக்தி இலக்கியம், ஆழ்வார்கள் மற்றும் நாயன்மார்கள் - சிற்றிலக்கியங்கள் - தமிழில் நவீன இலக்கியத்தின் வளர்ச்சி - தமிழ் இலக்கிய வளர்ச்சியில் பாரதியார் மற்றும் பாரதிதாசன் ஆகியோரின் பங்களிப்பு.						
<b>அலகு 2 : மரபு – பாறை ஓவியங்கள் முதல் ஓவியங்கள் வரை – சிற்பக் கலை</b>					3 Hours	
நடுகல் முதல் சிற்பங்கள் வரை – ஐம்பொன் சிலைகள் - பழங்குடியினர் மற்றும் அவர்கள் தயாரிக்கும் கைவினைப் பொருட்கள், பொம்மைகள் - தேர் செய்யும் கலை- சுடுமண் சிற்பங்கள் - நாட்டுப்புறத் தெய்வங்கள் - குமரிமுனையில் திருவள்ளூர் சிலை - இசைக் கருவிகள் - மிருதங்கம், பறை, வீணை, யாழ், நாதஸ்வரம் - தமிழர்களின் சமூக பொருளாதார வாழ்வில் கோவில்களின் பங்கு						
<b>அலகு 3: நாட்டுப்புறக் கலைகள் மற்றும் வீர விளையாட்டுகள்</b>					3 Hours	
தெருக்கூத்து, கரகாட்டம், வில்லுப்பாட்டு, கணியான் கூத்து, ஓயிலாட்டம், தோலபாவைக் கூத்து, சிலம்பாட்டம், வளரி, புலியாட்டம், தமிழர்களின் விளையாட்டுகள்.						
<b>அலகு 4: தமிழர்களின் திணைக் கோட்பாடுகள்</b>					3 Hours	
தமிழகத்தின் தாவரங்களும், விலங்குகளும் - தொல்காப்பியம் மற்றும் சங்க இலக்கியத்தில் அகம் மற்றும் புறக் கோட்பாடுகள் – தமிழர்கள் போற்றிய அறக்கோட்பாடு – சங்ககாலத்தில் தமிழகத்தில் எழுத்தறிவும், கல்வியும் -						

சங்ககால நகரங்களும் துறை முகங்களும் - சங்ககாலத்தில் ஏற்றுமதி மற்றும் இறக்குமதி - கடல்கடந்த நாடுகளில் சோழர்களின் வெற்றி.

அலகு 5: இந்திய தேசிய இயக்கம் மற்றும் இந்திய பண்பாட்டிற்குத் தமிழர்களின் பங்களிப்பு

3 Hours

இந்திய விடுதலைப்போரில் தமிழர்களின் பங்கு - இந்தியாவின் பிறப்புகளில் தமிழ்ப் பண்பாட்டின் தாக்கம் - சுயமரியாதை இயக்கம் - இந்திய மருத்துவத்தில், சித்த மருத்துவத்தின் பங்கு - கல்வெட்டுகள் கையெழுத்துப்படிக்கல் - தமிழ்ப் புத்தகங்களின் அச்சு வரலாறு.

Theory: 15 Hrs

Tutorial: --

Practical: --

Project:--

Total Hours: 15 Hrs

REFERENCES

1	தமிழக வரலாறு - மக்களும் பண்பாடு - கே.கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2	கணினித் தமிழ் - முனைவர் இல.சுந்தரம்.(விகடன் பிரசுரம்).
3	கீழடி - வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
4	பொருதை -ஆற்றங்கரை நாகரிகம். (தொல்லியல் துறை வெளியீடு)
5	Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL - (in print)
6	Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies)
7	Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8	The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
9	Keeladi - 'Sangam City Civilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10	Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by: The Author)
11	Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
12	Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) - Reference Book.

  
HOD

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U23TAM101	<b>தமிழர் மரபு / Heritage of Tamils</b>		L	T	P	J	C
			1	0	0	0	1
<b>Course Outcomes</b>							
At the end of the course, the student will be able to							
CO1:	Describe Tamil Language and Literature						
CO2:	Analyse Heritage - Rock Art Paintings To Modern Art – Sculpture						
CO3:	Explain Folk and Martial Arts						
CO4:	Describe Thinaï Concept of Tamils						
CO5:	Analyse Contribution of Tamils to Indian National Movement and Indian Culture						
<b>Course Assessment methods</b>							
<b>Direct</b>				<b>Indirect</b>			
CIE test I (30)	Total CIE: 100 marks			Course end survey			
CIE test II (30)	Semester End Examination: NIL						
CIE test III (40)							
<b>Unit 01: LANGUAGE AND LITERATURE</b>						<b>3 Hours</b>	
Language Families in India - Dravidian Languages – Tamil as a Classical Language - Classical Literature in Tamil – Secular Nature of Sangam Literature – Distributive Justice in Sangam Literature - Management Principles in Thirukural - Tamil Epics and Impact of Buddhism & Jainism in Tamil Land - Bakthi Literature Azhwars and Nayanmars - Forms of minor Poetry - Development of Modern literature in Tamil - Contribution of Bharathiyar and Bharathidhasan..							
<b>Unit 02: HERITAGE - ROCK ART PAINTINGS TO MODERN ART – SCULPTURE</b>						<b>3 Hours</b>	
Hero stone to modern sculpture - Bronze icons - Tribes and their handicrafts - Art of temple car making - - Massive Terracotta sculptures, Village deities, Thiruvalluvar Statue at Kanyakumari, Making of musical instruments - Mridhangam, Parai, Veenai, Yazh and Nadhaswaram - Role of Temples in Social and Economic Life of Tamils							
<b>Unit 03: FOLK AND MARTIAL ARTS</b>						<b>3 Hours</b>	
Therukoothu, Karagattam, Villu Pattu, Kaniyan Koothu, Oyillattam, Leather puppetry, Silambattam, Valari, Tiger dance - Sports and Games of Tamils							
<b>Unit 04: THINAI CONCEPT OF TAMILS</b>						<b>3 Hours</b>	
Flora and Fauna of Tamils & Aham and Puram Concept from Tholkappiyam and Sangam Literature - Aram Concept of Tamils - Education and Literacy during Sangam Age - Ancient Cities and Ports of Sangam Age - Export and Import during Sangam Age - Overseas Conquest of Cholas.							
<b>Unit 05: CONTRIBUTION OF TAMILS TO INDIAN NATIONAL MOVEMENT AND INDIAN CULTURE</b>						<b>3 Hours</b>	
Contribution of Tamils to Indian Freedom Struggle - The Cultural Influence of Tamils over the other parts of India – Self-Respect Movement - Role of Siddha Medicine in Indigenous Systems of Medicine – Inscriptions & Manuscripts – Print History of Tamil Books							
Theory: 15 Hrs		Tutorial: --		Practical: --		Project:--	
Total Hours: 15 Hrs							
<b>REFERENCES</b>							
1	தமிழக வரலாறு – மக்களும் பண் பொடும் – மக.மக. பிள்மள (தவளியீடு: தமிழ்நொடு பொடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).						
2	கணினித் தமிழ் – முமனவர ில. சுந்தரம் . (விகடன் பிரசுரம் ) .						

3	கீழடி - மவமக நதிக்கமரயில் ஂங்ககொல நகர நொகரிகம் (ததொல்லியல் துமறதவளியீடு)
4	பொருமந - ஆற்றங்கமர நொகரிகம். (ததொல்லியல் துமற தவளியீடு)
5	Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL - (in print)
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9	Keeladi - 'Sangam City Civilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
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11	Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
12	Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) - Reference Book.

  
HOD

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U23GE101	BASIC APTITUDE-1	L	T	P	J	C
		2	0	0	0	0

### Course Outcomes

At the end of the course, the student will be able to

<b>CO1:</b>	Solve the problems in Divisibility, Division algorithm, Successive Division and HCF & LCM. Identify Synonyms and Antonyms.
<b>CO2:</b>	Elucidate the problems in BODMAS rule, Approximation, Surds and Indices, Algebraic Simplification and Square root and Cube root. Choose appropriate Verbal Analogies and edit the given passages.
<b>CO3:</b>	Crack the problems involving Ratio and Proportion, and discuss Proportionality Theorems. Comprehend the given passages for Reading Comprehension activity and answer the questions correctly.
<b>CO4:</b>	Deduce the problems involving Linear equation and Quadratic equation. Demonstrate good vocabulary skill by doing the one word substitution and sentence filler exercise with high degree of accuracy.
<b>CO5:</b>	Interpret the logical reasoning problems from Number series, Coding and Decoding and Exhibit good expertise in detecting errors in the given sentences.

### Pre-requisite:

- Basic English language and Grammar knowledge
- Knowledge in Basic Mathematics

### CO/PO, PSO Mapping

(3/2/1 indicates the strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	2	1	1	1	3	3	3	2	3
CO2	3	3	3	2	1	1	1	3	3	3	2	3
CO3	3	3	3	2	1	1	1	3	3	3	2	3
CO4	3	3	3	2	1	1	1	3	3	3	2	3
CO5	3	3	3	2	1	1	1	3	3	3	2	3

### Course Assessment methods

Direct		Indirect
CIE test I (30) - Theory	Total CIE: 100 marks Semester End Examination – NIL	Course end survey
CIE test II (30) - Theory		
CIE test III (40) – Theory		

<b>Unit 01</b>				<b>6 Hours</b>
Number Properties: Classification of numbers - Divisibility - Division algorithm -Successive Division - HCF and LCM –Problems Verbal Aptitude: Synonyms and b. Antonyms				
<b>Unit 02</b>				<b>6 Hours</b>
Simplification: BODMAS Rule - Approximation - Surds and Indices - Algebraic Simplification - Square root and Cube root – Problems Verbal Aptitude: Verbal analogy, Editing passages				
<b>Unit 03</b>				<b>6 Hours</b>
Ratio and Proportion : Ratio - Properties of Ratios - Compound Ratio - Coin based problems - Proportion - Proportionality Test - Proportionality Theorems - Inverse Proportion - Variation - Problems  Verbal Aptitude: Reading Comprehension				
<b>Unit 04</b>				<b>6 Hours</b>
Equations: a. Linear equation: Simultaneous Linear Equations - Consistent System - Inconsistent System - Problems b. Quadratic Equation: Different Ways to Express the Quadratic Equation - Discriminant of the Quadratic Equations - Roots - Nature of the Roots - Relation between roots and coefficient of equation - Formation of a Quadratic Equation – Problems  Verbal Aptitude: One word substitution , Sentence filler words				
<b>Unit 05</b>				<b>6 Hours</b>
Logical Reasoning : Number series – Coding and Decoding – Problem Verbal Aptitude: Error detection				
<b>Theory: 30 Hrs</b>	<b>Tutorial: 0</b>	<b>Practical: 0</b>	<b>Project: 0</b>	<b>Total Hours: 30 Hrs</b>
<b>TEXT BOOKS</b>				
1.	S.Chand and Dr.R.S.Aggarwal, “Quantitative Aptitude for competitive examinations”, S Chand and Company Limited 2019.			
2.	Nishit K.Sinha, “Logical Reasoning and Data Interpretation”, Pearson 2021.			

*S. Anita*  
15/09/2023

**Dr.S.Anita**

**Head/Training**

**Dr. S. ANITA**

**Professor and Head**

**Department of Training,**

**SONA COLLEGE OF TECHNOLOGY,**

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U23OL1101	French	L	T	P	J	C
		1	0	0	0	1
<b>Course Outcomes</b>						
<b>At the end of the course, the student will be able to</b>						
CO1:	Read French phrases, Spell French phonitis, practice French accents, differentiate French and English sounds					
CO2:	Introduce oneself, talk about someone, ask others personal information, identify an object, ask and respond politely in a conversation					
CO3:	Read and write a small announcement, describe about neighbours, write a small portrait					
CO4:	Express one's wishes, talk about one's hobbies, ask time, describe one's status of life in a blog, justify a choice, express one's preferences, write a list of needs					
CO5:	Suggest to do something, appreciate something, talk about a movie, write a postal card					
<b>Course Assessment methods</b>						
<b>Direct</b>				<b>Indirect</b>		
CIE test I (30)		Total CIE: 100 marks		Course end survey		
CIE test II (30)		Semester End Examination: NIL				
CIE test III (40)						
<b>Unit 01:</b>					<b>3 Hours</b>	
Hr 2: Alphabets, Basic wishes, self-introduction, basic verbs: avoir and être						
Hr 4: Nationalities and countries, colors, days & months						
Hr 6: Definite articles, numbers 0-20, write about one's identification						
<b>Unit 02:</b>					<b>3 Hours</b>	
Hr 8: Professions, conjugation: 1 <sup>st</sup> group verbs, indefinite articles						
Hr 10: Preposition of place, identity card, negative sentence						
Hr 12: Things around us, subjective and ephatic pronouns, self-introduction online						
<b>Unit 03:</b>					<b>3 Hours</b>	
Hr 14: Talk about accommodation, conjugation: aller and venir, possessive adjectives						
Hr 16: Adjective's gender, noun's gender, things in a room, simple prepositions						
Hr 18: Physical description, speak about accommodation, writing a self-potrait						
<b>Unit 04:</b>					<b>3 Hours</b>	
Hr 20: Hobbies, conjugation: vouloir, pouvoir and devoir, connected articles						
Hr 22: Interrogative adjectives, daily activities, time and seasons, pronominal verbs						
Hr 24: Near future tense, talk about preferences, write a mail						
<b>Unit 05:</b>					<b>3 Hours</b>	
Hr 26: Outing activities, conjugation: faire and sortir, demonstrative adjectives						
Hr 28: Adverbs of frequency, family members, past tenses (passé composé and imparfait)						
Hr 30: French arts, talk about a film, and write a postal card						
Theory: 15 Hrs		Tutorial: --	Practical: --	Project:--	Total Hours: 15 Hrs	
<b>TEXT BOOKS</b>						
1.	The course faculty will provide relevant audios, videos, handouts and notes					
2.	Books : Saison (Méthode de français, cahier d'activités)					
3.	Reference books : La conjugaison, Dondon, Echo					

*M. Renuga*  
HOD


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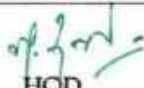
Sona College of Technology,

SALEM - 636 007

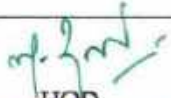
U23OL1102	German	L	T	P	J	C
		1	0	0	0	1
<b>Course Outcomes</b>						
At the end of the course, the student will be able to						
CO1:	Use common, everyday expressions to greet others and introduce themselves.					
CO2:	Construct simple sentences /questions.					
CO3:	Initiate and sustain basic conversation based on family, professions,					
CO4:	Hobbies and food.					
CO5:	Identify differences in using nouns based on gender.					
<b>Course Assessment methods</b>						
Direct				Indirect		
CIE test I (30)		Total CIE: 100 marks		Course end survey		
CIE test II (30)		Semester End Examination: NIL				
CIE test III (40)						
<b>Unit 01:</b>				<b>3 Hours</b>		
<ul style="list-style-type: none"> <li>Greeting and taking leave, introducing oneself, introducing others</li> </ul>						
<b>Unit 02:</b>				<b>3 Hours</b>		
<ul style="list-style-type: none"> <li>Alphabets, spelling, numbers</li> </ul>						
<b>Unit 03:</b>				<b>3 Hours</b>		
<ul style="list-style-type: none"> <li>Age, Telephone/mobile numbers, Month, Date, Time</li> </ul>						
<b>Unit 04:</b>				<b>3 Hours</b>		
<ul style="list-style-type: none"> <li>Languages, Family, Asking/giving information about family members</li> </ul>						
<b>Unit 05:</b>				<b>3 Hours</b>		
<ul style="list-style-type: none"> <li>Hobbies, Professions</li> </ul>						
Theory: 15 Hrs		Tutorial: --	Practical: --	Project:--	Total Hours: 15 Hrs	
<b>TEXT BOOKS</b>						
1.	Netzwerk A1					

  
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U23OL1103		Japanese					L	T	P	J	C
							1	0	0	0	1
<b>Course Outcomes</b>											
At the end of the course, the student will be able to											
CO1:	Use words and phrases of greeting in Japanese, write the letters of the alphabet, identify names of objects and do a self-introduction using short and simple sentences										
CO2:	Demonstrate the use of time-related words and verb conjunctions and make light conversation asking for directions and answering questions										
CO3:	Use different kinds of verbs through the day and those used for giving things, and demonstrate the use of adjectives										
CO4:	Express liking for the Japanese language, describe the locations of different things and demonstrate counting in Japanese										
CO5:	Make comparisons of stated things, express a willingness to go to Japan and use 'Te-form' verbs										
<b>Course Assessment methods</b>											
Direct						Indirect					
CIE test I (30)			Total CIE: 100 marks			Course end survey					
CIE test II (30)			Semester End Examination: NIL								
CIE test III (40)											
<b>Unit 01:</b>						<b>3 Hours</b>					
Hr 1-2: Greeting words and phrases; the Japanese alphabet: 104 Hiragana and 104 Katakana letters Hr 3-4: Identifying words from pictures or objects shown Hr 5-6: Self-introduction											
<b>Unit 02:</b>						<b>3 Hours</b>					
Hr 7-8: Asking for directions when shopping Hr 9-10: Time words and Verb Conjugations Hr 11-12: Making light conversation											
<b>Unit 03:</b>						<b>3 Hours</b>					
Hr 13-14: Expressions to use verbs from morning to night Hr 15-16: Verbs used for giving things Hr 17-18: Adjectives											
<b>Unit 04:</b>						<b>3 Hours</b>					
Hr 19-20: Ways to show liking for the Japanese language Hr 21-22: Describing the location of things (or where things are) Hr 23-24: Japanese numbers and counting											
<b>Unit 05:</b>						<b>3 Hours</b>					
Hr 25-26: Making comparisons Hr 27-28: Expressions wishing for something, like 'I want to go to Japan ...!' Hr 29-30: Using 'Te-form' Verb											
Theory: 15 Hrs		Tutorial: --		Practical: --		Project:--		Total Hours: 15 Hrs			
<b>TEXT BOOKS</b>											
1.	The course faculty will provide handouts / notes / course material.										
2.	Books on Basic Japanese language available in the college library.										

  
HOD  
**Dr. M. RENUGA,**  
Professor & Head,  
Department of Humanities & Language

U23OL1104	Korean	L	T	P	J	C
		1	0	0	0	1
<b>Course Outcomes</b>						
At the end of the course, the student will be able to						
CO1:	Use single vowels and consonants syllable structure.					
CO2:	Greet others and introduce themselves.					
CO3:	Identify time , date and week					
CO4:	Explain location and places					
CO5:	Construct simple sentences / questions.					
<b>Course Assessment methods</b>						
<b>Direct</b>				<b>Indirect</b>		
CIE test I (30)	Total CIE: 100 marks			Course end survey		
CIE test II (30)	Semester End Examination: NIL					
CIE test III (40)						
Unit 01: Hangeul					3 Hours	
Single Vowels & Consonants Syllable Structure Tense Consonants Aspirated Consonants Double Vowels Final Consonants Double Final Consonants Liaison						
Unit 02: Introduction					3 Hours	
Greetings Talking about names Self-introduction Introducing my family members						
Unit 03: Time and Date					3 Hours	
Talking about location Talking about dates and days of the week Talking about doing something in the past						
Unit 04: Location and Places					3 Hours	
Talking about location Talking about doing something at a location Talking about directions						
Unit 05: Future					3 Hours	
Talking about doing something in the future Talking about plans for the future Talking about hope for the future						
Theory: 15 Hrs		Tutorial: --	Practical: --	Project:--	Total Hours: 15 Hrs	
<b>REFERENCES</b>						
1	Vitamin Korean - 1					

  
 HOD  
**Dr. M. RENUGA,**  
 Professor & Head,  
 Department of Humanities & Languages,  
 Sona College of Technology,

U23OL1105		Hindi					L	T	P	J	C
							1	0	0	0	1
<b>Course Outcomes</b>											
At the end of the course, the students will be able to											
CO1:	Write स्वर(अ - अः), व्यंजन(क - श्र)										
CO2:	Identify and write बारहखडी(क - श्रः)										
CO3:	Coin 2,3&4 letters words										
CO4:	Read and frame sentences ( grammar, verb, noun, pronoun, adjective, etc...)										
CO5:	Communicate effectively using tenses ( with Continuous )										
<b>Course Assessment methods</b>											
<b>Direct</b>						<b>Indirect</b>					
CIE test I (30) CIE test II (30) CIE test III (40)						Total CIE: 100 marks Semester End Examination: NIL Course end survey					
Unit 01: स्वर (अ - अः), व्यंजन (क - श्र)								3 Hours			
Hindi letters learning Letters identification Reading Writing Letters pronunciation											
Unit 02: बारहखडी (क - श्रः)								3 Hours			
Hindi letters learning Letters identification Reading Writing Letters pronunciation											
Unit 03: 2,3 & 4 letters words								3 Hours			
Words making Words meaning Reading & Writing											
Unit 04 : Grammar, ( Verb, noun, pronoun, adjective, etc...)								3 Hours			
Words meaning Reading & Writing Sentence framing											
Unit 05 : Tenses ( with Continuous )								3 Hours			
Talking about school Talking about family, friends Talking about doing something in the past, present, future Translation											
Theory: 15 Hrs		Tutorial: --		Practical: --		Project:--		Total Hours: 15 Hrs			
<b>REFERENCES</b>											
1	Diploma in Hindi (department of higher education, Delhi)										

  
HOD

**Dr. M. RENUGA,**  
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Department of Humanities & Languages  
Annamalai University,  
SALEM - 636 012

**Sona College of Technology, Salem**  
(An Autonomous Institution)  
**Courses of Study for B.E/B.Tech. Semester II under Regulations 2023 (CBCS)**  
Branch: Mechanical Engineering

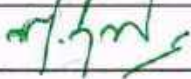
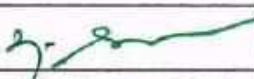
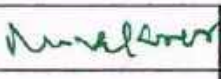
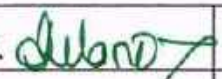

S.No	Course Code	Course Title	L	T	P	J	C	Category	Total Contact Hours	Course Type*	
<b>Theory courses</b>											
1.	U23ENG201B	Communication Skills in English	2	0	2	0	3	HS	60	TL	
2.	U23MAT202C	Vector Calculus and Differential Equations	3	1	0	0	4	BS	60	TT	
3.	U23PHY203F	Physics for Mechanical Engineering	3	0	0	0	3	BS	45	T	
4.	U23ME201	Engineering Mechanics for Mechanical Engineering	3	1	0	0	4	ES	60	TT	
5.	U23ME202	Manufacturing Process	3	0	0	0	3	PC	45	T	
6.	U23TAM201	தமிழரும் தொழில்நுட்பமும்/ Tamil and Technology	1	0	0	0	1	HS	15	T	
7.	U23GE201	Basic Aptitude- II	2	0	0	0	0	AC	30	T	
<b>Practical courses</b>											
8.	U23PHL210A	Physics Laboratory	0	0	2	0	1	BS	30	L	
9.	U23ME203	Workshop Practices for Mechanical Engineering	0	0	2	0	1	PC	30	L	
<b>Total Credits</b>							<b>20</b>				
<b>Optional Language Courses**</b>											
10.	U23OL1201	French - II	1	0	0	0	1	OL	15	T	
11.	U23OL1202	German - II							15	T	
12.	U23OL1203	Japanese - II							15	T	
13.	U23OL1204	Korean - II							15	T	
14.	U23OL1205	Hindi - II							15	T	

\*T- Theory, TT- Theory with Tutorial, TL- Theory with Laboratory, TP- Theory with Project, TLP- Theory with Laboratory and Project, L-Laboratory, LT- Laboratory with Theory, LP- Laboratory with Project

\*\*Students may opt for foreign languages viz., German/French/Japanese/Korean/Hindi with additional one credit

(Not accounted for CGPA calculation)

**Approved By**

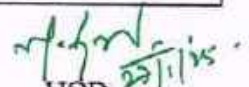
				
Chairperson, Science and Humanities BoS	Chairperson, Mech BoS	Member Secretary, Academic Council	Dean-Academics	Chairperson, Academic Council & Principal
Dr.M.Renuga	Dr. D.Senthilkumar	Dr.R.Shivakumar	Dr.J.Akilandeswari	Dr.S.R.R.Senthil Kumar

Copy to:-

HOD/ Mechanical Engineering, Second Semester B.E. Mech. Students and Staff, COE


U23ENG201B	Communication Skills in English								L	T	P	J	C	
									2	0	2	0	3	
<b>Course Outcomes</b>														
At the end of the course, the student will be able to														
CO1:	Use grammatical components effectively in both written and spoken communication													
CO2:	Make self-introduction, deliver speeches and technical presentation													
CO3:	Demonstrate effective listening skills for academic and professional purposes													
CO4:	Write emails and formal letters and build resumes and construct paragraphs													
CO5:	Develop speaking skills both in terms of fluency and comprehensibility													
<b>Pre-requisite:</b>														
<ul style="list-style-type: none"> <li>• Knowledge and Understanding of Grammar</li> <li>• Fundamental Language Skills (LSRW)</li> </ul>														
<b>CO/PO, PSO Mapping</b>														
(3/2/1 indicates the strength of correlation) 3-Strong, 2-Medium, 1-Weak														
COs	Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	1	1	1	1	3	3	2	3	3	2	3	2	3
CO2	1	1	1	1	1	3	3	3	3	3	3	3	3	3
CO3	1	2	3	2	2	3	3	2	3	3	3	3	3	3
CO4	1	2	1	2	2	3	3	3	3	3	3	3	3	3
CO5	1	2	2	3	2	3	3	3	3	3	3	3	3	3
<b>Course Assessment methods</b>														
<b>Direct</b>										<b>Indirect</b>				
CIE test I (10) (Theory)					Total CIE: 50 marks Semester End Examination: 50 marks (SEE – Theory (25 marks + Lab (25 marks))					Course end survey				
CIE test II (10) (Theory)														
CIE test III (10) (Theory)														
CIE test IV (15) (Laboratory)														
Assignment/seminar/Quiz (5)														
<b>Unit 01:</b>										<b>6 Hours</b>				
<ul style="list-style-type: none"> <li>• General vocabulary, Parts of Speech, Articles</li> <li>• Email, fixing an appointment, cancelling appointments, conference details, hotel accommodation, order for equipment, training programme details, paper submission for seminars and conferences</li> <li>• Paragraph writing – Describing – defining – providing examples or evidences</li> </ul>														
<b>Unit 02:</b>										<b>6 Hours</b>				
<ul style="list-style-type: none"> <li>• Tenses, Sentence Patterns, Coherence and Cohesion</li> </ul>														

<ul style="list-style-type: none"> <li>• Instructions</li> <li>• Letter Writing - calling for quotations, placing orders</li> </ul>					
<b>Unit 03:</b>				<b>6 Hours</b>	
<ul style="list-style-type: none"> <li>• Prefixes and Suffixes</li> <li>• Cover letter and resume writing</li> </ul>					
<b>Unit 04:</b>				<b>6 Hours</b>	
<ul style="list-style-type: none"> <li>• Modal verbs, concord</li> <li>• Checklist</li> <li>• Letter Writing - Business communication, complaints, replies to queries from business customers</li> </ul>					
<b>Unit 05:</b>				<b>6 Hours</b>	
<ul style="list-style-type: none"> <li>• If conditionals</li> <li>• Letter Writing - inviting dignitaries, accepting and declining invitations</li> </ul>					
<b>Lab component:</b>					
<ol style="list-style-type: none"> <li>1. Self-introduction, personal information, name, home background, study details, area of interest, hobbies, strengths and weaknesses, projects and paper presentations, likes and dislikes in food, travel, clothes, special features of home town.</li> <li>2. Mini presentation - Office Arrangements, Facilities, Office Functions, Sales, Purchases, Training Recruitment, Advertising, Applying for financial assistance, applying for a job.</li> <li>3. Listening - understanding short conversations or monologues, taking down phone messages, orders, notes, etc.</li> <li>4. Listening – entering information in tabular form</li> <li>5. Loud Reading</li> </ol>					
<b>Theory: 30 Hrs</b>		<b>Tutorial: --</b>	<b>Practical: 30 hours-</b>	<b>Project:--</b>	<b>Total Hours: 60 Hrs</b>
<b>TEXT BOOKS</b>					
1. Technical English I & II, Dr. M. Renuga et al. Sonaversity, 2016					
2. <b>Extensive Reading</b>					
<ol style="list-style-type: none"> <li>1. The Story of Google – Sara Gilbert, published by Jaico</li> <li>2. The Story of Amazon.com- Sara Gilbert, published by Jaico</li> <li>3. Witness - Jamel Brinkley</li> </ol>					
<b>REFERENCES</b>					
1. Norman Whitby, Business Benchmark – Pre-Intermediate to Intermediate, Students Book, Cambridge University Press, 2006.					
2. A Course in Communication Skills, P. Kiranmai Dutt, Geetha Rajeevan, C. L. N. Prakash, published by Cambridge University Press India Pvt. Ltd.					

  
HOD

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**Professor & Head,**  
Department of Humanities & Languages,  
Sona College of Technology,  
SALEM - 636 005.

SEMESTER - II	VECTOR CALCULUS AND DIFFERENTIAL EQUATIONS											L	T	P	J	C
U23MAT202C	(Common to CIVIL, MECHANICAL and MECHATRONICS)											3	1	0	0	4
<b>Course Outcomes</b>																
At the end of the course, the student will be able to																
CO1:	apply the concepts of vector differentiation and integration to determine the line, surface and volume integrals.															
CO2:	apply the classical methods to solve linear ordinary differential equations.															
CO3:	apply the appropriate numerical methods to solve ordinary differential equations.															
CO4:	apply the classical methods to solve partial differential equations.															
CO5:	apply the appropriate finite difference schemes to solve partial differential equations.															
<b>Pre-requisites:</b>																
<ul style="list-style-type: none"> <li>Fundamentals of elementary algebra</li> <li>Fundamentals of calculus</li> </ul>							<ul style="list-style-type: none"> <li>Fundamentals of trigonometry</li> <li>Fundamentals of geometry</li> </ul>									
<b>CO/PO, PSO Mapping</b>																
(3/2/1 indicates the strength of correlation) 3-Strong, 2-Medium, 1-Weak																
COs	Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2		
CO1	3	3	3	3	2							2	3	3		
CO2	3	3	3	3	2							2	3	3		
CO3	3	3	3	3	2							2	3	3		
CO4	3	3	3	3	2							2	3	3		
CO5	3	3	3	3	2							2	3	3		
<b>Course Assessment methods</b>																
<b>Direct</b>										<b>Indirect</b>						
CIE test I (9) CIE test II (9) CIE test III (10) Objectives Test (7)					Assignment/seminar/Quiz (5) Total CIE: <b>40 marks</b> Semester End Examination: <b>60 marks</b>					Course end survey						
<b>Unit 01</b>	<b>VECTOR CALCULUS</b>											<b>12 Hours</b>				
<b>Vector differentiation:</b> Scalar and vector valued functions – Gradient of a scalar point function – Level surface, Unit normal vector, Angle between the two surfaces, directional derivatives – Divergence of a vector point function – Solenoidal vector – Curl of a vector point function – Irrotational vector – Problems based on vector identities – Scalar potential.																
<b>Vector integration:</b> Line, surface and volume integrals – Statements of Green's, Stoke's and Gauss divergence theorems – Simple applications involving squares, rectangles, cubes and rectangular parallelopiped.																
<b>Unit 02</b>	<b>ORDINARY DIFFERENTIAL EQUATIONS</b>											<b>12 Hours</b>				
Higher order linear ordinary differential equations with constant coefficients – Cauchy's and Legendre's linear ordinary differential equations – Method of variation of parameters.																

<b>Unit 03</b>	<b>NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS</b>	<b>12 Hours</b>
<p><b>Single Step Methods:</b> Numerical solution of first order ordinary differential equations by Taylor's series, Euler and Modified Euler and Fourth order Runge – Kutta method.</p> <p><b>Multi Step Methods:</b> Numerical solution of first order ordinary differential equations by Milne's and Adam's predictor-corrector methods.</p>		
<b>Unit 04</b>	<b>PARTIAL DIFFERENTIAL EQUATIONS</b>	<b>12 Hours</b>
<p>Formation of partial differential equations – Lagrange's partial differential equation – Clairaut's form of partial differential equations – Second order linear partial differential equation with constant coefficients.</p>		
<b>Unit 05</b>	<b>NUMERICAL SOLUTION OF PARTIAL DIFFERENTIAL EQUATIONS</b>	<b>12 Hours</b>
<p>Classification of second order partial differential equations – Finite difference schemes for the solution of two dimensional Laplace's and Poisson's equations on rectangular domain – One dimensional heat flow equation by explicit (Bender-Schmidt's) and implicit (Crank Nicholson) methods.</p>		
<b>Theory: 45 Hours</b>	<b>Tutorial: 15 Hours</b>	<b>Practical: - Project: - Total Hours: 60 Hours</b>
<b>TEXT BOOKS:</b>		
1.	T. Veerarajan, "Linear Algebra and Partial Differential Equations", McGraw Hill Publishers, 1 <sup>st</sup> Edition, 2018.	
2.	T. Veerarajan, "Engineering Mathematics for Semesters I & II", McGraw Hill Publishers, 1 <sup>st</sup> Edition, 2019.	
3.	T. Veerarajan, "Numerical Methods", McGraw Hill Publishers, 1 <sup>st</sup> Edition, 2018.	
<b>REFERENCE BOOKS:</b>		
1.	J. Stewart, "Calculus", Cengage Publishers, 8 <sup>th</sup> Edition, 2016.	
2.	C. Prasad and R. Garg, "Advanced Engineering Mathematics", Khanna Publishers, 1 <sup>st</sup> Edition, 2018.	
3.	E. Kreyszig., "Advanced Engineering Mathematics", Wiley Publishers, 10 <sup>th</sup> Edition, Reprint, 2017.	
4.	B. S. Grewal, "Higher Engineering Mathematics", Khanna Publishers, 44 <sup>th</sup> Edition, 2018.	
5.	B. V. Ramana, "Higher Engineering Mathematics", McGraw Hill Publishers, 29 <sup>th</sup> Reprint, 2017.	
 <b>Dr. S. JAYABHARATHI</b> ASSOCIATE PROFESSOR & HEAD DEPARTMENT OF MATHEMATICS, SONA COLLEGE OF TECHNOLOGY, SALEM-636 005. Tamilnadu. Ph: 0427 - 4099999.		
<b>BoS Date: 08. 07. 2023</b>	<b>HoD / Mathematics</b>	

U23PHY203F	PHYSICS FOR MECHANICAL ENGINEERING				L	T	P	J	C					
					3	0	0	0	3					
<b>Course Outcomes</b>														
At the end of the course, the student will be able to														
CO1:	Analyse the relation between the arrangement of atoms and material properties.													
CO2:	Discuss the dual nature of matter and radiation and the application of the wave nature of particles.													
CO3:	Describe the basic components of lasers.													
CO4:	Distinguish the types of magnetic materials.													
CO5:	Elucidate the different modes of heat transfer.													
<b>Pre-requisite:</b>														
Basic Knowledge of atomic physics, optics and thermal physics														
<b>CO/PO, PSO Mapping</b>														
(3/2/1 indicates the strength of correlation) 3-Strong, 2-Medium, 1-Weak														
COs	Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	P09	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	-	-	-	2	2	-	-	2	-	1	-	2
CO2	3	2	-	-	-	2	2	-	-	2	-	1	-	2
CO3	3	2	-	-	-	2	2	-	-	2	-	1	-	2
CO4	3	2	-	-	-	2	2	-	-	2	-	1	-	2
CO5	3	2	-	-	-	2	2	-	-	2	-	1	-	2
<b>Course Assessment methods</b>														
<b>Direct</b>					<b>Indirect</b>									
CIE test I (9) CIE test II (9) CIE test III (10) Objectives Test (7)					Assignment / Seminar / Quiz (5) Total CIE: 40 marks Semester End Examination (60)					Course end survey				
<b>Unit 01: CRYSTAL PHYSICS</b>										<b>9 Hours</b>				

Importance of crystals - Types of crystals - Basic definitions in crystallography (Lattice -space lattice - unit cell - lattice parameters - basis) - Bravais lattices - Lattice planes and Miller indices - Interplanar distance - d spacing in cubic lattice - Calculation of number of atoms per unit cell - Atomic radius - Coordination number - Atomic Packing Factor for SC, BCC, FCC and HCP structures - Polymorphism and allotropy - Crystal imperfections - Point, line and surface defects - Burger vector.

**Unit 02: QUANTUM PHYSICS**

**9 Hours**

Limitations of classical theory - Dual nature of matter and radiation - Compton effect - Expression for Compton shift (no derivation) - de Broglie waves - Heisenberg's Uncertainty Principle - Schrödinger's time independent and time dependent wave equations - Physical significance of wave function - Energy and wave function of an electron trapped in one dimensional box - Application of wave nature of particles - Electron microscope - Comparison of optical and electron microscope - Scanning electron microscope - Transmission electron microscope - Limitations of electron microscope.

**Unit 03: LASERS**

**9 Hours**

Energy level - Stimulated absorption - Population inversion - Meta stable state - Spontaneous emission - Stimulated emission - Basic components of a laser - Einstein's theory of spontaneous and stimulated emission of radiation - Types of lasers - Solid state laser - Nd: YAG laser - Gas laser - CO<sub>2</sub> laser - Semiconductor laser - Homojunction and hetero junction laser - Holography - Construction and reconstruction of hologram - Application of laser in industry - Cutting, welding and drilling - Medical applications - Lasik - Laser in 3D printing - Operation and its applications.

**Unit 04: MAGNETIC MATERIALS**

**9 Hours**

Basic definitions - Magnetic moment - Magnetic field - Magnetic field intensity - Magnetic permeability - Magnetization - Intensity of magnetization - Magnetic susceptibility - Types of magnetic materials - Dia, Para and Ferromagnetic materials - Domain theory of ferromagnetism - Origin of domains - Antiferromagnetic materials- Ferrites - Structure, properties and applications - Hysteresis - Hard and soft magnetic materials.

**Unit 05: THERMAL PHYSICS**

**9 Hours**

Heat and temperature - Modes of heat transfer - Conduction, convection and radiation - Specific

heat capacity - Thermal capacity and coefficient of linear thermal expansion - Thermal conductivity - Measurement of thermal conductivity of a good conductor - Forbe's method - Measurement of thermal conductivity of a bad conductor - Lee's disc method - Radial flow of heat - Cylindrical flow of heat - Practical applications of conduction of heat - Thermal radiations - Properties and applications of thermal radiations.

Theory: 45 Hrs

Tutorial: --

Practical: --

Project: --

Total Hours: 45 Hrs

#### TEXTBOOKS

1. M.N. Avadhanulu, P.G. Kshirsagar, "A Textbook of Engineering Physics", S. Chand & Company Ltd, New Delhi 2014.
2. B D. K. Bhattacharya, Poonam Tandon "Engineering Physics", Oxford University Press 2017.

#### REFERENCES

1. "Engineering Physics", Sonaversity, Sona College of Technology, Salem, Revised Edition 2018.
2. B. K. Pandey and S. Chaturvedi, "Engineering Physics", Cengage Learning India Pvt. Ltd., Delhi, 2021.
3. Arthur Beiser, Shobhit Mahajan, S. Rai Choudhury, "Concepts of Modern Physics", McGraw-Hill (Indian Edition), 2017.
4. R. Wolfson, "Essential University Physics", Volume 1 & 2. Pearson Education (Indian Edition), 2009.
5. R. Murugesan, Kiruthiga Sivaprasath, "Thermal Physics", S. Chand & Company Ltd, New Delhi 2018.

*C. Shanthi*  
27-1-2025

Dr. C. Shanthi  
HOD / Science

**Dr. C. SHANTHI, M.Sc., M.E., Ph.D.,**  
Professor of Physics  
Head, Department of Sciences  
Sona College of Technology (Autonomous)  
SALEM-636 005.

*M. Renuga*  
27-1-2025

Dr. M. Renuga  
BoS - Chairperson,  
Science and Humanities

**Dr. M. RENUGA,**  
Professor & Head,  
Department of Humanities & Languages,  
Sona College of Technology,  
SALEM - 636 005.

U23PHL210A	<b>PHYSICS LABORATORY</b> (Common to I Year B.E/B. Tech. CIVIL, MECH & FT)	L	T	P	J	C
		0	0	2	0	1

### Course Outcomes

At the end of the course, the student will be able to

CO1:	Determine the optical, thermal and magnetic properties of materials by various physics laboratory equipment.
CO2:	Access, process and analyse scientific information.
CO3:	Solve problems individually and collaboratively.

**Pre-requisite:** Capable of using Screw gauge, Vernier calliper, Travelling microscope, able to handle interferometer.

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### CO/PO, PSO Mapping

(3/2/1 indicates the strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2		1		1			1					2
CO2	3	2		1		1			1					2
CO3	3	2		1		1			1					2

### Course Assessment methods

Direct		Indirect
CIE test I (15)	RTPS (10)	Course end survey
Quiz 1 (5)	Record (10)	
CIE test II (15)	Total CIE:60 marks	
Quiz 2 (5)	Semester End Examination (40 marks)	

### LIST OF EXPERIMENTS

1	Determination of the thickness of a thin wire by forming interference fringes using air wedge apparatus.
2	Determination of velocity of ultrasonic waves and compressibility of the given liquid using ultrasonic interferometer.
3	Determination of Rigidity Modulus of given wire using Torsion Pendulum.
4	Determination of coefficient of viscosity of liquid by Poiseuille's method.
5	Determination of Young's modulus of the material of the beam by Non-uniform bending method.
6	Determination of the wavelength of a diode laser.

7	Determination of particle size of lycopodium powder using diode laser.
8	Determination of acceptance angle and numerical aperture of an optical fibre using diode laser.
9	Determination of the thermal conductivity of a bad conductor using Lee's Disc apparatus.
10	Determination of hysteresis loss using B-H curve method.
	<b>TOTAL : 30 HOURS</b>

*C. Shanthi*  
27.1.2025

**Dr. C. Shanthi**  
HOD / Science

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Professor of Physics  
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*M. Renuga*  
27.1.25

**Dr.M. Renuga**  
BoS - Chairperson,  
Science and Humanities

**Dr. M. RENUGA**,  
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SALEM - 636 005.

U23ME201	ENGINEERING MECHANICS FOR MECHANICAL ENGINEERING	L	T	P	J	C
		3	1	0	0	4

**Course Outcomes**

**At the end of the course, the student will be able to**

CO1:	Summarize the basic quantities and idealizations of mechanics and examine the standard procedures for performing numerical calculations.
CO2:	Apply the condition of equilibrium of rigid body in 2D and compute the support reactions.
CO3:	Compute the centroid of plane surfaces and develop a method for determining the moment of inertia.
CO4:	Analyze the mechanics of friction
CO5:	Apply critical thinking to analyze and solve dynamic problems, integrating principles of displacement, velocity, and acceleration

**Pre-requisite:**

**CO/PO, PSO Mapping**

(3/2/1 indicates the strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3											2	
CO2	3	3											2	
CO3	3	3											2	
CO4	3	3											2	
CO5	3	3											2	

**Course Assessment methods**

Direct			Indirect
CIE test I (9)		Assignment / Seminar / Quiz (5)	Course end survey
CIE test II (9)		Total CIE: 40 marks	
CIE test III (10)		Semester End Examination: 60 marks	
Objective Test (7)			

**Unit 01: FUNDAMENTAL CONCEPTS OF MECHANICS**

**12 Hours**

Introduction to mechanics - Fundamental concepts, units, and dimensions - General procedure for analyses - unit conversion - Laws of Mechanics (parallelogram law, Lami's theorem, triangular law of forces), and Principle of transmissibility - Types of forces acting on a body - Equilibrium of a particle - Equivalent system of forces and computation of resultant forces.

<b>Unit 02: EQUILIBRIUM OF RIGID BODIES IN 2 DIMENSIONS</b>				<b>12 Hours</b>
Free-Body Diagrams – Types of supports and their reactions - Requirements of static equilibrium – Moments and Couples - Moment of a Force about a Point, Varignon's Theorem – Equilibrium of rigid bodies in two dimensions.				
<b>Unit 03: CENTRIGIDS AND AREA MOMENT OF INERTIA</b>				<b>12 Hours</b>
Introduction - Centroids of simple Plane Areas and Curves (rectangle, triangle, circle, hollow circle, T-section & I-section) - Area moment of inertia for rectangle, circle, hollow circle, triangle, I-Section, C- Section, and T-Section.				
<b>Unit 04: FRICTION</b>				<b>12 Hours</b>
Types of friction - laws of sliding friction - Equilibrium analyses of simple systems with sliding friction - Angle of friction - cone of friction - Equilibrium of bodies on an inclined plane - Ladder friction- Applications of friction (Qualitative treatment only).				
<b>Unit 05: KINETICS AND KINEMATICS OF PARTICLES</b>				<b>12 Hours</b>
Displacement, velocity, acceleration, and their relationship - Rectilinear and Curvilinear motion- Newton's laws of motion (fundamentals) - Work-Energy principle - introduction to Impulse and momentum - analyses of the impact of elastic bodies.				
<b>Theory: 45 Hrs</b>	<b>Tutorial: 15 Hrs</b>	<b>Practical: Hrs</b>	<b>Project:</b>	<b>Total Hours: 60 Hrs</b>
<b>TEXT BOOKS</b>				
1.	Bansal R K, "A Textbook of Engineering Mechanics"- 6 <sup>th</sup> edition, 2022, Laxmipublications (P) LTD.			
2.	R. C. Hibbler, Engineering Mechanics: Statics & Dynamics, Person Prentice hall, 14 <sup>th</sup> edition, 2017.			
3.	Kumar, K.L., "Engineering Mechanics", 4 <sup>th</sup> Revised Edition, Tata McGraw-Hill Publishing Company, New Delhi (2017).			
<b>REFERENCES</b>				
1.	S. Timoshenko, Engineering Mechanics (In SI Units) (SIE) ,5th Edition, 2017, McGraw Hill Education.			
2.	Beer, F.P and Johnston Jr. E.R., "Vector Mechanics for Engineers (In SI Units): Statics and Dynamics", 12 <sup>th</sup> Edition, Tata McGraw-Hill Publishing company, New Delhi(2019).			
3.	Irving H. Shames and Krishna Mohana Rao. G., "Engineering Mechanics – Statics and Dynamics", 4th Edition, Pearson Education (2016)			
4.	Meriam J.L. and Kraige L.G., " Engineering Mechanics- Statics' - Volume 1, & 'Dynamics' , John Wiley & Sons,(2017 & 2018)			
5.	Rajasekaran S and Sankarasubramanian G., "Engineering Mechanics Statics and Dynamics", 3rd Edition, Vikas Publishing House Pvt. Ltd., (2005).			
6.	Bhavikatti, S.S "Engineering Mechanics", 7th New Age International (P) Limited Publishers,(2019).			

U23ME202		MANUFACTURING PROCESS					L	T	P	J	C			
							3	0	0	0	3			
<b>Course Outcomes</b>														
<b>At the end of the course, the student will be able to</b>														
CO1:	Explain the major concepts of material removal process, cutting tool materials, tool wear and tool life calculations.													
CO2:	Describe the parts and working principle of centre lathe, and discriminate the special purpose lathes of capstan and turret lathe													
CO3:	Analyze and select the suitable welding process based on the different applications and identify the causes of welding defects.													
CO4:	Explain the sand casting process, pattern materials, special casting processes and calculate the pattern allowances and casting pouring time													
CO5:	Elaborate the various types of moulding processes in the manufacturing of plastic components													
<b>Pre-requisite: Nil</b>														
<b>CO/PO, PSO Mapping</b>														
(3/2/1 indicates the strength of correlation) 3-Strong, 2-Medium, 1-Weak														
COs	Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	3					3	3	3	3	3	
CO2	3	3	2	3					3	3	3	3	3	
CO3	3	3	2	3					3	3	3	3	3	
CO4	3	3	2	3					3	3	3	3	3	
CO5	3	3	2	2					3	3	3	3	3	
<b>Course Assessment methods - Theory Course</b>														
<b>Direct</b>										<b>Indirect</b>				
CIE test I (9)					Assignment / Seminar / Quiz (5) Total CIE: <b>40 marks</b> Semester End Examination: <b>60 marks</b>					Course end survey				
CIE test II (9)														
CIE test III (10)														
Objective Test (7)														
<b>Unit 01: THEORY OF METAL CUTTING</b>										<b>9 Hours</b>				
Introduction: material removal processes, nomenclature of single point cutting tool- chip formation, orthogonal cutting, oblique cutting- shear angle in orthogonal cutting- cutting tool materials, tool wear, Taylors tool life, factors affecting tool life – tool life calculations - surface finish, cutting fluids.														

<b>Unit 02: CENTRE LATHE AND SPECIAL PURPOSE LATHES</b>				<b>9 Hours</b>
Centre lathe: constructional features- various operations, tool and work holding devices- taperturning methods, special attachments, lathe machining time calculations. Capstan and turret lathes – automats –Swiss type- Geneva mechanism, bar feeding mechanism.				
<b>Unit 03: METAL JOINING PROCESS</b>				<b>9 Hours</b>
Gas welding: Types- oxy- acetylene, Flame characteristics- Arc welding: Types- Metal arc welding- TIG welding- MIG welding-Plasma arc welding- Submerged arc welding- Electro slag welding – Melting efficiency - Resistance welding: Butt- Spot- Seam welding, Heat generated calculations - Friction welding- Electron beam welding. Thermit Welding - Brazing- Soldering- Welding defects.				
<b>Unit 04: METAL CASTING</b>				<b>9 Hours</b>
Sand Casting- Moulding Tools- Types of Patterns- Pattern Materials- Pattern Allowances- Pattern Allowances Calculations- Types of Moulding Sand- Properties- Core Making- Methods of Sand Testing- Pouring time calculations- Moulding Machines: Types- Melting Furnaces: Cupola, Crucible and Electric arc furnace- Special Casting Process: Shell, Investment Casting - Lost Wax Process- Pressure Die Casting- Centrifugal Casting- CO2 Process- Sand Casting Defects- Inspection Methods.				
<b>Unit 05: MANUFACTURING OF PLASTIC COMPONENTS</b>				<b>9 Hours</b>
Types and characteristics of plastics – Moulding of thermoplastics – working principles and typical applications – injection moulding – Plunger and screw machines – Compression moulding, Transfer Moulding – Typical industrial applications – Introduction to blow moulding –Rotational moulding – Film blowing – Extrusion				
<b>Theory: 45 Hrs</b>	<b>Tutorial:</b>	<b>Practical: Hrs</b>	<b>Project:</b>	<b>Total Hours: 45 Hrs</b>
<b>TEXT BOOKS</b>				
1.	P.N. Rao, "Manufacturing Technology: Foundry, Forming, and Welding, Volume 1", McGraw-Hill Education (India) Private Limited, 5th Edition, 2018.			
2.	P.N. Rao, "Manufacturing Technology: Metal Cutting and Machine Tools, Volume 2", McGraw-Hill Education (India) Private Limited, 4th Edition, 2019.			
3.	J.P. Kaushish "Manufacturing Processes" PHI Learning Private limited, second edition 2010.			
<b>REFERENCES</b>				
1.	B.S. Magendran parashar & R.K. Mittal, "Elements of Manufacturing Processes", Prentice Hall of India, 2003.			
2.	Hajra Choudhury, "Elements of Workshop Technology, Vol. I Media Promoters & Publishers pvt ltd .2009.			

  
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U23ME203	WORKSHOP PRACTICES FOR MECHANICAL ENGINEERING								L	T	P	J	C							
									0	0	2	0	1							
<b>Course Outcomes</b>																				
At the end of the course, the student will be able to																				
CO1:	Develop a different shape of joints in fitting, and dust pan in sheet metal.																			
CO2:	Create a various joints in carpentry and integrate the metals by different arc welding process																			
CO3:	Prepare a desired shape of given work piece using Lathe machine																			
<b>Pre-requisite: Nil</b>																				
<b>CO/PO, PSO Mapping</b> (3/2/1 indicates the strength of correlation) 3-Strong, 2-Medium, 1-Weak																				
COs	Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)																			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2						
CO1	3	3	3					3	3	3	3	1	3							
CO2	3	3	3	2				3	3	3	3	3	3							
CO3	3	3	3					3	3	3	3	3	3							
<b>Course Assessment methods</b>																				
<b>Direct</b>							<b>Indirect</b>													
CIE test I (15) Quiz I- (5) CIE test II (15) Quiz II- (5)							RTPS (10) Record (10) Total CIE: <b>60 marks</b> Semester End Examination: <b>40 marks</b>							Course end survey						

## LIST OF EXPERIMENTS

### **SECTION A: FITTING**

1. Making of Vee joint and square (T-fitting) joint. 3 hours

### **SECTION B: SHEET METAL**

2. Making of Dust Pan 3 hours

### **SECTION C: CARPENTRY**

3. Making of Half Lap joint 3 hours

### **SECTION D: WELDING**

4. Exercise on Arc welding of Butt joint 2 hours  
5. Exercise on Arc welding of Lap Joint. 2 hours  
6. Exercise on TIG welding. 3 hours  
7. Exercise on MIG welding. 3 hours

### **SECTION E: LATHE**

8. Exercise on simple Facing and Turning. 2 hours  
9. Exercise on step and taper Turning. 3 hours  
10. Exercise on grooving and Thread cutting operations. 3 hours  
11. Exercise on drilling and boring. 3 hours

**Total Number of hours: 30**

Theory: 0	Tutorial: 0	Practical: 30 Hrs	Project: 0	Total Hours: 30 Hrs
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U23TAM201	தமிழரும் தொழில்நுட்பமும்	L	T	P	J	C
		1	0	0	0	1
<b>Course Outcomes</b>						
At the end of the course, the student will be able to						
CO1:	Describe the weaving and ceramic technology					
CO2:	Explain the design and construction technology					
CO3:	Analyse the manufacturing technology					
CO4:	Describe the agriculture and irrigation technology					
CO5:	Explain the Scientific Tamil and Tamil Computing					
<b>Course Assessment methods</b>						
<b>Direct</b>				<b>Indirect</b>		
CIE test I (30)	Total CIE: 100 marks			Course end survey		
CIE test II (30)	Semester End Examination: NIL					
CIE test III (40)						
<b>Unit 01: WEAVING AND CERAMIC TECHNOLOGY</b>						<b>3 Hours</b>
அலகு I <u>நெசவு மற்றும் பாணைத் தொழில்நுட்பம்:</u> சங்க காலத்தில் நெசவுத் தொழில் - பாணைத் தொழில்நுட்பம் - கரும்பு சிவப்பு பாண்டங்கள் பாண்டங்களில் கீறல் குறியீடுகள்.						
<b>Unit 02: DESIGN AND CONSTRUCTION TECHNOLOGY</b>						<b>3 Hours</b>
அலகு II <u>வடிவமைப்பு மற்றும் கட்டிடத் தொழில்நுட்பம்:</u> சங்க காலத்தில் வடிவமைப்பு மற்றும் கட்டுமானங்கள் & சங்க காலத்தில் வீட்டுப் பொருட்களில் வடிவமைப்பு- சங்க காலத்தில் கட்டுமான பொருட்களும் நடுகல்லும் - சிலப்பதிகாரத்தில் மேடை அமைப்பு பற்றிய விவரங்கள் - மாமல்லபுரம் சிற்பங்களும், கோவில்களும் - சோழர் காலத்துப் பெருங்கோயில்கள் மற்றும் பிற வழிபாட்டுத் தலங்கள் - நாயக்கர் காலக் கோயில்கள் - மாதிரி கட்டமைப்புகள் பற்றி அறிதல், மதுரை மீனாட்சி அம்மன் ஆலயம் மற்றும் திருமலை நாயக்கர் மஹால் - செட்டிநாட்டு வீடுகள் - பிரிட்டிஷ் காலத்தில் சென்னையில் இந்தோ-சாரோசெனிக் கட்டிடக் கலை.						
<b>Unit 03: MANUFACTURING TECHNOLOGY</b>						<b>3 Hours</b>
அலகு III <u>உற்பத்தித் தொழில் நுட்பம்:</u> கப்பல் கட்டும் கலை - உலோகவியல் - இரும்புத் தொழிற்சாலை - இரும்பை உருக்குதல், எஃகு - வரலாற்றுச் சான்றுகளாக செம்பு மற்றும் தங்க நாணயங்கள் - நாணயங்கள் அச்சடித்தல் - மணி உருவாக்கும் தொழிற்சாலைகள் - கல்மணிகள், கண்ணாடி மணிகள் - கடுமண் மணிகள் - சங்கு மணிகள் - எலும்புத்துண்டுகள் - தொல்லியல் சான்றுகள் - சிலப்பதிகாரத்தில் மணிகளின் வகைகள்.						
<b>Unit 04: AGRICULTURE AND IRRIGATION TECHNOLOGY</b>						<b>3 Hours</b>
அலகு IV <u>வேளாண்மை மற்றும் நீர்ப்பாசனத் தொழில் நுட்பம்:</u> அணை, ஏரி, குளங்கள், மதுகு - சோழர்காலக் குழுவித் தூம்பின் முக்கியத்துவம் - கால்நடை பராமரிப்பு - கால்நடைகளுக்காக வடிவமைக்கப்பட்ட கிணறுகள் - வேளாண்மை மற்றும் வேளாண்மைச் சார்ந்த செயல்பாடுகள் - கடல்சார் அறிவு - மீன்வளம் - முத்து மற்றும் முத்துக்குளித்தல் - பெருங்கடல் குறித்த பண்டைய அறிவு - அறிவுசார் சமூகம்.						
<b>Unit 05: SCIENTIFIC TAMIL &amp; TAMIL COMPUTING</b>						<b>3 Hours</b>
அலகு V <u>அறிவியல் தமிழ் மற்றும் கணித்தமிழ்:</u> அறிவியல் தமிழின் வளர்ச்சி - கணித்தமிழ் வளர்ச்சி - தமிழ் நூல்களை மின்பதிப்பு செய்தல் - தமிழ் மென்பொருட்கள் உருவாக்கம் - தமிழ் இணையக் கல்விக்கழகம் - தமிழ் மின் நூலகம் - இணையத்தில் தமிழ் அகராதிகள் - சொற்குவைத் திட்டம்.						

Theory: 15 Hrs	Tutorial: --	Practical: --	Project:--	Total Hours: 15 Hrs
<b>TEXT BOOKS</b>				
1.	தமிழக வரலாறு - மக்களும் பண்பாடும் - கே.கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).			
2.	கணிணித் தமிழ் - முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்). கீழடி - வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு) பொருதை - ஆற்றங்கரை நாகரிகம். (தொல்லியல் துறை வெளியீடு)			
<b>REFERENCES</b>				
3.	Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)			
4.	Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.			
5.	Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).			
6.	The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)			
7.	Keeladi - 'Sangam City Civilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)			
8.	Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by: The Author)			
9.	Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)			
10	Journey of Civilization Indus to Vaigai (R.Ramakrishna) (Published by: RMRL) – Reference Book.			

  
HOD

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U23TAM201	TAMILS AND TECHNOLOGY	L	T	P	J	C
		1	0	0	0	1
<b>Course Outcomes</b>						
At the end of the course, the student will be able to						
CO1:	Describe the weaving and ceramic technology					
CO2:	Explain the design and construction technology					
CO3:	Analyse the manufacturing technology					
CO4:	Describe the agriculture and irrigation technology					
CO5:	Explain the Scientific Tamil and Tamil Computing					
<b>Course Assessment methods</b>						
<b>Direct</b>				<b>Indirect</b>		
CIE test I (30)		Total CIE: 100 marks		Course end survey		
CIE test II (30)		Semester End Examination: NIL				
CIE test III (40)						
<b>Unit 01: WEAVING AND CERAMIC TECHNOLOGY</b>						<b>3 Hours</b>
Weaving Industry during Sangam Age – Ceramic technology – Black and Red Ware Potteries (BRW) – Graffiti on Potteries						
<b>Unit 02: DESIGN AND CONSTRUCTION TECHNOLOGY</b>						<b>3 Hours</b>
Designing and Structural construction House & Designs in household materials during Sangam Age - Building materials and Hero stones of Sangam age – Details of Stage Constructions in Silappathikaram - Sculptures and Temples of Mamallapuram - Great Temples of Cholas and other worship places - Temples of Nayaka Period - Type study (Madurai Meenakshi Temple)- Thirumalai Nayakar Mahal - Chetti Nadu Houses, Indo - Saracenic architecture at Madras during British Period.						
<b>Unit 03: MANUFACTURING TECHNOLOGY</b>						<b>3 Hours</b>
Art of Ship Building - Metallurgical studies - Iron industry - Iron smelting, steel -Copper and gold- Coins as source of history - Minting of Coins – Beads making-industries Stone beads -Glass beads - Terracotta beads -Shell beads/ bone beats - Archeological evidences - Gem stone types described inSilappathikaram.						
<b>Unit 04: AGRICULTURE AND IRRIGATION TECHNOLOGY</b>						<b>3 Hours</b>
Dam, Tank, ponds, Sluice, Significance of Kumizhi Thoempu of Chola Period, Animal Husbandry - Wells designed for cattle use - Agriculture and Agro Processing - Knowledge of Sea - Fisheries – Pearl - Conche diving - Ancient Knowledge of Ocean - Knowledge Specific Society						
<b>Unit 05: SCIENTIFIC TAMIL &amp; TAMIL COMPUTING</b>						<b>3 Hours</b>
Development of Scientific Tamil - Tamil computing – Digitalization of Tamil Books – Development of Tamil Software – Tamil Virtual Academy – Tamil Digital Library – Online Tamil Dictionaries –Sorkuvai Project						
Theory: 15 Hrs		Tutorial: --	Practical: --	Project:--	Total Hours: 15 Hrs	
<b>TEXT BOOKS</b>						
1.	தமிழக வரலாறு - மக்களும் பண்பாடும் - கே.கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).					
2.	கணினித் தமிழ் - முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்). கீழ்க் -வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு) பொருநை - ஆற்றங்கரை நாகரிகம். (தொல்லியல் துறை வெளியீடு)					

**REFERENCES**

1.	Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
2.	Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies).
3.	Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
4.	The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
5.	Keeladi - 'Sangam City Civilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
6.	Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by: The Author)
7.	Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
8.	Journey of Civilization Indus to Vaigai (R.Ramakrishna) (Published by: RMRL) – Reference Book.



HOD

**Dr. M.RENUGA,**  
**Professor & Head,**Department of Humanities & Languages,  
College of Technology,  
LEM - 600 005.

U23GE201	BASIC APTITUDE-II (Common to All Departments)	L	T	P	J	C
		2	0	0	0	0

### Course Outcomes

At the end of the course, the student will be able to

CO1:	Solve the problems in Percentage, Conversion of Percentage to Ratio and Ratio into Percentage and work on verbal aptitude questions
CO2:	Elucidate the problems in Profit and loss and percentage of profit and loss. Choose appropriate sentence fillers and Idioms and phrase
CO3:	Crack the problems involving Geometry, Area, Perimeter/Circumference, Surface area and Volume. Comprehend the given passages for Reading Comprehension activity and answer the questions correctly.
CO4:	Deduce the problems involving Trigonometry and exhibit good expertise in detecting errors in the given sentences.
CO5:	Interpret the problems on Ages & logarithm and work on logical reasoning and demonstrate good vocabulary skill by spotting errors.

### Pre-requisite:

- Basic English language and Grammar knowledge
- Knowledge in Basic Mathematics

### CO/PO, PSO Mapping

(3/2/1 indicates the strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	2	1	1	1	3	3	3	2	3
CO2	3	3	3	2	1	1	1	3	3	3	2	3
CO3	3	3	3	2	1	1	1	3	3	3	2	3
CO4	3	3	3	2	1	1	1	3	3	3	2	3
CO5	3	3	3	2	1	1	1	3	3	3	2	3

### Course Assessment methods

Direct		Indirect
CIE test I (30) - Theory	Total CIE: 100 marks Semester End Examination – NIL	Course end survey
CIE test II (30) - Theory		
CIE test III (40) – Theory		

<b>Unit 01</b>				<b>6 Hours</b>	
<b>Percentage:</b> Conversion of a Percentage into a Fraction – Conversion of a Percentage into a Ratio – Conversion of a Ratio into a Percentage - Percentage Change – Successive percentage – Problems					
<b>Verbal Aptitude:</b> Jumbled sentences & Reconstructions of sentences (PQRS)					
<b>Unit 02</b>				<b>6 Hours</b>	
<b>Profit Loss:</b> Types of prices – Profit – Loss – Percentage of Profit and Loss - Common Gain or Loss – Selling Price and Cost Price Equality – Successive Profit and Loss – Problems					
<b>Verbal Aptitude:</b> Sentence fillers two words & Idioms and phrase					
<b>Unit 03</b>				<b>6 Hours</b>	
<b>Geometry:</b> Angles – Complementary and Supplementary angles – Lines – Triangle – Types of triangles – Properties of Triangles – Problems					
<b>Area, Perimeter / Circumference:</b> Triangles - Rectangles and Squares – Parallelogram, Rhombus and Trapezium – Circles – Problems					
<b>Surface area, curved surface area &amp; Volume:</b> Cuboid – Cube – Right circular cylinder – Right circular cone – Sphere – Hemisphere– Problems					
<b>Verbal Aptitude:</b> Reading comprehension.					
<b>Unit 04</b>				<b>6 Hours</b>	
<b>Trigonometry:</b> Value of Trigonometry ratios for particular values – Sign of Trigonometrical ratios – Trigonometrical ratios for sum or difference of angles Problems					
<b>Verbal Aptitude:</b> Spotting errors					
<b>Unit 05</b>				<b>6 Hours</b>	
Averages – Problems on ages – Logarithm - <b>Logical Reasoning:</b> Alpha Series – Venn diagram – Problems					
<b>Verbal Aptitude:</b> Writing captions for given pictures.					
<b>Theory: 30 Hrs</b>		<b>Tutorial: 0</b>	<b>Practical: 0</b>	<b>Project: 0</b>	<b>Total Hours: 30 Hrs</b>
<b>TEXT BOOKS</b>					
1.	S.Chand and Dr.R.S.Aggarwal, “Quantitative Aptitude for competitive examinations”, S Chand and Company Limited 2019.				
2.	Nishit K.Sinha, “Logical Reasoning and Data Interpretation”, Pearson 2021.				

*S. Anita*  
6/02/2024

**Dr.S.Anita**  
**Professor & Head**  
**Department of Training**  
**Dr. S. ANITA**  
**Professor and Head**  
**Department of Training,**  
**SONA COLLEGE OF TECHNOLOGY,**  
**SALEM-636 005.**

U23OL1201	French - II				L	T	P	J	C
					1	0	0	0	1
<b>Course Outcomes</b>									
<b>At the end of the course, the student will be able to</b>									
CO1:	Accept and refuse of an invitation, give some instruction of do's and don'ts, converse in commercial centres, write an invitation								
CO2:	Describe a city, locate a place in a city, ask further details, describe one's hometown								
CO3:	Talk about things around us, recite a past event, identify sign boards, express agree and disagree, express obligation and prohibition, sell an object in online								
CO4:	Talk about one's goals, express one's feelings, write a list of things to do, express an opinion, talk about weather, draft a mail response								
CO5:	Express one's interest and wish, describe a pet animal, express one's aversions, encourage others, write to ask for a help, narrate a past event, write a biography								
<b>Course Assessment methods</b>									
<b>Direct</b>					<b>Indirect</b>				
CIE test I (30)			Total CIE: 100 marks		Course end survey				
CIE test II (30)			Semester End Examination: NIL						
CIE test III (40)									
<b>Unit 01:</b>							<b>3 Hours</b>		
Hr 2: City shopping and services, conjugation: payer, manger and acheter, negative sentence									
Hr 4: Imperative sentence, food and beverages, utensils, cutleries, corckeries									
Hr 6: Quantitative articles, quantities, pronoun 'en', express appreciation, write an invitation									
<b>Unit 02:</b>							<b>3 Hours</b>		
Hr 8: City and localities, Conjugation: prendre, adjectives of place, pronoun 'y'									
Hr 10: Transport, leisure activities, preposition of place, degrees of comparison									
Hr 12: Asking information about a new place, describe a city									
<b>Unit 03:</b>							<b>3 Hours</b>		
Hr 14: Things in a store, conjugation : faire, imparfait 2, passé composé									
Hr 16: Things in a repairing shop, computer, relative pronouns: que and qui									
Hr 18: Imperative negative, express obligation and interdiction, online sale and response									
<b>Unit 04:</b>							<b>3 Hours</b>		
Hr 20: Professions, conjugation: croire, voir, recent past tense									
Hr 22: Traveling formalities, expressing about health condition, future tense									
Hr 24: Pronoun COD, talk about weather condition, write about one's plans and projections									
<b>Unit 05:</b>							<b>3 Hours</b>		
Hr 26: Citizenship and solidarity, conjugation: connaitre and savoir, depuis vs pendant									
Hr 28: Imparfait vs passé composé, nature and environment, indirect pronouns COI									
Hr 30: Animals, conditional, talk on supporting others, write a biography									
<b>Theory: 15 Hrs</b>		<b>Tutorial: --</b>		<b>Practical: --</b>		<b>Project:--</b>		<b>Total Hours: 15 Hrs</b>	
<b>TEXT BOOKS</b>									
1.	The course faculty will provide relevant audios, videos, handouts and notes.								
2.	Books : Saison (Méthode de français, cahier d'activités)								
3.	Reference books : La conjugaison, Dondon, Echo								

M. Renuga  
13/2/24  
HOD

**Dr. M. RENUGA,**  
Professor & Head,  
Department of Humanities & Languages,  
Sona College of Technology,  
SALEM

U23OL1202	German - II				L	T	P	J	C
					1	0	0	0	1
<b>Course Outcomes</b>									
At the end of the course, the student will be able to									
CO1:	Use grammatical expressions appropriately in day-to-day conversation.								
CO2:	Make them frame simple sentences /questions.								
CO3:	Accentuate to start and sustain basic conversation								
CO4:	Helps them articulate thoughts in German								
CO5:	Identify the different forms of the verb								
<b>Course Assessment methods</b>									
<b>Direct</b>					<b>Indirect</b>				
CIE test I (30) CIE test II (30) CIE test III (40)			Total CIE: 100 marks Semester End Examination: NIL		Course end survey				
<b>Unit 01:</b> Nominative/accusative case, adjectives							3 Hours		
<b>Unit 02:</b> Modes of transportation, orientation, giving/understanding simple directions							3 Hours		
<b>Unit 03:</b> • Food and beverages, Modal verbs, Separable verbs							3 Hours		
<b>Unit 04:</b> • Simple sentences using modal / separable verbs							3 Hours		
<b>Unit 05:</b> • Articles of clothing							3 Hours		
Theory: 15 Hrs		Tutorial: --		Practical: --		Project:--		Total Hours: 15 Hrs	
<b>TEXT BOOKS</b>									
1.	Netzwerk A1								

*M. Renuga*  
HOD 13/12/2023

**Dr. M.RENUGA,**  
**Professor & Head,**  
Department of Humanities & Languages,  
Sona College of Technology,  
SALEM - 636 :

U23OL1203	Japanese - II				L	T	P	J	C
					1	0	0	0	1
<b>Course Outcomes</b>									
<b>At the end of the course, the student will be able to</b>									
CO1:	Use verbs in polite conversation or for dissuasion and describe two different activities								
CO2:	Demonstrate the application of causative verbs and those that express ability or possibility, and describe experiences								
CO3:	Use plain-style expressions, those that state opinions, and verbs and adjectives that go with nouns								
CO4:	Express sentences that use 'when' and 'if' and those that describe how services are given and received								
CO5:	Read 126 letters of Kanji, and demonstrate adequate knowledge of the lessons learnt in Levels I and II to pass the Japanese Language Proficiency Test (JLPT) for the N5 Level								
<b>Course Assessment methods</b>									
<b>Direct</b>					<b>Indirect</b>				
CIE test I (30)					Total CIE: 100 marks Semester End Examination: NIL Course end survey				
CIE test II (30)									
CIE test III (40)									
<b>Unit 01:</b>								<b>3 Hours</b>	
Hr 1-2: Words and verbs expressing requests / Kanji 1-10									
Hr 3-4: Asking for permission; making statements to prohibit something / Kanji 11-20									
Hr 5-6: Describing two activities / Kanji 21-30									
<b>Unit 02:</b>								<b>3 Hours</b>	
Hr 7-8: Verbs that express 'I have to ...' / Kanji 31-40									
Hr 9-10: Verbs which express ability or possibility / Kanji 41-50									
Hr 11-12: Describing experience / Kanji 51-60									
<b>Unit 03:</b>								<b>3 Hours</b>	
Hr 13-14: Plain-style expressions / Kanji 61-70									
Hr 15-16: Expressions like 'I think that ...' / Kanji 71-80									
Hr 17-18: Qualifying nouns with verbs and adjectives / Kanji 81-90									
<b>Unit 04:</b>								<b>3 Hours</b>	
Hr 19-20: Expressions using 'When ...' / Kanji 91-100									
Hr 21-22: Describing the giving and receiving of services / Kanji 101-110									
Hr 23-24: Expressions using 'If ...' / Kanji 111-126									
<b>Unit 05:</b>								<b>3 Hours</b>	
Hr 25-26: Preparing for JLPT N5									
Hr 27-28: Preparing for JLPT N5									
Hr 29-30: Preparing for JLPT N5									
<b>Theory: 15 Hrs</b>		<b>Tutorial: --</b>		<b>Practical: --</b>		<b>Project:--</b>		<b>Total Hours: 15 Hrs</b>	
<b>TEXT BOOKS</b>									
1.	The course faculty will provide handouts / notes / course material.								
2.	Books on Basic Japanese language available in the college library.								

HOD

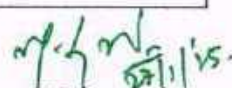
**Dr. M. RENUGA,**  
Professor & Head,  
Department of Humanities & Languages,  
Sona College of Technology,

U23OL1204		Korean - II			L	T	P	J	C
					1	0	0	0	1
<b>Course Outcomes</b>									
At the end of the course, the student will be able to									
CO1:	Identify time								
CO2:	Identify the date and days of the week								
CO3:	Explain location and places								
CO4:	Explain destination								
CO5:	Construct simple sentences / questions.								
<b>Course Assessment methods</b>									
<b>Direct</b>					<b>Indirect</b>				
CIE test I (30)			Total CIE: 100 marks Semester End Examination: NIL		Course end survey				
CIE test II (30)									
CIE test III (40)									
Unit 01: Time						3 Hours			
Talking about time									
Unit 02: Date						3 Hours			
Talking about dates and days of the week Talking about doing something in the past									
Unit 03: Location						3 Hours			
Talking about location Talking about doing something at a location									
Unit 04: Direction						3 Hours			
Talking about directions									
Unit 05: Future						3 Hours			
Talking about doing something in the future Talking about plans for the future Talking about hope for the future									
Theory: 15 Hrs		Tutorial: --		Practical: --		Project:--		Total Hours: 15 Hrs	
<b>REFERENCES</b>									
1	Vitamin Korean - 1								

  
 13/2/24  
 HOD

**Dr. M. RENUGA,**  
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 Department of Humanities & Languages,  
 Sona College of Technology,  
 SALEM - 636 002.

U23OL1205	Hindi - II		L	T	P	J	C
			1	0	0	0	1
<b>Course Outcomes</b>							
<b>At the end of the course, the students will be able to</b>							
CO1:	Write Tenses and Self – Introduction						
CO2:	Write Hindi numbers & sentence Translations						
CO3:	Read and Write comprehension question & days of the week						
CO4:	Read and frame sentences ( Story ) & part of the body						
CO5:	Communicate effectively using tenses ( Conversation )						
<b>Course Assessment methods</b>							
<b>Direct</b>				<b>Indirect</b>			
CIE test I (30)	Total CIE: 100 marks			Course end survey			
CIE test II (30)	Semester End Examination: NIL						
CIE test III (40)							
Unit 01:	Tenses and Self – Introduction					3 Hours	
Learning Hindi pronunciation Speaking based on Tenses ( Present, past & future ) Reading Writing							
Unit 02:	Hindi Numbers & Sentence Translations					3 Hours	
Reading Writing Letters pronunciation Meanings learning							
Unit 03:	Comprehension question & Days of the week					3 Hours	
Reading & analysing the meaning Learning							
Unit 04 :	Story and Part of the body					3 Hours	
Words meaning Reading & Writing Sentence framing							
Unit 05 :	Conversation and Colours name					3 Hours	
Conversation between a boy and Doctor Coersation between Taxi driver and Passenger							
<b>Theory: 15 Hrs</b>		<b>Tutorial: --</b>		<b>Practical: --</b>		<b>Project:--</b>	
<b>Total Hours: 15 Hrs</b>							
<b>REFERENCES</b>							
1	Diploma in Hindi (department of higher education, Delhi)						
2	Hindi Prachara sabha exam books ( Prathamc and Madhyama )						

  
HOD

**Dr. M.RENUGA,**  
**Professor & Head,**  
Department of Humanities & Languages,  
Sona College of Technology,  
SALEM - 636 005.


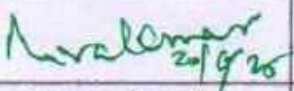
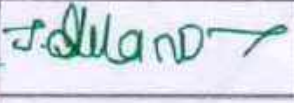

Mech  
III

**Sona College of Technology, Salem**  
(An Autonomous Institution)  
**Courses of Study for B.E/B.Tech. Semester III under Regulations 2023 (CBCS)**  
Branch: Mechanical Engineering

S.No	Course Code	Course Title	L	T	P	J	C	Category	Total Contact hours	Course Type*
<b>Theory courses</b>										
1.	U23MAT301D	Probability and Statistics	3	1	0	0	4	BS	60	TT
2.	U23ME301	Engineering Thermodynamics	3	0	0	0	3	PC	45	T
3.	U23ME302	Fluid Mechanics and Machinery	3	0	2	0	4	PC	75	TL
4.	U23ME303	Conventional and Modern Manufacturing	3	0	2	0	4	PC	75	TL
5.	U23ME304	Instrumentation and Control Systems	3	0	0	0	3	ES	45	T
6.	U23ME305	Kinematics of Machines	3	0	0	0	3	PC	45	T
7.	noc25-mg106	NPTEL Design Thinking - A Primer	1	0	0	0	1	ES	15	T
8.	U23GE302	<b>Audit Course:</b> Environment and Climate Science	2	0	0	0	0	AC	30	T
<b>Practical courses</b>										
9.	U23GE301	Soft Skills and Aptitude-I	0	0	2	0	1	EEC	30	L
<b>Total Credits</b>							23			

\*T- Theory, TT- Theory with Tutorial, TL- Theory with Laboratory, TP- Theory with Project, TLP- Theory with Laboratory and Project, L-Laboratory, LT- Laboratory with Theory, LP- Laboratory with Project, P-Project.

Approved By

			
Chairperson, Mechanical Engineering BoS	Member Secretary, Academic Council	Dean-Academics	Chairperson, Academic Council & Principal
Dr.D.Senthilkumar	Dr.R.Shivakumar	Dr..J.Akilandeswari	Dr.S.R.R.Senthil Kumar

Copy to:-

HOD/ Mechanical Engineering, Third Semester B.E. Mechanical Students and Staff, COE

SEMESTER - III	PROBABILITY AND STATISTICS (CSE / BME / MECH/ EXE)										L	T	P	J	C
U23MAT301D											3	1	0	0	4
<b>COURSE OUTCOMES</b>															
At the end of the course, the student will be able to															
<b>CO1:</b>	apply the concepts of measures of central tendency, dispersion to the given data and analyze the results.														
<b>CO2:</b>	compute simple and partial correlation coefficients and analyze regression equations for estimation and prediction purposes.														
<b>CO3:</b>	apply the concepts of random variables and their properties to generate the moments.														
<b>CO4:</b>	fit the suitable distribution and its properties to the real world problems and interpret the results.														
<b>CO5:</b>	apply the concepts of joint probability distribution and its properties to find the covariance.														
<b>Pre-requisites:</b>															
<ul style="list-style-type: none"> <li>Fundamentals of elementary algebra</li> <li>Fundamentals of calculus</li> </ul>								<ul style="list-style-type: none"> <li>Fundamentals of trigonometry</li> <li>Fundamentals of geometry</li> </ul>							
<b>CO/PO, PSO Mapping</b>															
(3/2/1 indicates the strength of correlation) 3-Strong, 2-Medium, 1-Weak															
<b>COs</b>	Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3 (CSE)
CO1	3	3	3	3	3						2	2	2		2
CO2	3	3	3	3	3						2	2	2		2
CO3	3	3	3	3	3						2	2	2		2
CO4	3	3	3	3	3						2	2	2		2
CO5	3	3	3	3	3						2	2	2		2
<b>COURSE ASSESSMENT METHODS</b>															
<b>DIRECT</b>										<b>INDIRECT</b>					
CIE test I (9) CIE test II (9) CIE test III (10) Objectives Test (7)					Assignment/Quiz/Seminar (5) Total CIE: 40 marks Semester End Examination: 60marks					Course end survey					
<b>Unit 01</b>	<b>MEASURES OF CENTRAL TENDENCY AND DISPERSION</b>											<b>12 Hours</b>			
Measures of central tendency (simple arithmetic mean, median, mode) – Quartiles – Measures of dispersion - Absolute and relative measures (range, inter-quartile range, quartile deviation, mean deviation about mean, standard deviation, coefficient of variation) .															
<b>Unit 02</b>	<b>CORRELATION AND REGRESSION</b>											<b>12 Hours</b>			
Simple and rank correlations – Multiple and partial correlations – Linear regression – Relation between simple correlation and regression - Curve fitting (straight line and parabola).															
<b>Unit 03</b>	<b>ONE DIMENSIONAL RANDOM VARIABLE</b>											<b>12 Hours</b>			
One dimensional random variable – Discrete random variable – Distribution function of the discrete random variable –Probability mass function– Properties– Continuous random variable– Distribution function of the continuous random variable – Probability density function –Properties –Moments – Mathematical expectations– Moment generating function and its properties.															

<b>Unit 04</b>	<b>THEORETICAL DISTRIBUTIONS</b>	<b>12 Hours</b>
Discrete distributions- Binomial distributions- Additive property, moment generating function, mean, variance and standard deviation of binomial distribution- Poisson distribution - Additive property, moment generating function, mean, variance and standard deviation of Poisson distribution - Poisson distribution as limiting form of binomial distribution (Statement only)- Geometric distribution- Memoryless property, moment generating function, mean, variance and standard deviation of Geometric distribution- Continuous distribution- Uniform distribution- moment generating function, mean, variance and standard deviation of Uniform distribution- Exponential distribution- Memoryless property, moment generating function, mean, variance and standard deviation of exponential distribution- Normal distribution- Additive property, moment generating function, mean, variance and standard deviation of Normal distribution (without derivation)- Normal distribution as limiting form of binomial distribution (Statement only)-Problems based on real time applications in discrete and continuous distributions.		
<b>Unit 05</b>	<b>TWO DIMENSIONAL RANDOM VARIABLES</b>	<b>12 Hours</b>
Two dimensional discrete random variables – Joint probability distributions of discrete random variables- Marginal and conditional probability distributions- Two dimensional continuous random variables- Joint probability density function- Joint probability distribution function for continuous two dimensional random variables- Marginal and conditional density functions- Covariance- Correlation.		
Theory: <b>45 Hours</b>	Tutorial: <b>15 Hours</b>	Practical:-- Project:-- Total: <b>60 Hours</b>
<b>TEXT BOOKS:</b>		
1.	S. C. Gupta and V. K. Kapoor, "Fundamentals of Mathematical Statistics", Sultan Chand and Sons Publishers, 11 <sup>th</sup> Revised Edition, 2019.	
2.	T. Veerarajan, "Probability, Statistics and Random Processes with Queuing Theory and Queuing Networks", McGraw Hill Publishers, 4 <sup>th</sup> Edition, 7 <sup>th</sup> Reprint, 2018.	
<b>REFERENCE BOOKS:</b>		
1.	R. A. Johnson and C. B. Gupta, "Miller and Freund's, Probability and Statistics for Engineers", Pearson Publishers, 9 <sup>th</sup> Edition, 2018.	
2.	S. Ross, "A First Course in Probability", Pearson Publishers, 9 <sup>th</sup> Edition, 2019.	
3.	S. P. Gupta, "Statistical Methods", Sultan Chand and Sons Publishers, 46 <sup>th</sup> Edition, 2023.	
B.E/B. TECH REGULATIONS 2023		HEAD OF THE DEPARTMENT OF MATHEMATICS
S&H BoS DATE:22-06-2024		

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U23ME301	ENGINEERING THERMODYNAMICS	L	T	P	J	C
		3	0	0	0	3

**Course Outcomes**

At the end of the course, the student will be able to

CO1:	Discuss the thermodynamic properties of system and apply the first law of thermodynamics to solve engineering problems.
CO2:	Apply the Second law of thermodynamics and entropy principle to various processes.
CO3:	Determine the thermodynamic properties of pure substance in flow and non-flow processes.
CO4:	Compare the ideal and real gases and its appropriate thermodynamic relations.
CO5:	Compute the Psychrometric properties of air and analyze the Psychrometric processes in real time applications.

**Pre-requisite: Engineering Mathematics, Engineering Physics**

**CO/PO, PSO Mapping**

(3/2/1 indicates the strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	P09	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2										2	
CO2	3	3	2	2									2	
CO3	3	3	2										2	
CO4	3	3	2										1	
CO5	3	3	2	2									2	

**Course Assessment methods**

Direct		Indirect
CIE test I (9)	Objectives Test (7) Total CIE: 40 marks Semester End Examination: 60 marks	Course end survey
CIE test II (9)		
CIE test III (10)		
Assignment/seminar/Quiz (5)		

**Unit 01: BASIC CONCEPTS AND FIRST LAW OF THERMODYNAMICS**

**9 Hours**

Basic concepts - macroscopic and microscopic approach, Thermodynamic system - classification, Properties of system- state, path, process and cycle, Concept of Quasi static process, thermodynamic equilibrium - Forms of Work and Heat interaction - Sign Convention, Zeroth law of thermodynamics- temperature scales, First Law of Thermodynamics, Constant Volume and Constant Pressure Specific Heats - Internal Energy, Enthalpy, application of first law to non-flow processes and steady flow systems.

**Unit 02: SECOND LAW OF THERMODYNAMICS AND CONCEPTS OF ENTROPY**

**9 Hours**

Kelvin-Planck and Clausius Statements of the Second Law - Heat Engine, Heat pump and Refrigerator - Equivalence of Kelvin-Planck and Clausius statement-Reversibility and irreversibility - Causes of

Irreversibility - Carnot Cycle - Carnot theorem - Thermodynamic Temperature Scale.				
Clausius Inequality - Entropy - A property - Entropy change in reversible process - Principle of Increase of Entropy - availability (theory only). Third law of thermodynamics-statement.				
<b>Unit 03: PROPERTIES OF PURE SUBSTANCE</b>				<b>9 Hours</b>
Properties of pure substance, thermodynamic properties of pure substance in solid, liquid and vapour phases, phase rule, p-v, p-T, T-v, T-s, h-s diagrams. p-v-T surface. Formation of steam and its thermodynamic properties- Use of Steam Table and Mollier Chart - Calculations of work done and heat transfer in non flow and flow processes - Determination of steam quality-Simple Rankine cycle.				
<b>Unit 04: IDEAL AND REAL GASES, THERMODYNAMIC RELATIONS</b>				<b>9 Hours</b>
Ideal and real gases - Equations of state for ideal and real gases- van der Waal's relation-Reduced properties. Compressibility factor-Principle of Corresponding states, Generalized Compressibility Chart and its use. Exact differential, Maxwell relations, Tds Equations, Difference and ratio of heat capacities, Joule-Thomson Coefficient, Clausius Clapeyron equation.				
<b>Unit 05: PSYCHROMETRY</b>				<b>9 Hours</b>
Psychrometric properties, Psychrometric charts. Property calculations of air vapour mixtures by using chart and expressions. Psychrometric process - adiabatic saturation, sensible heating and cooling, humidification, dehumidification, evaporative cooling and adiabatic mixing.				
<b>Theory: 45 Hrs</b>	<b>Tutorial: -</b>	<b>Practical: -</b>	<b>Project:-</b>	<b>Total Hours: 45 Hrs</b>
(Use of Steam tables, Mollier chart and Psychrometric charts are permitted)				
<b>TEXT BOOKS</b>				
1.	Cengel, "Thermodynamics – An Engineering Approach" 10th Edition, Tata McGraw Hill, New Delhi, 2023.			
2.	Domkundwar, Kothandaraman, "A course in Thermal Engineering", 6 <sup>th</sup> edition, Dhanpat Rai & Co (P) Ltd. 2016.			
3.	Chattopadhyaya, P. "Engineering Thermodynamics", Oxford university press, New Delhi, 2016.			
<b>REFERENCES</b>				
1.	Nag.P.K., "Engineering Thermodynamics", 6 <sup>th</sup> Edition Tata McGraw-Hill, New Delhi, 2017.			
2.	Sonntag, R.E., Borgnakke, C., and Van Wylen, G.J., "Fundamentals of Thermodynamics", 7th ed., John Wiley, 2015.			
3.	Michael J Moran, Howard N. Shapiro, Daisie D. Boettner, Margaret B. Baily, "Fundamentals of Engineering Thermodynamics" 8th Edition, John Wiley & sons, 2014			
4.	Holman.J.P., "Thermodynamics", 4th Ed. McGraw-Hill, 2008.			
5.	Arora C.P, "Thermodynamics", Tata McGraw-Hill, New Delhi, 2004.			

V. Ravi Kumar  
7/1/2025

  
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U23ME302	FLUID MECHANICS AND MACHINERY	L	T	P	J	C
		3	0	2	0	4

**Course Outcomes**

At the end of the course, the student will be able to

CO1:	Apply and critically evaluate the properties of fluids and pressure measurement techniques to solve complex engineering problems.
CO2:	Analyse the fluid flow problems using continuity equation and Bernoulli's equation with their applications.
CO3:	Distinguish laminar and turbulent flow through circular pipes and estimate power transmission through pipes.
CO4:	Solve the real time problems with help of dimensional analysis by using Buckingham's $\Pi$ theorem.
CO5:	Analyse the performance of hydraulic turbines and pumps.

**Pre-requisite: Engineering Mathematics, Engineering Physics**

**CO/PO, PSO Mapping**

(3/2/1 indicates the strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2										2	2
CO2	3	3	3										2	2
CO3	3	3	3										2	2
CO4	3	3	3										2	2
CO5	3	3	3										2	2

**Course Assessment methods- Theory with Laboratory Course**

Direct	Indirect
CIE test I (10)-Theory CIE test II (10)-Theory CIE test III (10)-Theory CIE test IV (15)-Laboratory	Assignment/seminar/Quiz (5) Total CIE: (50 marks) Semester End Examination: 50 marks [SEE-Theory(35 marks), Lab(15 marks)]
	Course end survey

**Unit 01: FLUID PROPERTIES AND PRESSURE MEASUREMENT**

**T:9 Hours**

Definitions – Fluid - Properties of fluids- mass density, specific weight, specific volume, specific gravity, viscosity, compressibility, surface tension, capillarity, vapour pressure, cavitation - Pressure measurement-

manometry, buoyancy, stability of floating bodies, forces on submerged bodies.				
<b>Unit 02: FLUID KINEMATICS AND DYNAMICS</b>				<b>T:9 Hours</b> <b>P: 6 Hours</b>
Types of fluid flow - application of continuity equation, Continuity equations in Cartesian coordinates. Euler's equation of motion along streamline, Bernoulli's equation, and its applications- Orifice meter, Venturimeter, Pitot tube. Practical (Only for practical examination): Determination of the Coefficient of discharge of given Orifice meter and Venturi meter; Determination of velocity of air using pitot tube.				
<b>Unit 03: FLOW THROUGH PIPES</b>				<b>T: 9 Hours</b> <b>P:6 Hours</b>
Laminar flow through circular pipes – Hagen Poiseuille equation - Boundary layer concept- Turbulent flow through circular pipes - Darcy Weisbach equation – friction factor - Moody diagram - Energy losses, pipes in series and parallel - Power transmission through pipes. Practical (Only for practical examination): Determination of friction factor for a given set of pipes; Determination of minor losses for a given set of pipes.				
<b>Unit 04: DIMENSIONAL ANALYSIS</b>				<b>T:9 Hours</b>
Need for dimensional analysis – methods of dimensional analysis – Buckingham's $\Pi$ -theorem, Dimensionless parameters - application of dimensionless parameters. Models and Similitude - Model laws.				
<b>Unit 05: HYDRAULIC TURBINES AND PUMPS</b>				<b>T: 9 Hours</b> <b>P: 18 Hours</b>
Hydraulic turbines-classification and working principle. Pelton wheel turbine -Francis turbine-Kaplan turbine- Velocity triangle-work done- Efficiencies- Performance calculations. - Centrifugal pumps- working principle – work done by the impeller – performance curves – Reciprocating pump- working principle – comparison.  Practical (Only for practical examination): Conducting experiments and drawing the characteristic curves of Pelton wheel, Francis turbine and Kaplan turbine; Conducting experiments and drawing the characteristic curves of centrifugal pump and reciprocating pump.				
<b>Theory: 45 Hrs</b>	<b>Tutorial:</b>	<b>Practical:30 Hrs</b>	<b>Project:</b>	<b>Total Hours: 75 Hrs</b>
<b>TEXT BOOKS</b>				
1.	Sukumar Pati., "Fluid Mechanics and Hydraulics Machines", Tata McGraw Hill publications (P) Ltd, New Delhi, 2015.			
2.	Bansal, R.K., "Fluid Mechanics and Hydraulics Machines," (9th edition), Laxmi publications (P) Ltd, New Delhi, 2017.			
<b>REFERENCES</b>				
1.	C.S.P.Ojha, R.Berndtsson, P.N.Chandramouli., "Fluid Mechanics and Machinery," Oxford University Press, New Delhi, 2010			
2.	Modi P.N. and Seth, S.M. "Hydraulics and Fluid Mechanics", Standard Book House 20th edition, New Delhi 2015.			

3.	Streeter, V. L. and Wylie E. B., "Fluid Mechanics", McGraw Hill Publishing Co. 2010.9th edition.
4.	Kumar K. L., "Engineering Fluid Mechanics", Eurasia Publishing House(p) Ltd., New Delhi 2004.
5.	Ramamritham. S, "Hydraulics, Fluid Mechanics and Fluid Machines," Dhanpat Rai & Sons, Delhi, edition 2012.

**LIST OF EXPERIMENTS**

1.	Determination of the Coefficient of discharge of given Orifice meter.
2.	Determination of the Coefficient of discharge of given Venturi meter.
3.	Determination of friction factor for a given set of pipes.
4.	Determination of minor losses for a given set of pipes.
5.	Determination of velocity of air using pitot tube.
6.	Conducting experiments and drawing the characteristic curves of Pelton wheel.
7.	Conducting experiments and drawing the characteristics curves of Francis turbine.
8.	Conducting experiments and drawing the characteristic curves of Kaplan turbine.
9.	Conducting experiments and drawing the characteristic curves of centrifugal pump.
10.	Conducting experiments and drawing the characteristic curves of Reciprocating pump.

  
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U23ME303	CONVENTIONAL AND MODERN MANUFACTURING	L	T	P	J	C
		3	0	2	0	4

**Course Outcomes**

At the end of the course, the student will be able to

CO1:	Acquire knowledge about principle of special machine tools and its operating mechanisms and produce various components from different machining methods.
CO2:	Demonstrate the working of various bulk deformation processes involving drawing, forging, rolling, and extrusion process.
CO3:	Acquire knowledge and analyse the various components of CNC machines and programming.
CO4:	Classify additive manufacturing process and identify suitable RP process for product manufacturing.
CO5:	Enhance and adopt advanced machining knowledge towards product development.

**Pre-requisite: Manufacturing Process, Workshop Practices laboratory**

**CO/PO, PSO Mapping**

(3/2/1 indicates the strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	1		2					3	3		2	3	2
CO2	3	1										2	3	
CO3	3	1		2						3		2	3	3
CO4	3	3	3	3	3				3	3		2	3	3
CO5	3	2			3					3		2	3	3

**Course Assessment methods- Theory with Laboratory Course**

Direct		Indirect
CIE test I (10 marks) - Theory	Assignment/seminar/Quiz (5 marks)	Course end survey
CIE test II (10 marks) - Theory	Total CIE: (50 marks)	
CIE test III (10 marks) - Theory	Semester End Examination: (50 marks)	
CIE test IV (15 marks) - Laboratory	[SEE - Theory (35 marks), Lab (15 marks)]	

**Unit 01: SPECIAL MACHINE TOOLS**

**T:9 Hours  
P: 18 Hours**

**Theory:** Construction, Types, Operations and mechanisms of Shaper, Planner, Slotter and Broaching, Operations: drilling, Reaming, Boring- Tapping. Milling operations-types of milling cutter. Gear: cutting, forming, milling, hobbing. Grinding: cylindrical grinding, surface grinding, Centre less grinding – honing, lapping and buffing.

<b>Practical (Only for practical examination):</b> Exercises on Milling machine (Vertical and Horizontal), Shaper, Grinding (Surface, Cylindrical), Slotting and Capstan Lathe.				
<b>Unit 02: BULK DEFORMATION PROCESSES</b>				<b>9 Hours</b>
Hot and Cold working Process- <b>Rolling:</b> Type of rolling mills- Process, <b>Drawing Process:</b> Wire drawing, Tube drawing, <b>Extrusion:</b> Direct and Indirect, Defects in rolling parts, <b>Forging Process:</b> Open and closed die forging, <b>Sheet metal:</b> Metal Spinning, Embossing, Coining, hydro forming, Rubber pad forming, and Explosive forming.				
<b>Unit 03: CNC MACHINE TOOLS</b>				<b>T:9 Hours P:6 Hours</b>
Evolution of CNC Technology, CNC and DNC concept, CNC Machine building, Classification- Open loop and closed loop control, guide ways – Friction, Anti friction and other types of guide ways, Automatic Tool Changer, Coordinate system, G & M Codes, CNC part programming for turning and Milling- examples.				
<b>Practical (Only for practical examination):</b> Simulation of CNC part programming for simple turning and milling.				
<b>Unit 04: DIGITAL MANUFACTURING</b>				<b>T:9 Hours P: 6 Hours</b>
Introduction, Principle, Classification – process parameters – process details – machine details, Software's, Applications of Fusion Deposition Modelling, Stereo-lithography, Solid Ground Curing, Selective Laser Sintering, Laminated Object Manufacturing.				
<b>Practical (Only for practical examination):</b> Simple CAD model preparation, Data interfacing: formats (STL, IGES), Model Slicing algorithms, Tool path generation, Production of simple 3D component.				
<b>Unit 05: ADVANCED MANUFACTURING</b>				<b>9 Hours</b>
Principles- Process Parameters- Process Capabilities and applications of: Electrical Discharge Machining, Wire Electrical Discharge Machining, Electro chemical Machining, Ultrasonic Machining, Laser beam machining, Electron beam machining, Abrasive Water jet machining and Plasma Arc cutting.				
<b>Theory: 45 Hrs</b>	<b>Tutorial:</b>	<b>Practical: 30 Hrs</b>	<b>Project:</b>	<b>Total Hours: 75 Hrs</b>
<b>TEXT BOOKS</b>				
1.	Pawan Negi, Mangey Ram, Om Prakash Yadav, "Basics of CNC Programming", River Publishers, 2022.			
2.	Kaushik Kumar, Divya Zindani, J. Paulo Davim, " Rapid Prototyping, Rapid Tooling and Reverse Engineering", De Gruyter, 2020.			
3.	P.N. Rao, "Manufacturing Technology: Metal Cutting and Machine Tools, Volume 2", McGraw-Hill Education (India) Private Limited, 4th Edition, 2019.			
4.	J.P .Kaushish "Manufacturing Processes" PHI Learning Private limited, second edition 2019.			
5.	Gary F. Benedict, "Nontraditional Manufacturing Processes", CRC Taylor and Francis, 2015.			
<b>REFERENCES</b>				

1.	B.L. Juneja,G.S. Sekhon, Nitin Seth, "Fundamentals of Metal Cutting and Machine Tools", Published by New Age International (P) Limited. 2014
2.	Mikell P Groover, "Principles of Modern Manufacturing", Wiley India Pvt Ltd, 2014.

**LIST OF EQUIPMENT'S**

1.	Horizontal Milling Machine	-	1 No
2.	Vertical Milling Machine	-	1 No
3.	Surface Grinding Machine	-	1 No
4.	Cylindrical Grinding Machine	-	1 No
5.	Shaper	-	2 Nos.
6.	Slotter	-	1 No
7.	Turret and Capstan Lathes	-	1 No
8.	3D Printer	-	1 No
9.	Computers- CNC & 3D print simulation	-	30 No's (per batch)



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U23ME304	INSTRUMENTATION AND CONTROL SYSTEMS	L	T	P	J	C
		3	0	0	0	3

**Course Outcomes**

At the end of the course, the student will be able to

CO1:	Describe the basic components of instrumentation, measurement, and control systems.
CO2:	Assess the parameters and performance of transducers.
CO3:	Develop measurement techniques for mechanical systems.
CO4:	Implement control engineering methods in automatic control systems used in contemporary manufacturing, processing, and transportation settings.
CO5:	Design mechanical control systems for automation purposes.

**Pre-requisite: Physics for Mechanical Engineering**

**CO/PO, PSO Mapping**

(3/2/1 indicates the strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO 1								3						
CO 2	3	3			3									3
CO 3					3								3	3
CO 4					3									3
CO 5			3		3			3		3			3	3

**Course Assessment methods**

Direct	Indirect
CIE test I (9) CIE test II (9) CIE test III (10) Assignment/seminar/Quiz (5)	Objectives Test (7) Total CIE: 40 marks Semester End Examination: 60 marks Course end survey

**Unit 01: MEASURING SYSTEM**

**9 Hours**

Concepts of Mechanical measuring instruments – Elements of a measuring system – Requirements of measuring instruments – Static and dynamic characteristics of measuring instruments – Errors in measurements - Impedance matching - Least square method- Zero and first order system- step response and impulse response.

**Unit 02: TRANSDUCER ENGINEERING**

**9 Hours**

Classification and types of Transducers and Sensors – Transducer's Mathematical model - Electromechanical, Piezoelectric, Thermocouples and Optoelectronic transducers - principles of resistive, inductive, and capacitive transducers - Transducer Troubleshooting- special transducers - Smart sensors-

Nano sensors.				
<b>Unit 03: INDUSTRIAL INSTRUMENTATION</b>				<b>9 Hours</b>
Measurement of vibrations and speed – Accelerometer – Sensors to measure absolute, gauge, vacuum and atmospheric pressures - Measurement of temperature: pyrometer, Fiber optics sensor - Measurement of flow - hot wire anemometer – magnetic flow meter– ultrasonic meter. Measurement of displacement – Measurement of Force –Strain gauge, Load cells- Measurement of torque – Case study assignments.				
<b>Unit 04: CONTROL SYSTEM</b>				<b>9 Hours</b>
Introduction to Control systems – Open and Closed loop systems – stepper and servo mechanisms. Transfer function: Block diagram reduction algebra, signal flow graphs – Pollution Control system- Basics of Controllers and response analysis- Problems.				
<b>Unit 05: DESIGN OF AUTOMATION AND CONTROLS SYSTEM</b>				<b>9 Hours</b>
Automated systems- introduction to systems –design of hydraulic and pneumatic control system controls – Basics of Directional Control Valve (DCV) - sequence operations- Applications of relays/switches- design of – electro pneumatics - Programmable controllers - Cost considerations - programmable logic controllers - PLC languages (Basics of Ladder Diagram) - case studies.				
<b>Theory: 45 Hrs</b>	<b>Tutorial:</b>	<b>Practical:</b>	<b>Project:</b>	<b>Total Hours: 45 Hrs</b>
<b>TEXT BOOKS</b>				
1.	Ernest O. Doebelin, Dhanesh N. Manik, Doebelin's "Measurement Systems", 7th Edition, McGraw-Hill; Seventh edition, ISBN-13: 978-9353168711, 2019.			
2.	Alan S. Morris, Reza Langari"Measurement and Instrumentation"" Theory and application, Academic Press, ISBN No. 978-0-12-3819604, 2016.			
3.	Norman S. Nise, "Control Systems Engineering", Wiley, 7th Edition, 2015.			
4.	Katsuhiko Ogata, "Modern Control Engineering", Prentice Hall, 5th Edition, 2009.			
<b>REFERENCES</b>				
1.	Gene F. Franklin, J. Da Powell, and Abbas Emami-Naeini, "Feedback Control of Dynamic Systems", Pearson, 7th Edition, 2014.			
2.	Robert B. Northrop, "Introduction to Instrumentation and Measurements", CRC Press, 3rd Edition, 2014.			

  
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U23ME305	KINEMATICS OF MACHINES	L	T	P	J	C
		3	0	0	0	3

### Course Outcomes

At the end of the course, the student will be able to

CO1:	Apply Kutzbach and Gruebler's criterion, Grashoff's law to solve problems in various mechanisms.
CO2:	Determine the displacement, velocity, and acceleration in simple mechanisms.
CO3:	Construct displacement diagrams and cam profile for radial cam.
CO4:	Design the simple, compound and epicyclic gear trains.
CO5:	Synthesize four-bar and slider Crank mechanisms and analyze the characteristics of robot arm kinematics.

Pre-requisite: Engineering Mechanics

### CO/PO, PSO Mapping

(3/2/1 indicates the strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	2									3	
CO2	3	3	2	2									3	
CO3	3	3	3										3	
CO4	3	3	3										3	
CO5	3	3	3	3									3	

### Course Assessment methods

Direct		Indirect
CIE test I (9)	Objectives Test (7) Total CIE: 40 marks Semester End Examination: 60 marks	Course end survey
CIE test II (9)		
CIE test III (10)		
Assignment/seminar/Quiz (5)		

<b>Unit 01: BASICS OF MECHANISMS</b>	<b>9 Hours</b>
Basic concepts of Link, Kinematic pair, Kinematic chain, Mechanism, Machine, Degree of Freedom, Kutzbach and Grubler's criterion and Grashoff's law- Degree of freedom - Kinematic Inversions of four bar chain and slider crank chain - Mechanical Advantage - Transmission angle. Description of common Mechanisms - Single, Double and Offset slider mechanism. Straight line Mechanisms (Exact & Approximate Straight line).	
<b>Unit 02: KINEMATICS OF LINKAGE MECHANISMS</b>	<b>9 Hours</b>
Analysis of simple mechanisms (single slider crank mechanism, four bar mechanism) - Graphical methods for displacement, velocity and acceleration polygons; Coincident points - Coriolis acceleration. Velocity analysis using instantaneous centres of simple mechanisms (Single slider crank mechanism and four bar mechanism).	

<b>Unit 03: KINEMATICS OF CAM MECHANISMS</b>				<b>9 Hours</b>
Classifications of cam and follower – Displacement, Velocity & Acceleration diagram – Follower Motion (Uniform Velocity Motion, Simple Harmonic Motion, Uniform Acceleration and Retardation motion, Cycloidal motions) – Graphical construction of displacement, Velocity & Acceleration diagram and cam profile for a radial cam - Pressure angle and undercutting.				
<b>Unit 04: GEARS AND GEAR TRAINS</b>				<b>9 Hours</b>
Classification of gears – Gear tooth terminology –involute tooth profile. Fundamental Law of toothed gearing and involute gearing – Length of the path of contact and contact ratio - Interference and undercutting – Nonstandard gear teeth – helical, bevel, worm, rack and pinion gears (basics only). Gear trains – Simple, compound and Epicyclic gear trains.				
<b>Unit 05: SYNTHESIS OF MECHANISMS AND ROBOT ARM KINEMATICS</b>				<b>9 Hours</b>
Classification of synthesis – type, dimension, number, Synthesis of four bar mechanism and Slider crank Mechanism -Chebyshev and Freudenstein's method. Robot Arm kinematics – Denavit - Hartenberg Parameters - Forward and inverse kinematics of a two dimensional 2 degree of freedom manipulators (type RR).				
<b>Theory: 45 Hrs</b>	<b>Tutorial: 0</b>	<b>Practical: 0</b>	<b>Project:0</b>	<b>Total Hours: 45 Hrs</b>
<b>TEXT BOOKS</b>				
1.	K.S. Fu, R.C Gonzalez, "Robotics control, sensing, Vision, and Intelligence", Tata McGraw-Hill, 2016, ISBN-13: 978-0-07-026510-3			
2.	Robert L. Norton, "Kinematics and Dynamics of Machinery", Tata McGraw-Hill, 2010. ISBN: 9789351340201			
<b>REFERENCES</b>				
1.	S.S.Rattan, "Theory of Machines & Mechanisms", Tata McGraw hill publishers, 4th Edition, 2019, ISBN-13: 9789353166335, 9353166330.			
2.	Sadhu Singh, "Theory of Machines", Pearson Education, New Delhi, 3rd Edition, 2012, ISBN : 978-8131760697.			
3.	Ghosh A and A.K.Mallick, "Theory of Mechanisms and Machines", Affiliated East- West Pvt. Ltd., New Delhi, 2008, ISBN-13: 978-8185938936.			
4.	Khurmi, R.S./"Theory of Machines", 14th Edition, S Chand Publications, 2007.			
5.	Ambekar A. G., "Mechanism and Machine Theory", Prentice Hall of India, NewDelhi, 2007, ISBN:9788120331341			

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JUNCTION MAIN ROAD, SALEM-5

**ABOUT THE COURSE**

Design thinking is a systematic method of solving problems. This method is unique that it starts and ends with humans. The design thinkers start by observing, interviewing or just plain experiencing a situation. Then, they proceed to improve the situation of the humans by solving problems for them.

**COURSE LAYOUT**

Week 1 : Introduction to Design Thinking

Week 2 : Empathize Phase: Customer Journey Mapping

Week 3 : Analyze Phase: 5-Whys and How might we...

Week 4 : Solve Phase: Ideation: Free Brainstorming & Make/Test Phase: Prototype

**TOTAL HOURS : 15**

**BOOKS AND REFERENCES**

Prescribed Textbook for the course:

1.Karmic Design Thinking by Prof. Bala Ramadurai, available at Amazon (paperback), Amazon (e-book), Flipkart, Pothi, bookspace.in

**REFERENCES**

- 1.Design: Creation of Artifacts in Society by Prof. Karl Ulrich, U. Penn
- 2.Change by Design by Tim Brown.



**Dr. D. SENTHIL KUMAR, M.E., Ph.D**  
PROFESSOR & HEAD  
DEPT. OF MECHANICAL ENGG.  
SONA COLLEGE OF TECHNOLOGY  
JUNCTION MAIN ROAD, SALEM-5

U23GE302	ENVIRONMENT AND CLIMATE SCIENCE	L	T	P	J	C
		2	0	0	0	0

**Course Outcomes**

At the end of the course, the student will be able to

CO1:	Describe the importance of the acute need for environmental awareness and discuss significant aspects of natural resources like forests, water and food resources.
CO2:	Illustrate the concepts of an ecosystem and provide an overview of biodiversity and its conservation.
CO3:	Analyze the causes, effects of various environmental pollution and their remedial measures.
CO4:	Provide solutions to combat environmental issues like global warming, acid rain, ozone Layer depletion.
CO5:	Analyze the effect of climate change in various sectors and their remedial measures.

**Pre-requisite:**

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**CO/PO, PSO Mapping**

(3/2/1 indicates the strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2				2	2							-
CO2	2	-					1							-
CO3	3	2				2	3							2
CO4	3	2				2	3							2
CO5	3	2				2	2							2

**Course Assessment methods**

Direct		Indirect
CIE test I (30) - Theory CIE test II (30) - Theory CIE test III (40)- Theory	Total CIE: <b>100 marks</b> Semester End Examination - <b>NIL</b>	Course end survey

**Unit 01: INTRODUCTION TO ENVIRONMENTAL STUDIES AND NATURAL RESOURCES** **6 Hours**

Definition, Scope and Importance Forest Resources: - Use and over - exploitation, deforestation, Case Studies, Water Resources: - Use and Over-Utilization of Surface and ground water, Floods, Drought, Food Resources-Effects of Modern Agriculture, Fertilizer- Pesticide Problems-Role of an Individual in Conservation of Natural Resources.

**Unit 02: ECOSYSTEMS AND BIODIVERSITY** **6 Hours**

Structure and Function of an Ecosystem-Energy Flow in the Ecosystem -Food Chains, Food Webs and Ecological Pyramids.

Introduction to Biodiversity-Value of Biodiversity: Consumptive Use, Productive Use, Social, Ethical, Aesthetic and Option Values-India as a Mega-Diversity Nation-Threats to Biodiversity: Habitat Loss, Poaching of Wildlife, Man-Wildlife Conflicts – Endangered and Endemic Species of India-Conservation of Biodiversity: In-Situ and Ex-Situ conservation of Biodiversity.				
<b>Unit 03: ENVIRONMENTAL POLLUTION</b>				<b>6 Hours</b>
Definition – Causes, Effects and Control Measures of: - (A) Air Pollution (B) Water Pollution (C) Soil Pollution (D) Marine Pollution (E) Noise Pollution (F) Thermal Pollution, Solid Waste Management- Effects and Control Measures of Acid Rain – Role of an Individual in Prevention of Pollution.				
<b>Unit 04: FUNDAMENTALS OF CLIMATE CHANGE</b>				<b>6 Hours</b>
Sustainable Development-Climate Change- Causes and effects of Global Warming-Effect of global warming in food supply, plants, sea, coral reef, forest, agriculture, economy-Kyoto Protocol in reduction of greenhouse gases-Ozone Layer Depletion-mechanism, effects and control measures- Montreal Protocol to protect ozone layer depletion-Rainwater Harvesting-Effect of climate change due to air pollution Case study - CNG vehicles in Delhi.				
<b>Unit 05: EFFECT OF CLIMATE CHANGE</b>				<b>6 Hours</b>
Fungal diseases in forests and agricultural crops due to climatic fluctuations - Growing energy needs - effect of climate change due to non-renewable energy resources. Renewable energy resources in the prevention of climatic changes- Effect of climatic changes in ground water table, garments, monuments, buildings, consumption of energy, agriculture and in electric power sector - Carbon credit - carbon footprint - disaster management -Role of an individual to reduce climate change.				
<b>Theory: 30</b>	<b>Tutorial: --</b>	<b>Practical: --</b>	<b>Project:--</b>	<b>Total Hours: 30 Hrs</b>
<b>TEXT BOOKS</b>				
1.	Miller, T.G. Jr., "Environmental Science", Wadsworth Pub. Co. 2018.			
2.	Anubha Kaushik and Kaushik, "Environmental Science and Engineering" New Age International Publication, 4 <sup>th</sup> Multicolour Edition, New Delhi, 2014.			
<b>REFERENCES</b>				
1.	S. Radjarejesri et al., "Environmental Science" Sonaversity, Sona College of Technology, Salem, 2018.			
2.	Masters, G.M., "Introduction to Environmental Engineering and Science", Pearson Education Pvt., Ltd., 2 <sup>nd</sup> Edition, 2004.			
3.	Erach, B., "The Biodiversity of India", Mapin Publishing P.Ltd., Ahmedabad, India.			
4.	Erach Bharucha, "Textbook of Environmental Studies for Undergraduate Courses", 2005, University Grands Commission. Universities Press India Private Limited, Hyderguda, Hyderabad – 500029.			

*Dr. M. Renuga*  
14/6/2025

**Dr. M. RENUGA,**  
Professor & Head,  
Department of Humanities & Languages,  
Sona College of Technology,  
SALEM - 636 005.

*Dr. C. Shanthi*  
14-6-2025

**Dr. C. SHANTHI, M.Sc., M.E., Ph.D.,**  
Professor of Physics  
Head, Department of Sciences  
Sona College of Technology (Autonomous)  
SALEM-636 005.

U23GE301	SOFT SKILLS AND APTITUDE - I	L	T	P	J	C
		0	0	2	0	1

**Course Outcomes**

**At the end of the course, the student will be able to**

<b>CO1:</b>	Demonstrate capabilities in specific soft-skill areas using hands-on and/or case-study approaches
<b>CO2:</b>	Solve problems of greater intricacy than those in BA-I and II in stated areas of quantitative aptitude and logical reasoning
<b>CO3:</b>	Demonstrate higher than BA-I and II levels of verbal aptitude skills in English regarding specific topics.

**Pre-requisite: Basic Aptitude I & II**

**CO/PO, PSO Mapping**

(3/2/1 indicates the strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	1	1	1	1	2	2	3	3	3	1	3	1	1
CO2	3	3	3	2	2	2	1	3	3	2	1	3	2	2
CO3	1	1	1	1	1	1	1	3	3	3	1	3	1	1

**Course Assessment methods**

Direct		Indirect
CIE test I (15)	RTPS (10)	Course end survey
Quiz - I (5)	Record (10)	
CIE test II (15)	Total CIE marks : 60 marks	
Quiz - II (5)	Semester End Examination : 40 marks	

1.Soft Skills	<b>Demonstrating soft-skill capabilities with reference to the following topics:</b>
	<ul style="list-style-type: none"> <li>a. Attitude building</li> <li>b. Self-awareness and self -acceptance</li> <li>c. Dealing with criticism</li> <li>d. Innovation and creativity</li> <li>e. Problem solving and decision making</li> <li>f. Public speaking</li> <li>g. Group discussions.</li> </ul>

<p><b>2. Quantitative Aptitude and Logical Reasoning</b></p>	<p><b>Solving problems with reference to the following topics:</b></p> <ul style="list-style-type: none"> <li>a. Vedic Mathematics</li> <li>b. Simplification</li> <li>c. Number Properties</li> <li>d. Averages</li> <li>e. Percentage</li> <li>f. Profit Loss and Discount</li> <li>g. Ratio &amp; Mixtures</li> <li>h. Equation</li> <li>i. Problem on Ages</li> <li>j. Data interpretation</li> </ul>			
<p><b>3. Verbal Aptitude</b></p>	<p><b>Demonstrating English language skills with reference to the following topics:</b></p> <ul style="list-style-type: none"> <li>a. Verbal analogy</li> <li>b. Tenses</li> <li>c. Prepositions</li> <li>d. Reading comprehension</li> <li>e. Choosing correct / incorrect sentences</li> <li>f. Describing pictures</li> </ul>			
<p>Theory : ---</p>	<p>Tutorial : ---</p>	<p>Practical : 30hrs</p>	<p>Project : ---</p>	<p>Total hours : 30hrs</p>

*S. Anita*  
6/06/2025


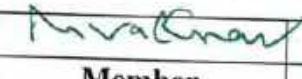
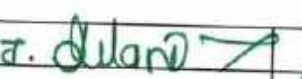

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Professor & Head  
Department of Training  
  
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**Sona College of Technology, Salem**  
**(An Autonomous Institution)**  
**Courses of Study for B.E/B.Tech. Semester IV under Regulations 2023 (CBCS)**  
**Branch: Mechanical Engineering**

S.No	Course Code	Course Title	L	T	P	J	C	Category	Total Contact Hours	Course Type*
<b>Theory courses</b>										
1.	U23ME401	Thermal Engineering	3	0	0	0	3	PC	45	T
2.	U23ME402	Strength of Materials	3	0	0	0	3	PC	45	T
3.	U23ME403	Engineering Materials and Metallurgy	3	0	0	0	3	PC	45	T
4.	U23ME404	Machine Learning	3	0	0	0	3	ES	45	T
5.	U23ME405	Dynamics of Machinery	3	0	2	0	4	PC	75	TL
6.	U23ME406	Metrology, Inspection and Quality Control	3	0	2	0	4	ES	75	TL
7.	U23GE402	<b>Audit Course:</b> Essence of Indian Traditional Knowledge	2	0	0	0	0	AC	30	T
<b>Practical courses</b>										
8.	U23ME407	Thermal Engineering Laboratory	0	0	3	0	1.5	PC	45	L
9.	U23ME408	Strength of Materials Laboratory	0	0	3	0	1.5	PC	45	L
10.	U23ME409	Machine Learning Laboratory	0	0	2	0	1	ES	30	L
11.	U23GE401	Soft Skills and Aptitude-II	0	0	2	0	1	EEC	30	L
<b>Total Credits</b>							25			

\*T- Theory, TT- Theory with Tutorial, TL- Theory with Laboratory, TP- Theory with Project, TLP- Theory with Laboratory and Project, L-Laboratory, LT- Laboratory with Theory, LP- Laboratory with Project, P-Project.

**Approved By**

			
<b>Chairperson, Mechanical Engineering BoS</b>	<b>Member Secretary, Academic Council</b>	<b>Dean-Academics</b>	<b>Chairperson, Academic Council &amp; Principal</b>
<b>Dr.D.Senthilkumar</b>	<b>Dr.R.Shivakumar</b>	<b>Dr.J.Akilandeswari</b>	<b>Dr.S.R.R.Senthil Kumar</b>

Copy to:-

HOD/ Mechanical Engineering, Fourth Semester B.E. Mechanical Students and Staff,  
 COE

U23ME401	THERMAL ENGINEERING	L	T	P	J	C
		3	0	0	0	3

### Course Outcomes

At the end of the course, the student will be able to

CO1:	Analyse the air standard efficiency and mean effective pressure of the various gas power cycles.
CO2:	Demonstrate the working of Internal Combustion engines and test the performance of Internal Combustion engines under different load conditions.
CO3:	Estimate steam flow rate through nozzle and analyze steam power cycle.
CO4:	Determine various performance characteristics of air compressors.
CO5:	Determine the COP of vapour compression refrigeration systems and solve simple cooling load estimation problems.

Pre-requisite: Engineering Thermodynamics.

### CO/PO, PSO Mapping

(3/2/1 indicates the strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	2								1	2	
CO2	3	2	2	2								1	2	
CO3	3	3	3	3								1	2	
CO4	3	2	2	2								1	1	
CO5	3	3	3	2								2	3	

### Course Assessment methods

Direct		Indirect
CIE test I (8)	Assignment/seminar/Quiz (5) Attendance (5) Total CIE: <b>40 marks</b> Semester End Examination: <b>60 marks</b>	Course end survey
CIE test II (8)		
CIE test III (8)		
Objectives Test (6)		

#### Unit 01: GAS POWER CYCLES

9 Hours

Otto, Diesel, Dual, Stirling, Brayton cycles. Actual and theoretical P-V diagram, Calculation of air standard efficiency and mean effective pressure, comparison of Otto, diesel and dual cycles.

#### Unit 02: INTERNAL COMBUSTION ENGINES

9 Hours

Classification of I.C engines, four stroke and two stroke cycle engines, combustion phenomenon and knocking in SI and CI engine, Valve and port timing diagrams – Super-charging and Turbo charging-

Ignition system and fuel injection system. Introduction to Direct injection (DI) engine, HCCI engine, CRDI engine. Cooling and lubrication system. Engine tests - performance, heat balance, and retardation - Morse test.				
<b>Unit 03: NOZZLES AND STEAM POWER CYCLES</b>				<b>9 Hours</b>
Steam nozzles- flow through steam nozzles, effect of friction, critical pressure ratio and super saturated flow. Introduction to steam turbines – Compounding of steam turbines (theory only). Steam power cycle- Rankine, Reheat and regeneration cycle.				
<b>Unit 04: AIR COMPRESSORS</b>				<b>9 Hours</b>
Classifications of compressors - Reciprocating air compressor - performance characteristics, effect of clearance volume, free air delivery and displacement, Multistage Compressor - intercooler –Description of Rotary compressor, vane, centrifugal and axial compressors.				
<b>Unit 05: REFRIGERATION AND AIR CONDITIONING</b>				<b>9 Hours</b>
Fundamentals of refrigeration – COP - properties of refrigerants, Vapour compression refrigeration system - cycle, p-h chart, Vapour absorption system- comparison, Fundamentals of air conditioning system, types and working principles. Simple cooling load estimation. Python programming for solving simple cooling load estimation in air-conditioning design problems (not for exam).				
<b>Theory: 45 Hrs</b>	<b>Tutorial: -</b>	<b>Practical: -</b>	<b>Project:-</b>	<b>Total Hours: 45 Hrs</b>
(Note: Use of Steam Tables, Refrigeration Tables and Psychrometric Chart are permitted in Examination)				
<b>TEXT BOOKS</b>				
1.	R.K.Rajput, “Thermal Engineering”, Laxmi Publications, New Delhi, Eleventh edition, 2020.			
2.	Kothandaraman C.P, Domkundwar and A.V. Domkundwar, “A course in Thermal Engineering”, Dhanpat Rai & Sons, Sixth Edition, 2016.			
3.	M.M.Rathore, “Thermal Engineering”, McGraw-Hill, New Delhi, 2010.			
<b>REFERENCES</b>				
1.	Sarkar B.K., “Thermal Engineering”, Tata McGraw-Hill, New Delhi, 2022			
2.	Arora C.P., “Refrigeration and Air conditioning”, Tata McGraw-Hill, New Delhi, 2017.			
3.	Holman J.P. “Thermodynamics”, McGraw-Hill, 1987.			
4.	V.Ganesan, “Internal Combustion Engines”, Tata McGraw-Hill, New Delhi, 2012.			
5.	Robert Sedgewick, Kevin Wayne, Robert Dondero, “Introduction to Programming in Python: An Inter-disciplinary Approach”, Pearson India Education Services Pvt. Ltd., 2016.			
6.	Ashok Namdev Kamthane, Amit Ashok Kamthane, “Programming and Problem Solving with Python”, Mc-Graw Hill Education, 2018.			

  
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 JUNCTION MAIN ROAD, EM-5  
 Regulations 2021

*wp*

U23ME402	STRENGTH OF MATERIALS	L	T	P	J	C
		3	0	0	0	3

**Course Outcomes**

**At the end of the course, the student will be able to**

<b>CO1:</b>	Analyze axial deformation, stresses, and strains in materials under axial loads (tension, compression).
<b>CO2:</b>	Evaluate the material's response to complex loading conditions using theories of failure and material strength.
<b>CO3:</b>	Calculate shear and bending stresses in structural members subjected to shear forces and bending moments.
<b>CO4:</b>	Apply the concepts of torsion, axial twist in shafts and Analyze the buckling load for columns, stability under various boundary conditions.
<b>CO5:</b>	Determine the deflections and deformations of beams under different loading conditions.

**Pre-requisite: Engineering Mechanics, Statics, Dynamics**

**CO/PO, PSO Mapping**

(3/2/1 indicates the strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3										3	3	
CO2	3	3	3		3					3		3	3	3
CO3	3	3	3		3					3		3	3	
CO4	3	3	3	3	3					3	3	3	3	3
CO5	3	3	3	3	3		3			3	3	3	3	3

**Course Assessment methods**

Direct		Indirect
CIE test I (8) CIE test II (8) CIE test III (8) Objectives Test (6)	Assignment/seminar/Quiz (5) Attendance (5) Total CIE: <b>40 marks</b> Semester End Examination: <b>60 marks</b>	Course end survey

**Unit 01: Introduction to Strength of Materials** **9 Hours**

**Stress and Strain:** Concepts of stress and strain, types of stress and strain, Hooke's Law, Poisson's ratio, volumetric strain & Thermal strain

**Axial Force:** Deformation of bars under axial loads, axial deformation of materials.


**Stress-Strain Relationship:** Stress-strain curves for ductile and brittle materials, Young's Modulus, Yield Stress, Ultimate Stress & Proof stress, allowable stress and its significance.

**Unit 02: Complex Loading** **9 Hours**

**Combined Stresses:** Stresses due to combined axial, bending, and torsional loads

<b>Principal Stresses:</b> Mohr's Circle of Stress, principal planes and maximum shear stress, Relationship between Elastic constants, Factor of Safety.				
<b>Unit 03: Shear and Bending Stresses</b>				<b>9 Hours</b>
<b>Shear Stress:</b> Shear force and shear stress distribution across a beam section. <b>Bending Stress:</b> Derivation of bending equation, neutral axis, moment-curvature relationship, stresses in simple bending. <b>Shear Force and Bending Moment Diagrams:</b> Drawing shear force and bending moment diagrams for cantilever, simply supported and overhanging beams.				
<b>Unit 04: Torsion of Shafts, Columns and Buckling</b>				<b>9 Hours</b>
<b>Torsional Deformation:</b> Torsion in circular shafts, derivation of the torsion equation, angle of twist, shear stresses due to torsion. <b>Solid and Hollow Shafts:</b> Power transmission, applications of torsion in mechanical design <b>Buckling of Columns:</b> Types of buckling, critical load, Euler's theory of buckling for columns with different boundary conditions.				
<b>Unit 05: Deflection of Beams</b>				<b>9 Hours</b>
<b>Deflection due to Bending:</b> Equation for bending deflection, integration method, Macaulay's method. <b>Deflection due to Shear:</b> Differential equation for shear deflection. <b>Methods for Deflection Analysis:</b> Superposition principle, Moment-area method, Conjugate Beam method.				
<b>Theory: 45 Hrs</b>	<b>Tutorial: - 0</b>	<b>Practical: - 0</b>	<b>Project:- 0</b>	<b>Total Hours: 45 Hrs</b>
<b>TEXT BOOKS</b>				
1.	S. Timoshenko, Strength of Materials, CBS Publishers, 3rd Edition (2019)			
2.	J. M. Gere, Mechanics of Materials, Cengage Learning, 9th Edition (2018)			
3.	R.K. Bansal, Strength of Materials, Laxmi Publications, 6th Edition (2020)			
<b>REFERENCES</b>				
1.	R. C. Hibbeler, Mechanics of Materials, Pearson Education, 11th Edition (2019)			
2.	F.P. Beer, E.R. Johnston, Mechanics of Materials, McGraw-Hill Education, 8th Edition (2021)			

A.R.K  
(A. RAMESH KUMAR)

  
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DEPT. OF MECHANICAL ENGG.  
SONA COLLEGE OF TECHNOLOGY  
JUNCTION MAIN ROAD, SALEM-5

U23ME403	ENGINEERING MATERIALS AND METALLURGY	L	T	P	J	C
		3	0	0	0	3

**Course Outcomes**

At the end of the course, the student will be able to

<b>CO1:</b>	Analyze the constitution of alloys, solid solutions, and phase diagrams, including various reactions and imperfections in solids.
<b>CO2:</b>	Investigate heat treatment processes such as annealing, hardening, and case hardening and their effects on material properties.
<b>CO3:</b>	Examine the effects of alloying elements on ferrous and non-ferrous metals and evaluate their applications in engineering.
<b>CO4:</b>	Evaluate the properties and applications of non-metallic materials, including polymers, ceramics and composites.
<b>CO5:</b>	Critique the material testing methods to assess mechanical properties and select suitable materials based on engineering requirements.

**Pre-requisite: Chemistry for mechanical Engineering, Physics for mechanical Engineering**

**CO/PO, PSO Mapping**

(3/2/1 indicates the strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2										3	3	
CO2	3	2				3						3	3	3
CO3	3	2	2									3	3	3
CO4	3	2				3						3	3	3
CO5	3	2	2	3								3	3	3

**Course Assessment methods**

Direct		Indirect
CIE test I (8) CIE test II (8) CIE test III (8) Objectives Test (6)	Assignment/seminar/Quiz (5) Attendance (5) Total CIE: <b>40 marks</b> Semester End Examination: <b>60 marks</b>	Course end survey

**Unit 01: CONSTITUTION OF ALLOYS AND PHASE DIAGRAMS** **9 Hours**

Constitution of alloys - Solid solutions, substitutional and interstitial - phase diagrams, Isomorphous, eutectoid, eutectic, peritectoid, and peritectoid reactions, imperfections in solids: vacancies, interstitials, linear defects, edge and screw dislocations, interfacial defects, equilibrium diagram- Iron - Iron carbon.

**Unit 02: HEAT TREATMENT** **9 Hours**

Diffusion-steady-state and non-steady-state, Isothermal transformation diagrams - cooling curves superimpose on I.T diagram- CCII Full annealing, recrystallization and spheroidising -normalizing,

hardening, Jominy end quench test -Austempering, martempering - case hardening - carburizing, nitriding, cyaniding, carbonitriding, flame and induction hardening- Case studies of heat treatment in automobile engines.

<b>Unit 03: FERROUS AND NONFERROUS METALS</b>	<b>9 Hours</b>
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Effect of alloying elements on steel (Mn, Si, Cr, Ni, V, Ti & W) - stainless and tool steels- HSLA - maraging steels — Cast Irons - Grey, White, malleable, spheroidal graphite, alloy cast irons, Copper and Copper alloys - Brass, Bronze and Cupronickel – Aluminum, Al alloys and its applications in automobile industry- Bearing alloys. Joining of Dissimilar metals.

<b>Unit 04: NON-METALLIC MATERIALS</b>	<b>9 Hours</b>
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Polymers - types of polymers, commodity and engineering polymers - Properties and applications of PE, PP, PS, PVC, PMMA, PET, PC, PA, ABS, PI, PAI, PPO, PPS, PEEK, PTFE, , Polymer Composites - Fiber reinforced polymer (FRP), Carbon reinforcement fiber polymer (CRFP)- Case studies- Ceramics, Cermets.

<b>Unit 05: TESTING AND THE METHODOLOGY OF MATERIAL SELECTION</b>	<b>9 Hours</b>
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Mechanism of plastic deformation, slip and twinning, Types of fracture, Corrosion and Degradation of materials -Testing of materials under tension, compression and shear loads, Hardness tests {Brinell, Vickers and Rockwell), Impact test - Izod and Charpy, Fatigue and creep tests. Surface treatment, characterization, and selection of Materials: part and material requirements- material system- list candidate materials-properties of requirements-select best match and specify it- case studies on surface treatment in different industries.

<b>Theory: 45 Hrs</b>	<b>Tutorial: -</b>	<b>Practical: -</b>	<b>Project:-</b>	<b>Total Hours: 45 Hrs</b>
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**TEXTBOOKS**

1.	"Materials Science and Engineering: An Introduction" by William D. Callister and David G. Rethwisch, Wiley Publication, 10th Edition (2020).
2.	"Engineering Materials and Metallurgy" by R.K. Rajput, S. Chand Publishing, 4th Edition (2020).
3.	"Material Science and Metallurgy" by O.P. Khanna, Dhanpat Rai Publications, Edition (2021).
4.	"Mechanical Metallurgy" by George E. Dieter, McGraw-Hill Education Publication, 3rd Edition (2017).
5.	"Physical Metallurgy" by V. Raghavan, PHI Learning Publications, 3rd Edition (2021).

**REFERENCES**

1.	"Engineering Materials: Properties and Applications of Metals and Alloys" by Kenneth G. Budinski and Michael K. Budinski, Pearson Publication, 9th Edition 2009.
2.	"Elements of Materials Science and Engineering" by Lawrence H. Van Vlack, Pearson Education India publication; 6th edition 2002, ISBN: 8131706001.
3.	"The Science and Engineering of Materials" by Donald R. Askeland and Wendelin J. Wright, Cl-Engineering publication; 6th edition 2010, ISBN: 978-0495296027.
4.	"Introduction to Physical Metallurgy" by Sidney H. Avner, McGraw Hill Education publication; 2nd edition 2017, ISBN: 978-0074630068.
5.	"Innovations in Everyday Engineering Materials" by T. DebRoy and H.K.D.H. Bhadeshia Published by Springer International Publishing, 2021 edition.

*LSM*

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 JUNE / B.Tech Regulations 2023

U23ME404	MACHINE LEARNING	L	T	P	J	C
		3	0	0	0	3

**Course Outcomes**

**At the end of the course, the student will be able to**

<b>CO1:</b>	Cognize the basic concepts and techniques of Machine Learning.
<b>CO2:</b>	Analyze data based on analytics, metrics and visualize it for developing machine learning algorithms.
<b>CO3:</b>	Apply regression algorithms and compute the metrics.
<b>CO4:</b>	Understand and apply classification algorithms and compute its metrics.
<b>CO5:</b>	Apply clustering algorithms and perform cross validation.

**Pre-requisite: NIL.**

**CO/PO, PSO Mapping**

(3/2/1 indicates the strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2												
CO2	3	3	3	2	3					3		2		3
CO3	3	3	3	3	3							2	3	3
CO4	3	3	3	3	3							2	3	3
CO5	3	3	3	3	3							2	3	3

**Course Assessment methods**

Direct		Indirect
CIE test I (8) CIE test II(8) CIE test III (8) Objectives Test (6)	Assignment/seminar/Quiz (5) Attendance (5) Total CIE: <b>40 marks</b> Semester End Examination: <b>60 marks</b>	Course end survey

**Unit 01: INTRODUCTION**

**9 Hours**

History of Artificial Intelligence – overview of machine learning – Linear algebra – scalars, vectors and tensors –Matrix operations – special matrices –Matrix decomposition – labeled data – un- labeled data – supervised learning – unsupervised learning – semi-supervised learning – reinforced learning – data & its types – Artificial Intelligence and deep learning in Engineering applications.

<b>Unit 02: DATA ANALYTICS &amp; VISUALIZATION</b>				<b>9 Hours</b>
Introduction to Data Analytics - Descriptive Analytics, Diagnostic Analytics, Predictive Analytics and Prescriptive Analytics. Data exploration (histograms, bar chart, box plot, line graph, scatter plot) - Qualitative and Quantitative Data - Measure of Central Tendency (Mean, Median and Mode) - Measure of Positions (Quartiles, Deciles, Percentiles and Quantiles) - Measure of Dispersion (Range, Median, Absolute deviation about median, Variance and Standard deviation) - Measure of Distribution (Skewness and Kurtosis), Box and Whisker Plot.				
<b>Unit 03: MACHINE LEARNING ALGORITHMS – I</b>				<b>9 Hours</b>
Regression – Linear regression – Polynomial regression - regression metrics – computation of Mean Absolute Error (MAE), Mean Squared Error (MSE), Root Mean Squared Error (RMSE), $R^2$ (R-Squared) & Adjusted $R^2$ - goodness of fit – bias-variance tradeoff – Applications in new product design & optimization.				
<b>Unit 04: MACHINE LEARNING ALGORITHMS – II</b>				<b>9 Hours</b>
Classification – Logistic regression - k nearest neighbor (kNN) algorithm – Support vector machine - Naïve Bayes Classifier – Decision trees (entropy calculation, root node selection & construction of tree) - Classification metrics – Accuracy, Precision and Recall, F1-score & AU-ROC - Confusion Matrix – Application - Predictive Maintenance with Machine Learning				
<b>Unit 05: MACHINE LEARNING ALGORITHMS – III</b>				<b>9 Hours</b>
Clustering – Hierarchical – divisive, agglomerative, dendrograms, K-means – identification of centroids and location near centroids – Density based spatial clustering of applications with noise (DBSCAN) – Apriori Algorithm Cross-Validation in Machine Learning- K-Fold Cross-Validation – Applications in CAE simulation.				
<b>Theory: 45 Hrs</b>	<b>Tutorial: -</b>	<b>Practical: -</b>	<b>Project:-</b>	<b>Total Hours: 45 Hrs</b>
<b>TEXT BOOKS</b>				
1. Alpaydin, E., 2020. Introduction to machine learning. MIT press.				
2. Rogel-Salazar, J., 2020. Advanced data science and analytics with Python. Chapman and Hall/CRC.				
3. Embarak, D.O., Embarak and Karkal, 2018. Data analysis and visualization using python. Berkeley, CA, USA: Apress.				
<b>REFERENCES</b>				
1. Witten, Ian H., et al. Data Mining: Practical machine learning tools and techniques. Morgan Kaufmann, 2016.				
2. Xanthidis, D., Wang, H.I. and Manolas, C., 2022. Data Analytics and Data Visualization with Python. In Handbook of Computer Programming with Python (pp. 319-371). Chapman and Hall/CRC.				
3. Hackeling, Gavin. Mastering Machine Learning with scikit-learn. Packt Publish.				
4. Kelleher, John D., Brian Mac Namee, and Aoife D'arcy. Fundamentals of machine learning for predictive data analytics: algorithms, worked examples, and case studies. MIT press, 2020.				
5. Chandra, S.S. and Hareendran, S., 2021. <i>Machine learning: a practitioner's approach</i> . PHI Learning Pvt. Ltd..				

27/1/24

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U23ME405	DYNAMICS OF MACHINERY	L	T	P	J	C
		3	0	2	0	4

### Course Outcomes

At the end of the course, the student will be able to

<b>CO1:</b>	Analyze and apply static and dynamic force analysis, including turning moment diagrams and flywheel analysis.
<b>CO2:</b>	Apply the principles of static and dynamic balancing to rotating and reciprocating masses, including partial balancing of locomotive engines.
<b>CO3:</b>	Analyze the principles in mechanisms used for governing of machines and gyroscopes.
<b>CO4:</b>	Analyze the concepts in free and for vibrations for single-degree freedom systems.
<b>CO5:</b>	Determine the natural frequencies of transverse and torsional vibrations in mechanical systems.

**Pre-requisite: Engineering Mechanics for Mechanical Engineering, Kinematics of Machines**

### CO/PO, PSO Mapping

(3/2/1 indicates the strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3						3		2	3	
CO2	3	3	3	3						3		2	3	
CO3	3	3	3	3						3		2	3	
CO4	3	3		3								2	3	
CO5	3	3		3						3		2	3	

### Course Assessment Methods- Theory with Laboratory Course

Direct		Indirect
CIE test I (10) - Theory CIE test II (10) - Theory CIE test III (10) - Theory CIE test IV(10) – Laboratory	Attendance (5) Assignment / Quiz/ Seminar (5) Total CIE: <b>50 marks</b> Semester End Examination: <b>50 marks</b> [SEE- Theory (35 marks), Lab (15 marks)]	Course end survey

### Unit 01: FORCE ANALYSIS

**T:9 Hours**  
**P: 9 Hours**

#### Theory:

D'Alembert's principle -Applied and constraint forces – Free body diagrams – Static equilibrium conditions – Two, three & four members – Static force analysis of simple mechanisms – Dynamic equivalent system-correction couple – Inertia force and Inertia torque -Dynamic Analysis in reciprocating engines – Bearing loads – Crankshaft torque- Equivalent masses. Turning moment diagrams – Single and multi-cylinder engines & double acting engines – Maximum fluctuation of energy and its determination- Coefficient of fluctuation of speed – Fly Wheel Analysis.

<b>Practical (Only for practical examination):</b> Kinematics of 4 bar mechanisms – Slider crank and Crank Rocker Mechanism - Determination of velocity and acceleration; Determination of moment of inertia by oscillating method for connecting rod and Flywheel.				
<b>Unit 02: BALANCING</b>				<b>T: 9 Hours P: 3 Hours</b>
Static and dynamic balancing of rotating masses – Balancing of reciprocating masses Balancing of locomotives - Balancing of Multi-cylinder engines – Partial balancing of locomotive engines. <b>Practical (Only for practical examination):</b> Balancing of rotating masses – Determination of Magnitude and Direction of unbalanced forces.				
<b>Unit 03: MECHANISM FOR CONTROL</b>				<b>T: 9 Hours P: 9 Hours</b>
<b>Theory:</b> Necessity of governor- Types of governors- Working principle of centrifugal governors- Gravity-controlled and spring-controlled governors - Effect of friction – Hunting and Isochronism-calculation of equilibrium speed and ranges of speed of governors-controlling force diagram for spring-controlled governors. Gyroscopic couple – Gyroscopic effects on the movement of aeroplanes and ships – Stability of two-wheel drive and four-wheel drive – Gyroscope stabilization. <b>Practical (Only for practical examination):</b> Governors - Determination of sensitivity, effort, etc. for Watt, Porter, Proell, and spring-controlled Governors; Motorized Gyroscope-Verification of laws -Determination of gyroscopic couple.				
<b>Unit 04: LONGITUDINAL VIBRATIONS</b>				<b>T: 9 Hours</b>
Introduction to vibration – Terminology – Classification of vibrations – Undamped and Damped free vibration of single degree of freedom systems-springs in series springs in parallel and combinations- Viscous damping-types of damped system. Forced vibration of single degree of freedom system- harmonic excitation- Logarithmic decrement- magnification factor, vibration isolation and transmissibility.				
<b>Unit 05: TRANSVERSE AND TORSIONAL VIBRATIONS</b>				<b>T: 9 Hours P: 9 Hours</b>
<b>Theory:</b> Transverse vibrations of shafts and beams-natural frequency- Rayleigh's method - Dunkerley's method-whirling of shafts. Torsional vibrations -equivalent shafts- natural frequencies- single rotor, two rotor and three rotor systems. <b>Practical (Only for practical examination):</b> Whirling of shaft- Determination of critical speed of shaft with concentrated loads; Transverse vibration – free beam. Determination of natural frequency and deflection of the beam.				
<b>Theory: 45 Hrs</b>	<b>Tutorial:</b>	<b>Practical: 30 Hrs</b>	<b>Project:</b>	<b>Total Hours: 75 Hrs</b>
<b>TEXT BOOKS</b>				
1.	Rattan .S.S, "Theory of Machines", Fifth Edition, Tata McGraw-Hill Publishing Company Ltd, 2019.			
2.	Sadhu Singh "Theory of Machines", Pearson Education, 3rd edition, 2019.			
<b>REFERENCES</b>				
1.	Shigley J.E. and Uicker J.J., "Theory of Machines and Mechanisms", 4th edition, oxford university press, 2018.			

2.	Rao J.S and Dukkipati R.V, "Mechanism and Machine Theory", New Age International, New Delhi, 2018.
3.	Thomas Bevan, "Theory of Machines" CBS Publishers and Distributers, 3rd edition, 2018.
4.	P.L.Ballaney, "Theory of Machines", Khanna publishers, 23rd Edition, 2003, ISBN 817409122X, 9788174091222.
5.	Dr.V.P.Singh, Mechanical Vibrations, PHI, 2018.

#### LIST OF EQUIPMENT'S

1.	Four bar Mechanism
2.	Slider Crank Mechanism
3.	Compound Pendulum
4.	Universal Governor
5.	Motorized Gyroscope
6.	Whirling of shafts
7.	Transverse Vibration Apparatus
8.	Balancing of Rotating masses Apparatus

27/1/26

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U23ME406	METROLOGY, INSPECTION AND QUALITY CONTROL	L	T	P	J	C
		3	0	2	0	4

**Course Outcomes**

At the end of the course, the student will be able to

CO1:	Apply fundamental principles of metrology to demonstrate linear measuring instruments, comparators.
CO2:	Analyze various angular measuring instruments to perform precise angular and surface measurements.
CO3:	Analyze the principles and applications of various metrology techniques, including laser interferometry, autocollimation, and CMM, to critically evaluate the accuracy and precision
CO4:	Apply statistical quality control methods (control charts, process capability studies) to analyze and improve manufacturing processes.
CO5:	Determine the most suitable NDT technique for inspecting a given component by evaluating the component's characteristics.

**Pre-requisite: Manufacturing Process**

**CO/PO, PSO Mapping**

(3/2/1 indicates the strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	P09	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2			2								2	
CO2	2	2		2	1								2	2
CO3	2			2	2								2	2
CO4	3	3	3			2		1					2	1
CO5	3			3					2	2				2

**Course Assessment methods- Theory with Laboratory Course**

Direct		Indirect
CIE test I (10) - Theory CIE test II (10) - Theory CIE test III (10) - Theory CIE test IV(10) - Laboratory	Assignment / Quiz/ Seminar (5) Attendance(5) Total CIE: <b>50 marks</b> Semester End Examination: <b>50 marks</b> [SEE- Theory (35 marks),Lab (15 marks)]	Course end survey

**Unit 01: BASICS OF METROLOGY AND LINEAR MEASUREMENTS**

**T:9 Hours**  
**P: 10 hours**

Introduction to Metrology- Precision and accuracy. Limits, fits, and tolerances, GO and NO GO gauges-

design Taylor's principle, Feeler gauges, plug gauges, and snap gauges. Linear Measuring Instruments – Vernier caliper, Micrometer, Vernier height gauge, Depth Micrometer; Slip gauges. Comparators: Dial Indicator, Johansson Mikrokator, Sigma Comparator, Mechanical - Optical comparator, Electronic Comparators, Pneumatic Comparators.

**Practical (Only for practical examination):** Exercises on Calibration of linear measuring instruments – Vernier caliper, micrometer, Vernier height gauge, and vernier Depth gauge. Calibration of Dial gauge, Checking the limits of dimensional tolerances using Pneumatic comparators.

**Unit 02: ANGULAR AND SURFACE MEASUREMENTS**

**T: 9 Hours  
P: 12 Hours**

**Theory:** Angular measuring instruments – Protractors, Universal Bevel Protractors, Sine bar, Sine Center, Measurement of Inclines, Spirit Level, and Clinometer. Two-wire and three-wire methods, floating carriage micrometer. Gear Measurement - Gear tooth comparator, and Parkinson's Tester. Surface Texture Measurement - importance of surface conditions, roughness and waviness, surface roughness standards specifying surface roughness parameters- Ra, Ry, Rz, RMS value.

**Practical (Only for practical examination):** Measurement of Taper Angle using sine bar/bevel protractor, , Measurement of thread parameters using Floating carriage micrometer. Surface roughness tester.

**Unit 03: ADVANCES IN METROLOGY**

**T: 9 Hours  
P: 8 Hours**

Lasers in metrology - Laser interferometers – Tool Maker's microscope, profile projector. Principles and Methods of Straightness and Flatness Measurement - Autocollimators. Coordinate measuring machine (CMM). Importance of nanometrology- Transmission Electron Microscopy, scanning electron microscope, scanning tunneling microscope, Energy-dispersive X-ray spectroscopy, and X-ray powder diffraction (XRD).

**Practical (Only for practical examination):** Measurement of cutting tool parameters using tool maker's microscope and profile projector, Measurement of straightness and flatness using autocollimator.

**Unit 04: QUALITY CONTROL**

**T:9 Hours**

Introduction, definition, and concept of quality & quality control, statistical methods – Quality Tools – Histogram, Check sheets, Ishikawa diagrams, Pareto, Scatter diagrams, control charts for non-confirming – p chart, np chart, C and U charts, control charts for variables- X chart and R chart with process capability studies.

**Unit 05: QUALITY INSPECTION**

**T: 9 Hours**

Introduction to Nondestructive quality inspection – Principles, equipment, procedures, limitations, and applications of: Visual inspection – Magnifying Mirror, Fiber optic borescope – Liquid Penetrant Testing- Magnetic Particle Testing – Ultrasonic Testing – Eddy current Testing. Applications in inspection of castings, forgings, Extruded steel parts, bars, pipes, and rails.

**Theory: 45 Hrs**

**Tutorial:**

**Practical: 30 Hrs**

**Project:**

**Total Hours: 75 Hrs**

**Note: Use of statistical data book with supplementary details is permitted for Examination.**

**TEXT BOOKS**

1. Gupta, I.C., A Textbook of Engineering Metrology, Dhanpat Rai Publications, 2019.
2. J. Prasad, C G K Nair, "Non Destructive Testing and Evaluation of Materials", Tata McGraw Hill Education Private Limited, 2011.
3. Imalka Munaweera, M.L. Chamalki Madhusa, "Characterization Techniques for Nanomaterials", CRC Press, 2023.
4. Douglas C. Montgomery, Introduction to Statistical Quality Control, John Wiley & Sons, 2020.

**REFERENCES**

1. Doebelin E.O., Measurement Systems, Mc Graw-Hill, 2017.
2. Jain. R. K , Engineering Metrology, Khanna Publishers, 2022.
3. Grant, E.L., Statistical Quality Control, McGraw-Hill, 2017
4. Raghavendra N.V. and Krishnamurthy, L., Engineering Metrology and Measurements, Oxford University Press, 2013

**LIST OF EQUIPMENT'S**

1. Vernier Caliper, Vernier Height Gauge, Vernier Depth Gauge
2. Micrometer and Dial Gauge
3. Sine Bar and Slip Gauge Set
4. Bevel Protractor
5. Tool Makers Microscope
6. Autocollimator
7. Profile Projector
8. Floating Carriage Micrometer
9. Mechanical and Pneumatic Comparator
10. Surface Roughness Tester

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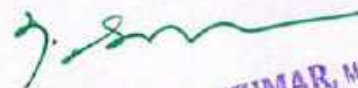
U23ME407	THERMAL ENGINEERING LABORATORY								L	T	P	J	C	
									0	0	3	0	1.5	
Course Outcomes														
At the end of the course, the student will be able to														
CO1:	Analyse the performance of an IC engine in different operational conditions and sketch valve and port-timing diagrams.													
CO2:	Evaluate the performance to improve efficiency of air compressor, refrigerator and air conditioning system.													
CO3:	Troubleshoot engine performance issues in real-time scenarios to ensure optimal functionality systematically.													
Pre-requisite: Nil														
<b>CO/PO, PSO Mapping</b> (3/2/1 indicates the strength of correlation) 3-Strong, 2-Medium, 1-Weak														
COs	Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1				2			2				2
CO2	3	2	1				2			2				2
CO3	3	2	1				2			2				2
<b>Course Assessment methods</b>														
<b>Direct</b>										<b>Indirect</b>				
CIE test I (15) Quiz I- (5) CIE test II (15) Quiz II- (5)					RTPS (10) Record (10) Total CIE: 60 marks Semester End Examination (40 marks)					Course end survey				

### LIST OF EXPERIMENTS

1. Valve Timing and Port Timing Diagrams.
2. Performance Test on 4-stroke Diesel Engine.
3. Heat Balance Test on 4-stroke Diesel Engine.
4. Retardation Test to find Frictional Power of a Diesel Engine.
5. Determination of Calorific value of Fuel using Bomb Calorimeter.
6. Determination of Viscosity using Red Wood Viscometer.
7. Determination of Flash Point and Fire Point.
8. Performance test on reciprocating air compressor.
9. Determination of COP of a Refrigeration system.
10. Determination of COP of an air conditioning system.

Total Number of hours:45Hrs

Theory: 0	Tutorial: 0	Practical: 45 Hrs	Project: 0	Total Hours: 45 Hrs
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U23ME408	STRENGTH OF MATERIALS LABORATORY					L	T	P	J	C				
						0	0	3	0	1.5				
<b>Course Outcomes</b>														
At the end of the course, the student will be able to														
CO1:	Analyse the compressive strength, tensile strength and shear strength of various engineering structures.													
CO2:	Evaluate the mechanical properties and behaviour of materials under various loads and conditions, including hardness, elasticity, and fatigue.													
CO3:	Investigate and characterize the mechanical properties and surface characteristics of materials using various testing and evaluation techniques.													
<b>Pre-requisite: Nil</b>														
<b>CO/PO, PSO Mapping</b> (3/2/1 indicates the strength of correlation) 3-Strong, 2-Medium, 1-Weak														
COs	Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3					2		2	2			3	2
CO2	3	3					2		2	2			3	2
CO3	3	3					2		2	2			3	2
<b>Course Assessment methods</b>														
<b>Direct</b>										<b>Indirect</b>				
CIE test I (15)					RTPS (10)					Course end survey				
Quiz 1 (5)					Record (10)									
CIE test II (15)					Total CIE: 60 marks									
Quiz 2 (5)					Semester End Examination: 40 marks									

### **LIST OF EXPERIMENTS**

1. Tension test on Mild Steel (MS) rod.
2. Compression test - Bricks & Concrete cubes.
3. Double shear test.
4. Deflection test - Cantilever & Simply supported beam.
5. Impact test Charpy & Izod.
6. Hardness test on various materials (Vickers, Rockwell & Brinell).
7. Tests on spring Tension & Compression.
8. Study of Fatigue test of metallic materials.
9. Torsion test of metallic materials.
10. Study of Non-destructive testing (NDT) on materials.
11. Micro hardness test on coated and hardened samples.

#### List of Equipment's (for a batch of 30 students)

1. Universal testing machine.
2. Compression testing machine.
3. Shear testing machine.
4. Deflection testing machine.
5. Rockwell hardness tester.
6. Brinell hardness tester.
7. Vickers hardness tester.
8. Fatigue testing machine.
9. Impact testing machine.
10. Ultrasonic pulse velocity.
11. Vickers micro hardness tester

**Total Number of hours:45**

<b>Theory: 0</b>	<b>Tutorial: 0</b>	<b>Practical: 45 Hrs</b>	<b>Project: 0</b>	<b>Total Hours: 45 Hrs</b>
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U23ME409	MACHINE LEARNING LABORATORY				L	T	P	J	C					
					0	0	2	0	1					
<b>Course Outcomes</b>														
At the end of the course, the student will be able to														
CO1:	Apply data analytics and visualization skills using python in-built library functions.													
CO2:	Design and evaluate prediction-based machine learning algorithms through python in-built library functions.													
CO3:	Design and evaluate classification & clustering-based machine learning algorithms through python in-built library functions.													
<b>Pre-requisite: Nil</b>														
<b>CO/PO, PSO Mapping</b> (3/2/1 indicates the strength of correlation) 3-Strong, 2-Medium, 1-Weak														
COs	Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	3				3	3		3		3
CO2	3	3	3	3	3				3			3		3
CO3	3	3	3	3	3				3			3		3
<b>Course Assessment methods</b>														
<b>Direct</b>							<b>Indirect</b>							
CIE test I (15) Quiz 1 (5) CIE test II (15) Quiz 2 (5)							RTPS (10) Record (10) Total CIE: <b>60 marks</b> Semester End Examination: <b>40 marks</b>			Course end survey				

### LIST OF EXPERIMENTS

1. Compute the mean, median, mode, percentile, quartile, decile, Standard deviation and variance of a given dataset.
2. Construction of scatter plots, line plots, bar plots & histograms for given dataset and summarize the salient conclusions by inference of the constructed plot.
3. Construct a box & whisker plot for a given dataset and summarize the salient conclusions by inference of the constructed plot.
4. Implement Linear regression algorithm for a given dataset and predict the outcome for a new data.
5. Compute the regression metrics (MAE, MSE, RMSE,  $R^2$  & Adjusted  $R^2$ ) for a given dataset.
6. Implement polynomial regression algorithm for a given dataset and infer the goodness of fit by varying the degree of polynomial.
7. Implement kNN algorithm for a given dataset and predict the outcome for a new data.
8. Compute the classification metrics (Accuracy, Precision and Recall, F1-score & AU-ROC) and develop the Confusion Matrix for a given dataset.
9. Implement k-Means algorithm for a given data set by computing centroids. Also determine the optimal value of 'k'.

(Note: Use of standard in-built library functions in Python tool should be utilized for all the experiments)

**Total Number of hours: 30**

<b>Theory: 0</b>	<b>Tutorial: 0</b>	<b>Practical: 30 Hrs</b>	<b>Project: 0</b>	<b>Total Hours: 30 Hrs</b>
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U23GE402	ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE										L	T	P	J	C
											2	0	0	0	0
<b>Course Outcomes</b>															
<b>At the end of the course, the student will be able to</b>															
CO1:	Analyze the basics of Indian Traditional knowledge in modern scientific perspectives.														
CO2:	Explain the basics of Vedic science and its applications in modern days.														
CO3:	Discuss the introduction and objectives of modern science.														
CO4:	Describe the contribution of Noble laureates for India's achievements in Science and Technology.														
CO5:	Analyze the various traditional practices for holistic health care of human beings.														
<b>Pre-requisite:</b>															
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<b>CO/PO, PSO Mapping</b>															
(3/2/1 indicates the strength of correlation) 3-Strong, 2-Medium, 1-Weak															
Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)															
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	2			2	-							2	2
CO2	2	2	2			2	-							2	2
CO3	2	2	2			2	-							2	2
CO4	2	2	2			2	-							2	2
CO5	2	2	2			2	-							2	2
<b>Course Assessment methods</b>															
<b>Direct</b>										<b>Indirect</b>					
CIE test I (30) - Theory CIE test II (30) - Theory CIE test III (40)- Theory					Total CIE: <b>100 marks</b> Semester End Examination - <b>NIL</b>					Course end survey					
<b>Unit 01: BASIC STRUCTURE OF INDIAN KNOWLEDGE SYSTEM</b>													<b>6 Hours</b>		
Indian Traditional Scriptures, Exposure to 4 – Vedas (the Rigveda, the Yajurveda, the Samaveda and the Atharvanaveda), 4 – Upavedas (Ayurveda, Dhanurveda, Gandharvaveda, Sthapatya, etc.), 6 – Vedangas (Shiksha, Kalp, Nirukta, Vyakaran, Jyotish).															
<b>Unit 02: INDIAN KNOWLEDGE SYSTEM AND MODERN SCIENCE</b>													<b>6 Hours</b>		
Relevance of Science and Spirituality, Science and Technology in ancient India, Superior intelligence of Indian sages and scientists.															

<b>Jnit 03: INDIAN TRADITION AND CULTURE</b>					<b>6 Hours</b>
The Indian way of life, Introduction to Indian tradition, The Scientific Outlook and Human Values – Basics of Applied Vedic Science – modern day application of Vedas and procedure – Ancient Indian Scientific thoughts.					
<b>Jnit 04: INDIAN ARTISTIC TRADITION</b>					<b>6 Hours</b>
Introduction and overview of significant art forms in ancient India such as painting, sculpture, Civil Engineering, Architecture, Music, Dance, Literature, etc.					
<b>Jnit 05: YOGA AND HOLISTIC HEALTH CARE</b>					<b>6 Hours</b>
Fundamentals of yoga and holistic health – Human biology – Importance and Practice of Yoga, Pranayama and other prevailing health care techniques – Diet and nutrition – Life management – Contemporary yogic models – case study.					
<b>Theory: 30</b>	<b>Tutorial: --</b>	<b>Practical: --</b>	<b>Project:--</b>		<b>Total Hours: 30 Hrs</b>
<b>REFERENCES</b>					
1.	Sivaramakrishnan, V., Cultural Heritage of India- Course Material, Bharatiya Vidya Bhavan, Mumbai, 5 th Edition, 2014.				
2.	Capra F., Tao of Physics, Shambhala, 2010				
3.	Chatterjee S.C. and Datta D.M., An Introduction to Indian Philosophy, University of Calcutta, 1984.				
4.	RN Jha, Science of Consciousness Psychotherapy and Yoga Practices, Vidyanidhi Prakasham, Delhi, 2016.				
5.	Raja Ram Mohan Roy, Vedic Physics, Mount Meru Publication ISBN: 9781988207049.				
6.	Swami Jitatmanand, Modern Physics and Vedant, Bharatiya Vidya Bhavan.				

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U23GE401	SOFT SKILLS AND APTITUDE – II	L	T	P	J	C
		0	0	2	0	1

**Course Outcomes**

At the end of the course, the student will be able to

CO1:	Demonstrate capabilities in additional soft-skill areas using hands-on and/or case-study approaches
CO2:	Solve problems of increasing difficulty than those in SSA-I in given areas of quantitative aptitude and logical reasoning and score 65-70% marks in company-specific internal tests
CO3:	Demonstrate greater than SSA-I level of verbal aptitude skills in English regarding the given topics and score 65-70% marks in company-specific internal tests

**Pre-requisite: Basic Aptitude I & II**

**CO/PO, PSO Mapping**

(3/2/1 indicates the strength of correlation) 3-Strong, 2-Medium, 1-Weak

CO-PO Mapping	Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO-1	1	1	1	1	1	2	2	3	3	3	1	3
CO-2	3	3	3	2	2	2	1	3	3	2	1	3
CO-3	1	1	1	1	1	1	1	3	3	3	1	3

**Course Assessment methods**

**Direct**

**Indirect**

CIE test I (15)  
Quiz - I (5)  
CIE test II (15)  
Quiz - II (5)

RTPS (10)  
Record (10)  
Total CIE marks : 60 marks  
Semester End Examination : 40 marks

Course end survey

**1. Soft Skills**

**Demonstrating soft-skill capabilities with reference to the following topics:**

- a. SWOT
- b. Goal setting
- c. Time management
- d. Stress management.
- e. Mindfulness
- f. Interpersonal skills and Intrapersonal skills
- g. Presentation skills
- h. Group discussions

**2. Quantitative Aptitude and Logical Reasoning**

**Solving problems with reference to the following topics:**

- a. Logarithm
- b. Progression

				<ul style="list-style-type: none"> <li>c. Time &amp; Work</li> <li>d. Simple Interest</li> <li>e. Compound Interest</li> <li>f. Time Speed &amp; Distance</li> <li>g. Plane Geometry</li> <li>h. Mensuration for 2D</li> <li>i. Mensuration for 3D</li> <li>j. Syllogism</li> </ul>
				<p><b>Demonstrating English language skills with reference to the following topics:</b></p> <ul style="list-style-type: none"> <li>a. Critical reasoning</li> <li>b. Theme detection</li> <li>c. Verbal analogy</li> <li>d. Prepositions</li> <li>e. Articles</li> <li>f. Cloze test</li> <li>g. Company specific aptitude questions</li> </ul>
	<b>3. Verbal Aptitude</b>			
<b>Theory : —</b>	<b>Tutorial : —</b>	<b>Practical : 30hrs</b>	<b>Project : —</b>	<b>Total hours : 30hrs</b>

*S. Anita*  
12/12/2020

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