

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

**(An Autonomous Institution)**

**B.E-Mechanical Engineering**

**CURRICULUM and SYLLABI**

**[For students admitted in 2022-2023]**

**B.E / B.Tech Regulation 2019**

**Approved by BOS and Academic Council meetings**

**Sona College of Technology, Salem**

**(An Autonomous Institution)**



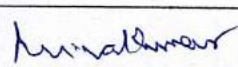

**Courses of Study for B.E/B.Tech. Semester I under Regulations 2019 (CBCS)**

**Branch: Mechanical Engineering**

S.No	Course Code	Course Title	L	T	P	C	Category	Total Contact Hours
<b>Theory</b>								
1	U19CHE104E	Chemistry for Mechanical Engineering	3	1	0	4	BS	60
2	U19MAT102A	Linear Algebra and Calculus	3	1	0	4	BS	60
3	U19EE106	Electrical Drives and ARM Processor	3	0	0	3	ES	45
4	U19EGR106	Engineering Graphics	2	0	2	3	ES	60 (30L+30P)
<b>Practical</b>								
5	U19CHL109	Chemistry Laboratory	0	0	3	1.5	BS	45
6	U19EEL114	Electrical Drives and ARM Processor Laboratory	0	0	4	2	ES	60
7	U19WPL112	Workshop Practice	0	0	2	1	ES	30
8	U19ENL115	Communication Skills in English - I	0	0	2	1	HS	30
9	U19GE101	Basic Aptitude - I	0	0	2	0	EEC	30
<b>Total Credits</b>						<b>19.5</b>		
<b>Optional Language Elective*</b>								
10	U19OLE1101	French	0	0	2	1	HS	30
11	U19OLE1102	German						30
12	U19OLE1103	Japanese						30

\*Students may opt for foreign languages viz., German/French/Japanese with additional one credit (Not accounted for CGPA calculation)

**Approved By**

			
<b>Chairperson, Science and Humanities BoS</b>	<b>Chairperson, Mechanical Engineering BoS</b>	<b>Member Secretary, Academic Council</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. S. R. R. Senthil Kumar</b>

Copy to:-

HOD/ Mechanical Engineering, First Semester BE MECH Students and Staff, COE

**Sona College of Technology, Salem – 636 005**

**(An Autonomous Institution)**

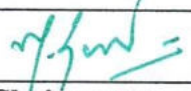
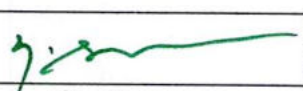
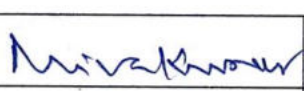
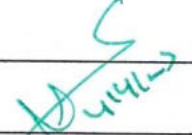
**Courses of Study for BE / B Tech Semester II under Regulations 2019 (CBCS)**

**Branch: Mechanical Engineering**

S.N	Course Code	Course Title	L	T	P	C	Category	Total Contact Hours
<b>Theory</b>								
1	U19TAM201	தமிழர் மரபு / Heritage of Tamils	1	0	0	1	HSMC	15
2	U19MAT202A	Differential Equations and Vector Calculus	3	1	0	4	BSC	60
3	U19PHY203D	Physics for Mechanical Engineering	3	1	0	4	BSC	60
4	U19PPR205	Problem Solving Using Python Programming	3	0	0	3	ESC	45
5	U19ME201	Manufacturing Process	3	0	2	4	ESC	75 (45L+30P)
6	U19ENG201D	Communication Skills in English for Engineers and Technocrats	2	0	2	3	HSC	60 (30L+30P)
<b>Practical</b>								
7	U19PHL210	Physics Laboratory	0	0	3	1.5	BSC	45
8	U19PPL211	Python Programming Laboratory	0	0	2	1	ESC	30
9	U19GE201	Basic Aptitude-II	0	0	2	0	EEC	30
<b>Total Credits</b>						<b>21.5</b>		
<b>Optional Language Elective*</b>								
10	U19OLE1201	French	0	0	2	1	HSMC	30
11	U19OLE1202	German						
12	U19OLE1203	Japanese						

\*Students may opt for foreign languages viz., German/French/Japanese with additional one credit (Not accounted for CGPA calculation)

Approved by

			
<b>Chairperson, Science and Humanities BoS</b>	<b>Chairperson, Mechanical Engineering BoS</b>	<b>Member Secretary, Academic Council</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. S. R. R. Senthil Kumar</b>

Copy to:-HOD/ Mechanical Engineering, Second Semester BE MECH Students and Staff, COE

03.03.2023

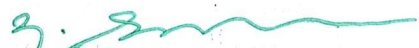
B.E/B.Tech Regulations-2019


Mech  
111

**Sona College of Technology, Salem**  
(An Autonomous Institution)  
**Courses of Study for B.E/B.Tech. Semester III Regulations 2019**  
**Branch: Mechanical Engineering**

S. No	Course Code	Course Title	Lecture	Tutorial	Practical	Credit	Total Contact Hours
<b>Theory</b>							
1	U19MAT301B/	Probability and Statistics	3	1	0	4	60 ✓
2	U19ME301/	Engineering Mechanics - Statics and Dynamics	3	1	0	4	60 ✓
3	U19ME302/	Engineering Thermodynamics	3	1	0	4	60 ✓
4	U19ME303/	Fluid Mechanics and Machinery	3	0	0	3	45 ✓
5	U19ME304/	Conventional and Smart Manufacturing	3	0	0	3	45 ✓
6	U19ME305/	Instrumentation and Control Systems	3	0	0	3	45 ✓
7	U19TAM301/	தமிழ்ரும் தொழில்நுட்பமும்/ Tamils and Technology	1	0	0	1	15 ✓
8	U19GE302/	Mandatory course: Environment and Climate Science	2	0	0	0	30 ✓
<b>Practical</b>							
9	U19ME306/	Fluid Mechanics and Machinery Laboratory	0	0	2	1	30 ✓
10	U19ME307/	Special Machines Laboratory	0	0	2	1	30 ✓
11	U19GE301/	Soft Skills and Aptitude – I	0	0	2	1	30 ✓
<b>Total Credits</b>						<b>25</b> ✓	

Approved By

  
Chairperson, Mechanical Engineering BoS  
Dr.D.Senthilkumar

  
Member Secretary, Academic Council  
Dr.R.Shivakumar

  
Chairperson, Academic Council & Principal  
Dr.S.R.R.Senthil Kumar

Copy to:-

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

11.08.2023

Regulations-2019


mech  
TV

**Sona College of Technology, Salem**  
(An Autonomous Institution)  
Courses of Study for B.E/B.Tech. Semester IV Regulations 2019  
Branch: Mechanical Engineering

S. No	Course Code	Course Title	Lecture	Tutorial	Practical	Credit	Total Contact Hours
<b>Theory</b>							
1 /	U19ME401 /	Thermal Engineering /	3	0	0	3	45 /
2 /	U19ME402 /	Strength of Materials /	3	0	0	3	45 /
3 /	U19ME403 /	Engineering Materials and Metallurgy /	3	0	0	3	45 /
4 /	U19ME404 /	Object Oriented Programming for Mechanical Engineering /	3	0	0	3	45 /
5 /	U19ME405 /	Kinematics of Machines /	3	0	0	3	45 /
6 /	U19GE403 /	Mandatory Course: Essence of Indian Traditional Knowledge /	2	0	0	0	30 /
<b>Practical</b>							
7 /	U19ME406 /	Thermal Engineering Laboratory /	0	0	2	1	30 /
8 /	U19ME407 /	Strength of Materials Laboratory /	0	0	2	1	30 /
9 /	U19ME408 /	Object Oriented Programming Laboratory for Mechanical Engineering /	0	0	2	1	30 /
10 /	U19GE401 /	Soft Skills and Aptitude - II /	0	0	2	1	30 /
<b>Total Credits</b>						<b>19</b> /	

Approved By

  
Chairperson, Mechanical Engineering BoS  
Dr. D. Senthilkumar

  
Member Secretary, Academic Council  
Dr. R. Shivakumar  
P-1-24

  
Chairperson, Academic Council & Principal  
Dr. S.R.R. Senthil Kumar

Copy to:-  
HOD/Mechanical Engineering, Fourth Semester BE Mechanical Students and Staff, COE

21.12.2023

Regulations-2019

## Sona College of Technology, Salem-5

### List of Professional Electives B.E/B.Tech under Regulation 2019

#### Department: Mechanical

S.No	Course Code	Course Name	L	T	P	C
1.	noc21-me115	<b>Elective NPTEL</b> Fundamentals of Additive Manufacturing Technologies	3	0	0	3
2.	noc21-cs63	<b>Elective NPTEL</b> Introduction to Internet of Things	3	0	0	3
3.	noc22-cs95	<b>Elective NPTEL</b> Introduction to Industry 4.0 and Industrial Internet of Things	3	0	0	3
4.	U19ME901	Machine Learning with Python Programming	3	0	0	3
5.	U19ME902	Data Analytics	3	0	0	3
6.	U19ME903	Data Structures using Python	3	0	0	3
7.	U19ME904	Heating Ventilation and Air Conditioning Design	3	0	0	3
8.	U19ME905	Modern Vehicle Technology and Automotive Testing	3	0	0	3
9.	U19ME906	Product Life Cycle Management	3	0	0	3
10.	U19ME907	Quality and Reliability Engineering	3	0	0	3
11.	U19ME908	Enterprise Resource Planning	3	0	0	3
12.	U19ME909	Supply Chain Management and Analytics	3	0	0	3
13.	U19ME910	Robotics and Automation	3	0	0	3
14.	U19ME911	Product Design and Development	3	0	0	3

**SONA COLLEGE OF TECHNOLOGY, SALEM-5**  
**DEPARTMENT OF MECHANICAL ENGINEERING**  
**LIST OF PROFESSIONAL ELECTIVES FOR HONOURS Degree**

**Date: 16-5-2023**

<b>S.No</b>	<b>Vertical 1: Robotics and Cyber Physical Systems</b>	<b>Vertical 2: Smart Manufacturing</b>	<b>Vertical 3: Product Life Cycle Management</b>	<b>Vertical 4: Futuristic Mobility</b>
1.	Robotic Systems I – Sensors & Actuators	Digital Manufacturing and Factory Automation	PLM Fundamentals	Robotic Systems I – Sensors & Actuators
2.	Robot Programming and Applications	Advanced Manufacturing Technologies	Lean Manufacturing	Intelligent vehicles technologies
3.	Mechatronics and Cyber- physical systems	Additive Manufacturing	Quality and Reliability Engineering	Driverless Car Assistance System
4.	Digital Manufacturing and Factory Automation	Energy Conservation in Industries	Enterprise Resource Planning	Automotive Transmission system
5.	Machine Learning with Python Programming	Machine Learning with Python Programming	Supply Chain management	Modern Vehicle Technology and Automotive Testing
6.	Robotics and Automation	Robotics and Automation	Product Design and Development	Supply Chain management
7.	NPTEL - I	NPTEL - I	NPTEL - I	NPTEL - I
8.	NPTEL - II	NPTEL - II	NPTEL - II	NPTEL - II

# SONA COLLEGE OF TECHNOLOGY, SALEM-5

## Department of Mechanical Engineering

### Honours Degree- Verticals & Courses

(Offered to UG students admitted during AY 2021- 2022 onwards, Regulation 2019)

#### **Vertical 1: Robotics and Cyber Physical Systems**

<b>S.No</b>	<b>Course Code</b>	<b>Course Name</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
1	U19ME2001	Robotic Systems I – Sensors & Actuators	3	0	0	3
2	U19ME2002	Robot Programming and Applications	3	0	0	3
3	U19ME2003	Mechatronics and Cyber-physical systems	3	0	0	3
4	U19ME2004	Digital Manufacturing and Factory Automation	3	0	0	3
5	U19ME901	Machine Learning with Python Programming	3	0	0	3
6	U19ME910	Robotics and Automation	3	0	0	3
7	NPTEL	NPTEL - I	3	0	0	3
8	NPTEL	NPTEL - II	3	0	0	3

#### **Vertical 2: Smart Manufacturing**

<b>S.No</b>	<b>Course Code</b>	<b>Course Name</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
1	U19ME2004	Digital Manufacturing and Factory Automation	3	0	0	3
2	U19ME2005	Advanced Manufacturing Technologies	3	0	0	3
3	U19ME2006	Additive Manufacturing	3	0	0	3
4	U19ME2007	Energy Conservation in Industries	3	0	0	3
5	U19ME901	Machine Learning with Python Programming	3	0	0	3
6	U19ME910	Robotics and Automation	3	0	0	3
7	NPTEL	NPTEL - I	3	0	0	3
8	NPTEL	NPTEL - II	3	0	0	3



### Vertical 3: Product Life Cycle Management

S.No	Course Code	Course Name	L	T	P	C
1	U19ME2008	PLM Fundamentals	3	0	0	3
2	U19ME2009	Lean Manufacturing	3	0	0	3
3	U19ME907	Quality and Reliability Engineering	3	0	0	3
4	U19ME908	Enterprise Resource Planning	3	0	0	3
5	U19ME909	Supply Chain management	3	0	0	3
6	U19ME911	Product Design and Development	3	0	0	3
7	NPTEL	NPTEL - I	3	0	0	3
8	NPTEL	NPTEL - II	3	0	0	3

### Vertical 4: Futuristic Mobility

S.No	Course Code	Course Name	L	T	P	C
1	U19ME2001	Robotic Systems I – Sensors & Actuators	3	0	0	3
2	U19ME2010	Intelligent vehicles technologies	3	0	0	3
3	U19ME2011	Driverless Car Assistance System	3	0	0	3
4	U19ME2012	Automotive Transmission system	3	0	0	3
5	U19ME905	Modern Vehicle Technology and Automotive Testing	3	0	0	3
6	U19ME909	Supply Chain management	3	0	0	3
7	NPTEL	NPTEL - I	3	0	0	3
8	NPTEL	NPTEL - II	3	0	0	3

# SONA COLLEGE OF TECHNOLOGY, SALEM-5

## Department of Mechanical Engineering

### Minor Degree- Verticals & Courses

(Offered to UG students admitted during AY 2021- 2022 onwards, Regulation 2019)

#### **Minor Vertical: Intelligent Industrial Automation**

<b>S.No</b>	<b>Course Code</b>	<b>Course Name</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
1	U19ME2001	Robotic Systems I – Sensors & Actuators	3	0	0	3
2	U19ME2002	Robot Programming and Applications	3	0	0	3
3	U19ME2004	Digital Manufacturing and Factory Automation	3	0	0	3
4	U19ME2006	Additive Manufacturing	3	0	0	3
5	U19ME901	Machine Learning with Python Programming	3	0	0	3
6	U19ME910	Robotics and Automation	3	0	0	3
7	NPTEL	NPTEL - I	3	0	0	3
8	NPTEL	NPTEL - II	3	0	0	3

**Sona College of Technology, Salem**

**(An Autonomous Institution)**



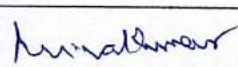

**Courses of Study for B.E/B.Tech. Semester I under Regulations 2019 (CBCS)**

**Branch: Mechanical Engineering**

S.No	Course Code	Course Title	L	T	P	C	Category	Total Contact Hours
<b>Theory</b>								
1	U19CHE104E ✓	Chemistry for Mechanical Engineering ✓	3 ✓	1 ✓	0	4 ✓	BS	60
2	U19MAT102A ✓	Linear Algebra and Calculus ✓	3 ✓	1 ✓	0	4 ✓	BS	60
3	U19EE106 ✓	Electrical Drives and ARM Processor ✓	3 ✓	0	0	3 ✓	ES	45
4	U19EGR106 ✓	Engineering Graphics ✓	2 ✓	0	2 ✓	3 ✓	ES	60 (30L+30P)
<b>Practical</b>								
5	U19CHL109 ✓	Chemistry Laboratory ✓	0	0	3 ✓	1.5 ✓	BS	45
6	U19EEL114 ✓	Electrical Drives and ARM Processor Laboratory ✓	0	0	4 ✓	2 ✓	ES	60
7	U19WPL112 ✓	Workshop Practice ✓	0	0	2 ✓	1 ✓	ES	30
8	U19ENL115 ✓	Communication Skills in English - I ✓	0	0	2 ✓	1 ✓	HS	30
9	U19GE101 ✓	Basic Aptitude - I ✓	0	0	2 ✓	0 ✓	EEC	30
<b>Total Credits</b>						<b>19.5</b> ✓		
<b>Optional Language Elective*</b>								
10	U19OLE1101 ✓	French ✓	0	0	2	1 ✓	HS	30
11	U19OLE1102 ✓	German ✓						30
12	U19OLE1103 ✓	Japanese ✓						30

\*Students may opt for foreign languages viz., German/French/Japanese with additional one credit (Not accounted for CGPA calculation)

**Approved By**

			
<b>Chairperson, Science and Humanities BoS</b>	<b>Chairperson, Mechanical Engineering BoS</b>	<b>Member Secretary, Academic Council</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. S. R. R. Senthil Kumar</b>

Copy to:-

HOD/ Mechanical Engineering, First Semester BE MECH Students and Staff, COE

**I SEMESTER (MECH)****COURSE CODE U19CHE104E**

L T P C

**COURSE NAME CHEMISTRY FOR MECHANICAL ENGINEERING**

3 1 0 4

**Course outcome:**

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

- CO1** Outline the principle, applications of electrochemistry, types of corrosion and its control methods.
- CO2** Describe the basic concepts, applications of surface chemistry and catalysis in engineering and technology.
- CO3** Discuss the chemistry of fuels and combustion.
- CO4** Analyze the industrial importance of phase rule and alloys.
- CO5** Outline the principle and processes of metallurgy and powder metallurgy.

CO / PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak Programme Outcomes (POs) and Programme Specific Outcome (PSOs)														
COs, POs PSOs Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO - 1	3	3												2
CO - 2	3	3												2
CO - 3	3	3												3
CO - 4	3	3												3
CO - 5	3	3						3						3

**UNIT I: ELECTROCHEMISTRY AND CORROSION****12**

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 – reversible and irreversible 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 – Corrosion control methods – Sacrificial anode and impressed cathode current method.

**UNIT II: SURFACE CHEMISTRY AND CATALYSIS****12**

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 – ion exchange adsorption- basic principles in adsorption chromatography – adsorption in pollution abatement (granular activated carbon and powdered activated carbon) – catalysis-types – characteristics of catalysts – autocatalysis – definition and examples.

**UNIT III: FUELS AND COMBUSTION****12**

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 – Methods of synthesis of petrol – Bergius and Fischer Tropsch processes - 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, Combustion – flue gas analysis by Orsat's method.

**UNIT IV: PHASE RULE AND ALLOYS****12**

Statement and explanation of terms involved - limitations and applications of phase rule - simple problems on the calculation of number of phases and number of components of systems in equilibrium (water system, decomposition of  $\text{CaCO}_3$ ,  $\text{PCl}_5$  and  $\text{NH}_4\text{Cl}$ ) – Construction of phase diagram for one component system; water system – condensed phase rule – construction of phase diagram by thermal analysis – simple eutectic systems (lead – silver system only).

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.

**UNIT V: METALLURGY****12**

Metallurgy – extraction of metals from its ores – froth floatation, electromagnetic separation and chemical methods – refining of metals – liquation and electrolytic refining methods – metallurgy of iron and nickel - Powder metallurgy – principle – characteristics of metal powders – methods of producing metal powders (mechanical pulverization, atomization, chemical reduction, electrolytic process, decomposition) – mixing and blending – compacting – sintering – applications, advantages and limitations of powder metallurgy, Applications of Chemistry in mechanical engineering.

**TOTAL: 60 HOURS****Text Books:**

1. P.C.Jain and Monica Jain, "Engineering Chemistry" Dhanpat Rai Pub, Co., New Delhi , 2010.
2. R. Venkatesh et al, "Chemistry For Mechanical Engineering" Sonaversity, Sona College of Technology, Salem, 2019.

**Reference Books:**

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).

**Dr. C. Shanthi**

HOD/Sciences

Dr. C. SHANTHI, M.Sc., Ph.D.,

Professor of Physics

Head, Department of Sciences

Sona College of Technology (Autonomous)

SALEM-636 005

## B. E. / MECHANICAL ENGINEERING

SEMESTER – I	LINEAR ALGEBRA AND CALCULUS	L	T	P	C
UI9MAT102A		3	1	0	4

**COURSE OUTCOMES**

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

1. find the rank of the matrix and solve linear system of equations by direct and indirect methods
2. apply the concepts of vector spaces and linear transformations in real world applications
3. apply the concepts of eigen values and eigen vectors of a real matrix and their properties in diagonalization and the reduction of a real symmetric matrix from quadratic form to canonical form
4. find the Taylor's series expansion, Jacobians and the maxima and minima of functions of two variables
5. apply appropriate techniques of multiple integrals to find the area and volume.

CO / PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
COs	Programme Outcomes (POs) and Programme Specific Outcome (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

**UNIT – I LINEAR SYSTEM OF EQUATIONS**

12

Rank of a matrix – Solution of linear system of equations by matrix method, Gauss elimination, Gauss-Jordan, Gauss-Jacobi and Gauss-Seidel methods.

**UNIT – II VECTOR SPACES**

12

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 – Rank-nullity theorem (without proof).

**UNIT – III EIGEN VALUES AND EIGEN VECTORS**

12

Eigen values and eigen vectors of real matrices – Properties of eigen values and eigen vectors – Cayley-Hamilton theorem – Diagonalization of real symmetric matrices – Reduction of quadratic form to canonical form.

**UNIT – IV MULTIVARIABLE CALCULUS**

12

Functions of several variables – Partial differentiation – Total derivative – Jacobians – Taylor's theorem for function of two variables – Maxima and minima of function of two variables without constraints – Constrained maxima and minima by Lagrange's method of undetermined multipliers.

**UNIT – V MULTIPLE INTEGRALS**

12

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.

Theory: 45 Hours

Tutorial: 15 Hours

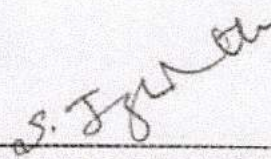
Total: 60 Hours

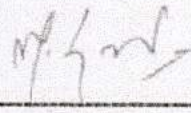
**TEXT BOOKS:**

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.

**REFERENCE BOOKS:**

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.

  
Prof. S. JAYABHARATHI  
Head / Department of Mathematics  
Sona College of Technology  
Salem – 636 005

  
Dr. M. RENUGA  
BoS - Chairperson  
Science and Humanities  
Sona College of Technology  
Salem – 636 005

## U19EE106 - ELECTRICAL DRIVES AND ARM PROCESSOR

**L T P C**  
**3 0 0 3**

**Course Outcomes: Upon completion of this course the students will be able to**

**CO1:** Explain the Construction, operation, starting and characteristics of DC motors.

**CO2:** Explain the Construction, Types, Operation and characteristics of Three Phase and Single Phase Induction motors.

**CO3:** Describe about Types of electric drives, Heating and Cooling curves and selection of power rating for motors.

**CO4:** Discuss about the Solid State Speed control of DC motors and three phase induction motors.

**CO5:** Identify the features of Intel 8085 Microprocessor and writing simple programs.

CO / PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
COs	Programme Outcomes (POs) and Programme Specific Outcome (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	3	2	-	3	-	-	-	-	2	1	1	1
CO2	3	2	2	2	2	3	-	-	-	-	2	1	1	1
CO3	3	3	2	2	-	2	-	-	-	-	2	1	1	1
CO4	1	3	2	1	-	-	-	-	-	-	2	1	1	1
CO5	1	2	2	1	2	2	-	-	-	-	2	1	1	1

### UNIT I - DC MOTORS

**L 9**

Construction, principle of operation, torque - speed characteristics – Starters – Speed control of DC series and shunt motors (Conventional Methods) – Armature and field control, Ward-Leonard control system, Applications.

### UNIT II - INDUCTION MOTORS

**L 9**

Three-phase induction motor: Construction – types – principle of operation – torque-slip characteristics – starting methods and speed control (Conventional Methods) – Single phase Induction motor, Applications.

### UNIT III - ELECTRIC DRIVES INTRODUCTION

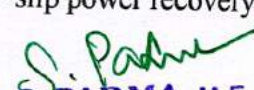
**L 9**

Basic Elements – Types of Electric Drives – factors are influencing the choice of electrical drives – Heating and cooling curves – Loading conditions and classes of duty – Selection of power rating for drive motors with regard to thermal overloading and Load variation factors.

### UNIT IV - SOLID STATE SPEED CONTROL OF AC AND DC DRIVES

**L 9**

Introduction – Half wave and Full Wave Rectifiers – Single phase half controlled and fully controlled bridge rectifier fed DC drives – single phase full bridge inverter with resistive and inductive load – voltage source inverter (VSI) and current source inverter (CSI) fed induction motor drives – slip power recovery scheme (Scherbious system and Kramers system)

  
**Dr. S. PADMA, M.E., Ph.D**  
Head of the Department  
Department of EEE,  
Sona College of Technology,  
SALEM-636 005



## UNIT V - ARM PROCESSOR FUNDAMENTALS

L 9

Architecture: Registers, Program status Register, Pipeline, Memory – ARM Instruction Set – Data processing Instructions, Branch Instructions, Load, store instructions, Software Interrupt Instruction, Program Status Register, Instructions, Loading Constants and Conditional Executions Basic Programming Using C.


**Total: 45 hours**

### TEXT BOOKS

1. Vedam Subramanyan, Electrical Drives concepts and applications, Tata McGraw Hill Publications, 2014
2. D.P. Kothari and I.J. Nagrath, "Electric Machines", Tata McGraw Hill Publishing Company Ltd, Fourth Edition 2010.

### REFERENCE BOOKS

1. Pillai.S.K "A first course on Electric drives", Wiley Eastern Limited, 3<sup>rd</sup> Edition Reprint 2015.
2. Jonathan W. Valvano., "Embedded System: Introduction to ARM Cortex-M Microcontrollers", 5th Edition, 2017, ISBN-13: 978-1477508992.
3. Electrical Drives and Microprocessor, Sonaversity.

  
**Dr. S. PADMA, M.E., Ph.D**  
Head of the Department  
Department of EEE,  
Sona College of Technology,  
SALEM-636 005

## U19EEL114 - ELECTRICAL DRIVES AND ARM PROCESSOR LABORATORY

**L T P C**  
**0 0 4 2**

**Course Outcomes:** Upon completion of this course the students will be able to

**CO1:** Analyze the characteristics and determine the efficiency of DC and AC motors.

**CO2:** Control the speed of DC and AC motors using rheostat and solid state controllers.

**CO3:** Execute a simple program interfacing with ARM processor.

CO / PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
COs	Programme Outcomes (POs) and Programme Specific Outcome (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	3	2	1	3	1	-	2	2	2	1	1	1
CO2	3	2	2	2	1	3	1	-	2	2	2	1	1	1
CO3	3	3	2	2	1	2	1	-	2	2	2	1	1	1

### LIST OF EXPERIMENTS

1. Load test on DC Shunt motor.
2. Load test on DC Series motor.
3. Speed control of DC shunt motor (Armature, Field control)
4. Load test on three phase squirrel cage Induction motor
5. Load test on single phase Induction Motor.
6. Speed control of three phase slip ring Induction Motor.
7. Single phase half controlled converter using R, RL Loads.
8. Single phase fully controlled converter using R, RL Loads.
9. Speed control of DC motor using 3Phase converter.
10. Speed control of 3 Phase Induction motor using Voltage Source Inverter (VSI).
11. Study of ARM evaluation system.
12. Write a program to interface stepper motor using ARM processor.
13. Write a program for an on chip ADC using ARM processor.

**TOTAL: 60 hours**

*S. Padma*  
**Dr. S. PADMA, M.E., Ph.D**  
Head of the Department  
Department of EEE,  
Sona College of Technology,  
SALEM-636 005

**COURSE CODE** U19EGR106 **L T P C**  
**COURSE NAME** ENGINEERING GRAPHICS **2 0 2 3**

**Course Outcomes**

Upon completion of this course the students will be able to

- CO1** Predict the construction of various curves in civil elevation, plan and machine components.
- CO2** Analyze the principles of projection of various planes by different angle to project points, lines and planes.
- CO3** Draw the principles of projection of simple solid by the axis is inclined to one reference plane by change of position method.
- CO4** Analyze the interior details of complex components, machineries by sectioning the solid body. Study the development of surfaces for prisms and pyramids.
- CO5** Draw the projection of three dimensional objects representation of machine structure and explain standards of orthographic views by different methods.

CO / PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
Programme Outcomes (POs) and Programme Specific Outcome (PSOs)														
COs, POs PSOs Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO 1	3	2	2	1	1	1	1	1	3	2	2	3	2	2
CO 2	3	2	2	1	2	1	1	1	3	2	2	3	2	2
CO 3	3	2	2	1	2	1	1	1	3	2	2	3	2	2
CO 4	3	2	2	1	2	1	1	1	3	2	2	3	2	2
CO 5	3	2	2	1	1	1	1	1	3	2	2	3	2	2

**CONCEPTS AND CONVENTIONS (Not for Examination) L 3 P 0**

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

**COMPUTER AIDED DRAFTING (Not for Examination) L 3 P 0**

Importance 2d Drafting, sketching, modifying, transforming and dimensioning.

**UNIT I PLANE CURVES (Manual drafting)**

L 4 P 2

Curves used in engineering practices Conics – Construction of ellipse – Parabola and hyperbola by eccentricity method – Construction of cycloid – construction of involutes of square and circle – Drawing of tangents and normal to the above curves.

**UNIT II PROJECTION OF POINTS, LINES AND PLANE SURFACES  
(CAD Software)**

L 9 P 3

Projection of points – Projection of straight lines located in the first quadrant – Determination of true lengths and true inclinations – Projection of polygonal surface and circular lamina inclined to one reference planes.

**UNIT III PROJECTION OF SOLIDS  
(CAD Software)**

L 9 P 3

Creation of 3D CAD models of pyramids, prisms and solids of revolutions - Sectional views -  
**(Not for Examination)**

Projection of simple solids like prisms – pyramids – cylinder and cone when the axis is inclined to one reference plane by change of position method.

**UNIT IV SECTION OF SOLIDS AND DEVELOPMENT OF SURFACES  
(CAD Software)**

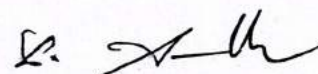
L 9 P 3

Sectioning of simple solids like prisms – pyramids, cylinder and cone in simple vertical position by cutting planes inclined to one reference plane and perpendicular to the other, (Obtaining true shape of section is not required). Development of lateral surfaces of simple and truncated solids – Prisms – pyramids – cylinders and cones.

**UNIT V CONVERSION OF ISOMETRIC VIEWS TO ORTHOGRAPHIC VIEWS  
(Manual drafting)**

L 9 P 3

Representation of three dimensional objects – General Principles of Orthographic projection – Need for importance of multiple views and their placement – First angle projection – layout of views – Developing visualization skills through free hand sketching of multiple views from pictorial views of objects.




---

**Total Number of hours: 60****Learning Resources****Text Books**

1. P. Suresh et al., "Engineering Graphics and Drawing", Sonaversity, Sona College of Technology, Salem, Revised edition, 2012.
2. K.V. Natarajan Engineering Graphics by, Chennai, 17th edition 2003.

**Reference Books**

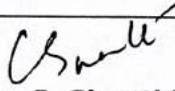
1. Dhananjay A. Jothe, Engineering Drawing with an introduction to AutoCAD, Tata McGraw Hill Publishing Company Limited, 2008.
2. Basant Agarwal and Agarwal C.M., Engineering Drawing, Tata McGraw Hill Publishing Company Limited, New Delhi, 2008.
3. K. R. Gopalakrishnana, Engineering Drawing (Vol. I & II), Subhas Publications, 1998.
4. Bertoline & Wiebe fundamentals of graphics communication III edition McGrawhill 2002.



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

U19CHL109		CHEMISTRY LABORATORY (Common to EEE and MECH)										L	T	P	C
												0	0	3	1.5
<b>Course Outcomes</b>															
After successful completion of this course, the students should be able to															
CO1:	Analyse the given water sample to determine the amount of hardness and alkalinity.														
CO2:	Determine the molecular weight of various polymers, analyse the quality of brass by estimating copper and estimate the amount of calcium oxide in the given cement sample. Calculate the amount of chromium present in the given sample of water,														
CO3:	Estimate the amount of DO in water and evaluate the amount of iron content in the given sample using spectrophotometry														
<b>CO/PO, PSO Mapping</b> (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
Programme Outcomes (POs) and Programme Specific Outcome (PSOs)															
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	
CO1	3			1		1					1			2	
CO2	3			1		1					1			2	
CO3	3			1		1					1			2	
<b>Course Assessment methods</b>															
<b>Direct</b>												<b>Indirect</b>			
Mean of 1 <sup>st</sup> half of Experiment (10)						Quiz on 2 <sup>nd</sup> half (5)						Course end survey			
Quiz on 1 <sup>st</sup> half (5)						Internal test II (10)									
Internal test I (10)						RTPS (10)									

Mean of 2 <sup>nd</sup> half of Experiment (10)	End semester Examination (40)
<b>List of Experiments (Physics part) (Any five experiments from the below list)</b>	
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 chloride ion present in the sample water by argentometric method.
5	Estimation of HCl by pH metry.
6	Determination of iron content in water by spectrophotometric method.
7	Estimation of HCl by conductometry. (HCl vs NaOH)
8	Estimation of mixture of acids by conductometry. (HCl + CH <sub>3</sub> COOH vs NaOH)
9	Estimation of ferrous ion by potentiometric titration.
10	Determination of Molecular weight of a polymer by viscosity measurements.
11	Determination of Dissolved Oxygen of water by Winkler's method.
12	Estimation of chromium in waste water.
<b>Total Hours: 45 Hrs</b>	

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

**COURSE CODE** U19WPL112 L T P C  
**COURSE NAME** WORKSHOP PRACTICE 0 0 2 1

**Course Outcomes**

Upon completion of this course the students will be able to

- CO1** Familiarize with the basic of tools and equipment's used in fitting, carpentry, welding and sheet metal.
- CO2** Fabricate the different simple products in above trades.
- CO3** Produce different joining of metals.

CO / PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak Programme Outcomes (POs) and Programme Specific Outcome (PSOs)														
COs, POs PSOs Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO 1	3	2	3	2	1	3	3	2	3	2	3	3	2	2
CO 2	3	2	3	2	1	3	3	2	3	2	3	3	2	2
CO 3	3	2	3	2	1	3	3	2	3	2	3	3	2	2

**LIST OF EXPERIMENTS**

**SECTION 1: FITTING**

Tools and Equipment's- Practice in filling.  
 Making of Vee joint and square (T-fitting) joint.

**SECTION 2: SHEET METAL**

Tools and Equipment's- Practice  
 Making of Dust Pan and Funnel.

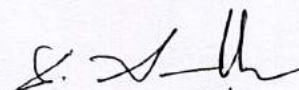
**SECTION 3: WELDING**

Tools and Equipment's - Practice  
 Arc welding of Butt joint and Lap Joint.

**SECTION 4: CARPENTRY**

Tools and Equipment's- Planning Practice  
 Making of Half Lap joint and Dovetail Joint.

**Total Number of hours: 30**

  
 D. Suresh Babu.

  
**Dr. D. SENTHIL KUMAR**, M.E., Ph.D  
 PROFESSOR & HEAD  
 DEPT. OF MECHANICAL ENGG.  
 SONA COLLEGE OF TECHNOLOGY  
 JUNCTION MAIN ROAD, SALEM-5  
 Page 1 of 1



UI9ENL115- Communication Skills in English - I  
First Year I Semester  
Common to Mechanical Branch

**Course Outcomes: At the end of the course, the students will be able to**

- Communicate competitively among themselves
- Demonstrate improved ability to communicate effectively in work place and at home
- Introduce themselves, deliver speeches on general topics and make technical presentation

	COURSE OUTCOMES	PROGRAMME OUTCOMES												Pso 1	Pso 2
		1	2	3	4	5	6	7	8	9	10	11	12		
1	Communicate competitively among themselves	1	1	1	2	2	2	3	2	3	3	3	3	3	3
2	Demonstrate improved ability to communicate effectively in work place and at home	2	2	2	3	2	2	3	2	3	3	3	3	3	3
3	Introduce themselves, deliver speeches on general topics and make technical presentation	1	1	1	2	2	3	3	2	3	3	3	3	3	3

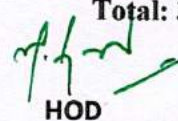
**Part - 1**

- Extempore presentation – story narration, simple, general, abstract topics and incidents

**Part - 2**

- Self- introduction - personal information, name, home background, study details, area of interest, hobbies, strengths and weaknesses
- Mini presentation in small groups of two or three on office arrangements, facilities, office functions, sales, purchases, training recruitment, advertising, applying for financial assistance, applying for a job, team work, discussion, presentation
- Situational Role Play - between examiner and candidate, teacher and student, customer and sales manager, hotel manager and organiser, team leader and team member, bank manager and candidate, interviewer and applicant, car driver and client, industrialist and candidate

Total: 30 hours



HOD

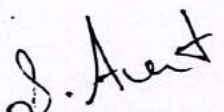
Humanities and Languages

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

J. J. M.  
25/11/20

Semester-I UI9GE101	Basic Aptitude – I (Common to All Departments)	L	T	P	C	Marks
Course Outcomes UI9GE101						
At the end of the course the student will be able to:						
1. Solve fundamental problems in specific areas of quantitative aptitude						
2. Solve basic problems in stated areas of logical reasoning						
3. Demonstrate rudimentary verbal aptitude skills in English with regard to specific topics						
1. Quantitative Aptitude and Logical Reasoning	<b>Solving simple problems with reference to the following topics:</b> a. Numbers – HCF & LCM b. Decimal fractions c. Simplification d. Square roots & cube roots e. Surds & indices f. Ratio and proportion g. Averages h. Area and volume i. Coding and decoding & artificial language					
2. Verbal Aptitude	<b>Demonstrating plain English language skills with reference to the following topics:</b> a. Synonyms b. Antonyms c. Verbal analogy d. Editing passages e. Sentence filler words					

30 hours

  
Dr.S.Anita

Head/Training

Department of Placement Training  
Sona College of Technology,  
Salem-636 005.

**Sona College of Technology, Salem – 636 005**

**(An Autonomous Institution)**

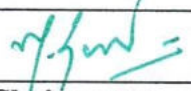
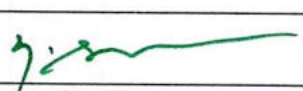
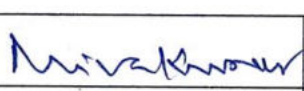
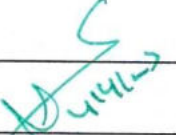
**Courses of Study for BE / B Tech Semester II under Regulations 2019 (CBCS)**

**Branch: Mechanical Engineering**

S.N	Course Code	Course Title	L	T	P	C	Category	Total Contact Hours
<b>Theory</b>								
1	U19TAM201	தமிழர் மரபு / Heritage of Tamils	1	0	0	1	HSMC	15
2	U19MAT202A	Differential Equations and Vector Calculus	3	1	0	4	BSC	60
3	U19PHY203D	Physics for Mechanical Engineering	3	1	0	4	BSC	60
4	U19PPR205	Problem Solving Using Python Programming	3	0	0	3	ESC	45
5	U19ME201	Manufacturing Process	3	0	2	4	ESC	75 (45L+30P)
6	U19ENG201D	Communication Skills in English for Engineers and Technocrats	2	0	2	3	HSC	60 (30L+30P)
<b>Practical</b>								
7	U19PHL210	Physics Laboratory	0	0	3	1.5	BSC	45
8	U19PPL211	Python Programming Laboratory	0	0	2	1	ESC	30
9	U19GE201	Basic Aptitude-II	0	0	2	0	EEC	30
<b>Total Credits</b>						<b>21.5</b>		
<b>Optional Language Elective*</b>								
10	U19OLE1201	French	0	0	2	1	HSMC	30
11	U19OLE1202	German						
12	U19OLE1203	Japanese						

\*Students may opt for foreign languages viz., German/French/Japanese with additional one credit (Not accounted for CGPA calculation)

Approved by

			
<b>Chairperson, Science and Humanities BoS</b>	<b>Chairperson, Mechanical Engineering BoS</b>	<b>Member Secretary, Academic Council</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. S. R. R. Senthil Kumar</b>

Copy to:-HOD/ Mechanical Engineering, Second Semester BE MECH Students and Staff, COE

03.03.2023

B.E/B.Tech Regulations-2019

**UNIT I LANGUAGE AND LITERATURE**

3

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.

**UNIT II HERITAGE - ROCK ART PAINTINGS TO MODERN ART – SCULPTURE**

3

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.

**UNIT III FOLK AND MARTIAL ARTS**

3

Therukoothu, Karagattam, Villu Pattu, Kaniyan Koothu, Oyillattam, Leather puppetry, Silambattam, Valari, Tiger dance - Sports and Games of Tamils.

**UNIT IV THINAI CONCEPT OF TAMILS**

3

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.

**UNIT V CONTRIBUTION OF TAMILS TO INDIAN NATIONAL MOVEMENT AND INDIAN CULTURE**

3

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.

**TOTAL : 15 PERIODS****TEXT-CUM-REFERENCE BOOKS**

1. தமிழக வரலாறு - மக்களும் பண்பாடும் - 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. பொருநை - 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

**Dr. M.RENUGA,**  
Professor & Head,

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

அலகு I மொழி மற்றும் இலக்கியம்: 3

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.

அலகு II மரபு - பாறை ஓவியங்கள் முதல் நவீன ஓவியங்கள் வரை - சிற்பக் கலை: 3

நடுகல் முதல் நவீன 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, நாத்தஸ்வரம் - தமிழர்களின் சமூக பொருளாதார வாழ்வில் கோவில்களின் பங்கு.

அலகு III நாட்டுப்புறக் கலைகள் மற்றும் வீர விளையாட்டுகள்: 3

தெருக்கூத்து, கரகாட்டம், வில்லுப்பாட்டு, கணியான் கூத்து, ஓயிலாட்டம், தோல்பாவைக் கூத்து, சிலம்பாட்டம், வளரி, புலியாட்டம், தமிழர்களின் விளையாட்டுகள்.

அலகு IV தமிழர்களின் திணைக் கோட்பாடுகள்: 3

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 V இந்திய தேசிய இயக்கம் மற்றும் இந்திய பண்பாட்டிற்குத் தமிழர்களின் பங்களிப்பு: 3

இந்திய விடுதலைப்போரில் தமிழர்களின் பங்கு - இந்தியாவின் பிறப்பகுதிகளில் தமிழ்ப் பண்பாட்டின் தாக்கம் - சுயமரியாதை இயக்கம் - இந்திய மருத்துவத்தில், சித்த மருத்துவத்தின் பங்கு - கல்வெட்டுகள், கையெழுத்துப்படிக்கள் - தமிழ்ப் புத்தகங்களின் அச்ச வரலாறு.

TOTAL : 15 PERIODS

#### TEXT-CUM-REFERENCE BOOKS

1. தமிழக வரலாறு - மக்களும் பண்பாடும் - 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. பொருளை - 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

Dr. M. RENUGA,  
Professor & Head,

Department of Humanities & Language  
Sona College of Technology,  
SALEM - 636 001.

## B. E. / MECHANICAL ENGINEERING

SEMESTER – II	DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS	L	T	P	C
U19MAT202A		3	1	0	4

## COURSE OUTCOMES

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

1. apply the classical methods to solve linear ordinary differential equations.
2. apply the appropriate numerical methods to solve ordinary differential equations.
3. apply the Laplace transforms technique to solve ordinary differential equations.
4. apply the classical method to solve partial differential equations.
5. apply the concepts of vector differentiation and integration to determine the line, surface and volume integrals.

CO / PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
COs	Programme Outcomes (POs) and Programme Specific Outcome (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

**UNIT – I ORDINARY DIFFERENTIAL EQUATIONS 12**

Linear higher order ordinary differential equations with constant coefficients – Cauchy's and Legendre's homogeneous linear ordinary differential equations – Method of variation of parameters.

**UNIT – II NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS 12**

**Single Step Methods:** Taylor's series – Euler and Modified Euler methods – Fourth order Runge – Kutta method for solving first and second order ordinary differential equations.

**Multi Step Methods:** Milne's and Adam's predictor-corrector methods.

**UNIT – III LAPLACE TRANSFORMS 12**

**Laplace transform:** Conditions for existence – Transform of elementary functions – Basic properties – Transform of derivatives and integrals – Transform of unit step function and impulse function – Initial and final value theorems – Transform of periodic functions.

**Inverse Laplace transform:** Standard results – Statement of convolution theorem and its applications – Solution of linear second order ordinary differential equations with constant coefficients using Laplace transform.

**UNIT – IV PARTIAL DIFFERENTIAL EQUATIONS**

12

Formation of partial differential equations – Lagrange's linear equation – Solution of standard types of first order partial differential equations – Linear partial differential equations of second and higher order with constant coefficients.

**UNIT – V VECTOR CALCULUS**

12

**Vector differentiation:** Scalar and vector valued functions – Gradient, directional derivative, divergence and curl – Scalar potential.

**Vector integration:** Line, surface and volume integrals – Statements of Green's, Stoke's and Gauss divergence theorem – Simple applications involving squares, rectangles, cubes and rectangular parallelepiped.

Theory: 45 Hours

Tutorial: 15 Hours

Total: 60 Hours

**TEXT BOOKS:**

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.

**REFERENCE BOOKS:**

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.

---

**Prof. S. JAYABHARATHI**  
Head / Department of Mathematics  
Sona College of Technology  
Salem – 636 005

---

**Dr. M. RENUGA**  
BoS - Chairperson  
Science and Humanities  
Sona College of Technology  
Salem – 636 005

Course Code:

U19PHY203D

L T P C

Course Name:

Physics for Mechanical Engineering

3 1 0 4 100

(for Mechanical Engineering)

**COURSE OUTCOMES:**

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

- CO1** Explain motion of objects in two dimensions.  
**CO2** Discuss different types of waves and their uses.  
**CO3** Illustrate electromagnetic waves and their applications.  
**CO4** Explain optical phenomena of waves and their propagation.  
**CO5** Describe quantum physics concepts and their uses.

CO / PO, PSO Mapping														
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
Programme Outcomes (POs) and Programme Specific Outcome (PSOs)														
COs, POs PSOs Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO-1	3	2	-	-	-	-	-	-	-	-	2	2	-	3
CO-2	3	2	-	-	-	-	-	-	-	-	2	2	-	3
CO-3	3	2	-	-	-	-	-	-	-	-	2	2	-	3
CO-4	3	2	-	-	-	-	-	-	-	-	2	2	-	3
CO-5	3	2	-	-	-	-	-	-	-	-	2	2	-	3

**UNIT 1 Mechanics****12**

**Vectors:** Introduction to vector – coordinate systems – vector and scalar quantities – some properties of vectors – components of a vector and unit vectors

**Motion in Two Dimensions:** The position, velocity and acceleration vectors – Two-dimension motion with constant acceleration – Projectile motion – Analysis mode; Particle in uniform circular motion – tangential and radial acceleration – relative velocity and relative acceleration.

**UNIT 2 Mechanical Waves****12**

**Wave Motion:** Propagation of a disturbance – Analysis Model – travelling wave – the speed of waves on strings – reflection and transmission – rate of energy transfer by sinusoidal waves on strings – the linear wave equation.

**Sound Waves:** Pressure variations in sound waves – speed of sound waves – intensity of periodic sound waves – The Doppler effect.

**UNIT 3 DC Current and Electromagnetic waves****12**

30.6.2022

B.E / B.Tech Regulation 2019



**Direct Current Circuits:** Electromotive force – Resistors in series and parallel – Kirchhoff's rules – RC circuits – Household wiring and electrical safety.

**Electromagnetic waves:** Displacement current and the general form of Ampere's law – Maxwell's equations and Hertz's discoveries – plane electromagnetic waves – Energy carried by electromagnetic waves – momentum and radiation pressure – Production of electromagnetic waves by antenna – the spectrum of electromagnetic waves.

#### **UNIT 4 Wave Optics, Diffraction Patterns and Polarization**

12

**Wave Optics:** Young's double-slit experiment – Analysis Model: Waves in interference – Intensity distribution of the double-slit interference pattern – change of phase due to reflection – interference in thin films – The Michelson's interferometer.

**Diffraction Patterns and Polarization:** Introduction to diffraction patterns – diffraction patterns from narrow slits – resolution of single-slit and circular apertures – The diffraction grating – diffraction of x-ray by crystals – polarization of light waves.

#### **UNIT 5 Quantum Physics**

12

**Particle nature of radiation:** Compton effect - expression for Compton shift (no derivation)

**Wave nature of matter:** de Broglie waves - Schrodinger'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 - A particle in a well of finite height and width.

**Application of wave nature of particles:** Introduction to electron microscope - Comparison of optical and electron microscope - Scanning electron microscope - Limitations of electron microscope

**TOTAL: 60 Hours**

#### **Text book**

1. Physics for Scientists and Engineers by Serway & Jewett – Cengage Publications 9<sup>th</sup> edition.
2. B. K. Pandey and Manoj K. Harbola, Cengage Learning India Pvt. Ltd., Delhi, 2012.

#### **References**

1. C. Shanthi et al., Engineering Physics, Sonaversity, Sona College of Technology, Salem (Revised edition, 2016).
2. M.N. Avadhanulu and PG Kshirsagar, A Text book of Engineering Physics, S.Chand and company, Ltd., New Delhi, 2005.
3. Rajendran.V and Marikani. A, Engineering Physics, Tata Mc Graw Hill

Sona College of Technology, Salem

Publications Ltd, III Edition, New Delhi, 2004.

Department of Sciences (Physics)

*C. Shanthi*  
30.6.2022

**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.

30.6.2022

B.E / B.Tech Regulation 2019

**COURSE OUTCOMES**

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

1. Develop algorithmic solutions to simple computational problems
2. Write simple Python programs
3. Write programs with the various control statements and handling strings in Python
4. Develop Python programs using functions and files
5. Analyze a problem and use appropriate data structures to solve it.

CO / PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
COs	Programme Outcomes (POs) and Programme Specific Outcome (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	3	3	1	1	2	2	1	3	3	3
CO2	3	3	3	3	3	2	1	1	1	1	1	3	3	3
CO3	3	3	3	3	3	3	2	1	1	1	1	3	3	3
CO4	3	3	3	3	3	2	2	1	1	2	1	3	3	3
CO5	3	3	3	3	3	3	3	1	1	1	1	3	3	3

**UNIT I - ALGORITHMIC PROBLEM SOLVING 9**

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 II - BASICS OF PYTHON PROGRAMMING 9**

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 III - CONTROL STATEMENTS AND STRINGS 9**

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.

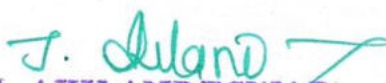
**UNIT IV - FUNCTIONS AND FILES 9**

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.

**UNIT V - DATA STRUCTURES: LISTS, SETS, TUPLES, DICTIONARIES 9**

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.

**TOTAL: 45 HOURS**


  
**Dr. J. AKILANDESWARI**  
 PROFESSOR & HEAD  
 Department of Information Technology  
 SONA COLLEGE OF TECHNOLOGY  
 SALEM - 636 005

## TEXT BOOK

1. Reema Thareja, "Problem Solving and Programming with Python", Oxford University Press, 2018.
2. Allen B. Downey, "Think Python: How to Think Like a Computer Scientist", 2nd edition, Updated for Python 3, Shroff/O'Reilly Publishers, 2016 (<http://greenteapress.com/wp/think-python/>)

## REFERENCES

1. Ashok Namdev Kamthane, Amit Ashok Kamthane, "Programming and Problem Solving with Python", Mc-Graw Hill Education, 2018.
2. Robert Sedgewick, Kevin Wayne, Robert Dondero, "Introduction to Programming in Python: An Inter-disciplinary Approach", Pearson India Education Services Pvt. Ltd., 2016.
3. Timothy A. Budd, "Exploring Python", Mc-Graw Hill Education (India) Private Ltd., 2015.
4. Kenneth A. Lambert, "Fundamentals of Python: First Programs", CENGAGE Learning, 2012.
5. Charles Dierbach, "Introduction to Computer Science using Python: A Computational Problem Solving Focus", Wiley India Edition, 2013.

  
Dr. J. AKILANDESWARI  
PROFESSOR & HEAD  
Department of Information Technology  
SONA COLLEGE OF TECHNOLOGY  
SALEM - 636 005

**COURSE CODE** U19ME201  
**COURSE NAME** MANUFACTURING PROCESS

L T P C  
 3 0 2 4

**Course Outcomes**

Upon completion of this course the students will be able to

- CO1** Explain the major concepts of material removal process and characterization of tool wear and its types.
- CO2** Discuss the cutting tool materials and its specific purpose and explain about lathe details, main dissimilarity of capstan and turret lathes.
- CO3** Describe the various types of welding process for the engineering application and investigate the welding defects.
- CO4** Explain the sand casting process, pattern materials and special casting processes.
- CO5** Elaborate the various types of moulding processes in manufacturing of plastic components.

CO / PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak Programme Outcomes (POs) and Programme Specific Outcome (PSOs)														
COs, POs PSOs Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO 1	3	2	2	3	3	3	2	-	2	3	2	3	3	3
CO 2	3	2	2	3	3	3	2	-	2	3	2	3	3	3
CO 3	3	2	2	3	2	3	-	-	2	3	2	3	3	3
CO 4	3	2	2	3	2	3	-	-	2	3	-	3	3	3
CO 5	3	2	2	2	3	3	3	3	3	3	2	3	3	3

**SECTION: A THEORY**

**Unit – I THEORY OF METAL CUTTING L 9**

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.

**Unit – II CENTRE LATHE AND SPECIAL PURPOSE LATHES L 9**

Centre lathe: constructional features- various operations, tool and work holding devices- taper turning methods, special attachments, Lathe machining time calculations. Capstan and turret lathes – automats –Swiss type- - geneva mechanism, Bar feed mechanism.

**Unit – III METAL JOINING PROCESS**

L 9

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 - Resistant welding: Butt- Spot- Seam welding, Friction welding- Electron beam welding. Thermit Welding - Brazing- Soldering- Welding defects.

**Unit – IV METAL CASTING**

L 9

Sand Casting- Moulding Tools- Types of Patterns- Pattern Materials- Pattern Allowances- Types of Moulding Sand- Properties- Core Making- Methods of Sand Testing- 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.

**Unit – V MANUFACTURING OF PLASTIC COMPONENTS**

L 9

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.

**Number of hours: 45****SECTION: B****PRACTICAL****LIST OF EXPERIMENTS**

1. Experiment on Simple Facing & Turning.
2. Exercise on Step And Taper Turning Model.
3. Exercise on Grooving And Thread Cutting Operation.
4. Exercise on Drilling, Boring.
5. Exercise on Arc Welding ( Tee Joint)
6. Exercise on TIG Welding
7. Exercise on MIG Welding

**LIST OF EQUIPMENTS**

1. Centre Lathe with accessories	-	15 No
2. Pillar type drilling machine	-	01 No
3. Table top drilling machine	-	01 No
4. Arc Welding Unit	-	01 No
5. TIG Welding Unit	-	01 No
6. MIG Welding Unit	-	01 No

**Number of hours: 30****Total Number of hours (45+30): 75**

## **Learning Resources**

### **Text Books**

1. J.P .Kaushish "Manufacturing Processes" PHI Learning Private limited, second edition 2010.
2. Hajra Choudhury, "Elements of Workshop Technology, Vol. I Media Promoters & Publishers pvt ltd .2009

### **Reference Books**

1. B.S. Magendran parashar & R.K. Mittal, "Elements of Manufacturing Processes", Prentice Hall of India, 2003.
2. P.N. Rao, Manufacturing Technology", Tata McGraw-Hill Publishing Limited, II Edition, 2009.



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

**U19ENG201D - Communication Skills in English for Engineers and Technocrats**

**First year II semester**

**Mechanical**

**Course Outcome: At the end of course, the students will be able to**

1. Use grammatical components effectively in both written and spoken communication
2. Read for gathering and understanding information, following directions and giving responses
3. Develop effective reading skills and reinforce language skills required for using grammar and building vocabulary.
4. Write email, formal letters and descriptions of graphics
5. Develop skills for writing reports and proposals, and for general purpose and technical writing.

	COURSE OUTCOMES	PROGRAMME OUTCOMES												Ps o1	Ps o2
		1	2	3	4	5	6	7	8	9	10	11	12		
1	Use grammatical components effectively in both written and spoken communication	1	1	1	2	2	2	3	3	3	3	3	3	3	3
2	Read for gathering and understanding information, following directions and giving responses	2	2	1	1	2	3	3	3	3	3	3	3	3	3
3	Develop effective reading skills and reinforce language skills required for using grammar and building vocabulary	2	2	1	1	2	3	3	3	3	3	3	3	3	3
4	Write email, formal letters and descriptions of graphics	1	1	2	2	2	3	2	2	1	3	3	2	3	3
5	Develop skills for writing reports and proposals, and for general purpose and technical writing	1	2	1	2	2	2	2	2	3	3	2	2	2	2

**UNIT -I**

**12**

- Focus on language -articles- prepositions - modal verbs- prefixes and suffixes.
- Understanding notice, messages, timetable, advertisements, graphs, Etc.



- Writing e-mail, constructing paragraphs and essays

## UNIT – II

12

- Focus on language - active and passive voice, tenses
- Reading passages for specific information transfer.
- Letter Writing - inviting dignitaries, accepting and declining invitations letter writing

## UNIT - III

12

- Focus on language - Collocation, concord,
- Reading passage with multiple choice questions
- Proposal

## UNIT - IV

12

- Focus on language - if conditional clauses, cause and effect expressions
- Short reading passage: gap-filling exercise related to grammar
- Writing- resume, instructions.

## UNIT - V

12

- Focus on language - pronoun, adverbs
- Short reading passages for sentence matching exercises, picking out specific information in a short text
- Writing- note making, report writing

**(Theory: 30 hours: Practical: 30 hours) Total: 60 hours**

### Textbook:

1. Technical English I & II, Dr. M. Renuga et al. Sonaversity, 2016.

### Extensive Reading

1. Who Moved my Cheese? – Spencer Johnson-G. P. Putnam's Sons
2. Discover the Diamond in You – Arindham Chaudhari – Vikas Publishing House Pvt. Ltd.

### Reference

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.

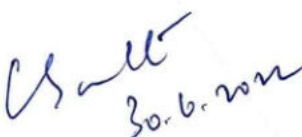


HOD

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

<b>U19PHL210</b>		<b>PHYSICS LABORATORY</b>											<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
													<b>0</b>	<b>0</b>	<b>3</b>	<b>1.5</b>
<b>Course Outcomes</b>																
<b>After successful completion of this course, the students should be able to</b>																
<b>CO1:</b>	Apply the principles of Thermal Physics and Elasticity to determine the Engineering properties of materials.															
<b>CO2:</b>	Apply the principles of Optics and Electricity to determine the Engineering properties of materials.															
<b>CO3:</b>	Determine the thickness and resistivity of the given copper turn used for house hold applications.															
<b>Pre-requisite:</b> Capable of using Screw gauge, Vernier calliper, Travelling microscope and Spectrometer																
<b>CO/PO, PSO Mapping</b> (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak																
<b>Programme Outcomes (POs) and Programme Specific Outcome (PSOs)</b>																
<b>COs</b>	<b>PO 1</b>	<b>PO 2</b>	<b>PO 3</b>	<b>PO 4</b>	<b>PO 5</b>	<b>PO 6</b>	<b>PO 7</b>	<b>PO 8</b>	<b>PO 9</b>	<b>PO 10</b>	<b>PO 11</b>	<b>PO 12</b>	<b>PSO 1</b>	<b>PSO 2</b>		
CO1	3			1		1					1			2		
CO2	3			1		1					1			2		
CO3	3			1		1					1			2		
<b>Course Assessment methods</b>																
<b>Direct</b>												<b>Indirect</b>				
Mean of 1 <sup>st</sup> half of Experiment (10)						Quiz on 2 <sup>nd</sup> half (5)						Course end survey				
Quiz on 1 <sup>st</sup> half (5)						Internal test II (10)										
Internal test I (10)						RTPS (10)										
Mean of 2 <sup>nd</sup> half of Experiment (10)						End semester Examination (40)										

<b>List of Experiments</b>	
1	Determination of velocity of ultrasonic waves and compressibility of the given liquid using ultrasonic interferometer.
2	Determination of Young's modulus of the material of the beam by Non-uniform bending method.
3	Determination of the thermal conductivity of a bad conductor using Lee's Disc apparatus.
4	Determination of specific resistance of a given wire using Carey Foster's bridge.
5	Determination of Rigidity Modulus of given wire using Torsion Pendulum.
6	Determination of coefficient of viscosity of liquid by Poiseuille's method.
7	Determination of Young's modulus of the material of the beam by uniform bending method.
8	Determination of laser wavelength using diode laser.
9	Determination of particle size of lycopodium powder using diode laser.
10	Determination of acceptance angle and numerical aperture of an optical fibre using diode laser.
11	Determination of the thickness of a thin wire by forming interference fringes using air wedge apparatus.
12	Determination of dispersive power of the prism for various pairs of colors in the mercury spectrum using a spectrometer.
13	Determination of Wavelength of Mercury spectrum using spectrometer.
14	Determination of band gap of the given semiconductor diode.
<b>Total Hours: 45 Hrs</b>	

  
 30.6.2022  
**Dr. C. SHANTHI, M.Sc., M.E., Ph.D.,**  
 Professor of Physics  
 Head, Department of Sciences  
 Sona College of Technology (Autonomous)  
 SALEM-636 005.

**COURSE OUTCOMES**

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


1. Implement the algorithms using basic control structures in Python
2. Develop Python programs to use functions, strings and data structures to solve different types of problems
3. Implement persistent storing information through file operations

CO / PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
COs	Programme Outcomes (POs) and Programme Specific Outcome (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	3	2	1		1	2	2	1	2	3	3
CO2	3	3	3	3	2	2		1	2	2	1	2	3	3
CO3	3	3	3	3	2	2		1	2	2	1	3	3	3

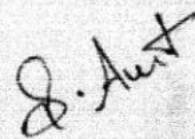
**LIST OF EXPERIMENTS**

1. Draw flowchart using any open source software.
2. Implement programs with simple language features.
3. Implement various branching statements in python.
4. Implement various looping statements in python.
5. Develop python programs to perform various string operations like concatenation, slicing, indexing.
6. Implement user defined functions using python.
7. Implement recursion using python.
8. Develop python programs to perform operations on list and tuples
9. Implement dictionary and set in python
10. Implement python program to perform file operations.

**TOTAL: 30 HOURS**

  
**Dr. J. AKILANDESWARI**  
 PROFESSOR & HEAD  
 Department of Information Technology  
 SONA COLLEGE OF TECHNOLOGY  
 SALEM - 636 005

Semester-II	Basic Aptitude – II - U19GE201 (Common to All Departments)	L	T	P	C	Marks
		0	0	2	0	100
<b>Course Outcomes</b>						
<b>At the end of the course the student will be able to:</b>						
1. Solve more elaborate problems than those in BA-I* in specific areas of quantitative aptitude						
2. Solve problems of greater intricacy than those in BA-I in stated areas of logical reasoning						
3. Demonstrate higher than BA-I level verbal aptitude skills in English with regard to specific topics						
<b>1. Quantitative Aptitude and Logical Reasoning</b>	<b>Solving quantitative aptitude and logical reasoning problems with reference to the following topics:</b> <ol style="list-style-type: none"> <li>Profit &amp; loss</li> <li>Partnership</li> <li>Chain rule</li> <li>Numbers</li> <li>Ages</li> <li>Percentages</li> <li>Logarithms</li> <li>Geometry</li> <li>Direction sense</li> <li>Symbols and series</li> </ol>					
<b>2.. Verbal Aptitude</b>	<b>Demonstrating verbal aptitude skills in English with reference to the following topics:</b> <ol style="list-style-type: none"> <li>Jumbled sentences</li> <li>Reconstructions of sentences (PQRS)</li> <li>Sentence fillers two words</li> <li>Idioms and phrases</li> <li>Spotting errors</li> <li>Writing captions for given pictures</li> </ol>					



**Dr.S.Anita**

**Head/Training**

**Dr. S. ANITA**

*Professor and Head  
Department of Training,*

**SONA COLLEGE OF TECHNOLOGY,  
SALEM - 636 005.**

**French Language A1 Level 2/A2**  
**First year II semester**

**Course code: U19OLE1201**

**0 0 2 1**

**Course Outcomes :** At the end of completion of this course, students will be able to,

1. Accept and refuse of an invitation, give some instruction of do's and don'ts, converse in commercial centres, write an invitation
2. Describe a city, locate a place in a city, ask further details, describe one's hometown
3. 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
4. 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
5. 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

**Unit-I Gouter à la campagne**

**6 hours**

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

**Unit-II Voyager dans sa ville**

**6 hours**

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

**Unit-III Faire du neuf avec du vieux**

**6 hours**

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

**Unit-IV Changer d'air**

**6 hours**

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

**Unit-V Devenir éco-citoyen**

**6 hours**

Hr 26: Citizenship and solidarity, conjugation: connaitre and savoir, depuis vs pendant

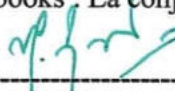
Hr 28: Imparfait vs passé composé, nature and environment, indirect pronouns COI

Hr 30: Animals, conditional, talk on supporting others, write a biography

**Total : 30 hours**

**Text Books**

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

  
-----  
**Dr. M. Renuga**  
BoS – Chairperson,  
Science & Humanities  
HOD / H&L

**Dr. M. RENUGA,**  
Professor & Head,  
Department of Humanities & Languages,  
Sona College of Technology,  
SALEM - 636 001.

## German Language Course

### First year II semester

Course Code: U19OLE1202

L T P C  
0 0 2 1

**Course Outcomes: At the end of the course, students should be able to,**

1. Use grammatical expressions appropriately in day-to-day conversation.
2. Make them frame simple sentences /questions.
3. Accentuate to start and sustain basic conversation
4. Helps them articulate thoughts in German
5. Identify the different forms of the verb.

**UNIT – I** **6**

- Nominative/accusative case, adjectives

**UNIT – II** **6**

- Modes of transportation, orientation, giving/understanding simple directions

**UNIT – III** **6**

- Food and beverages, Modal verbs, Separable verbs

**UNIT – IV** **6**

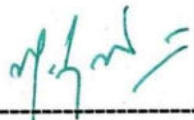
- Simple sentences using modal / separable verbs

**UNIT – V** **6**

- Articles of clothing

**Total : 30 hours**

**Text Book**  
Netzwerk A1

---

**Dr. M. Renuga**  
BoS – Chairperson,  
Science & Humanities  
HOD / H&L

**Dr. M. RENUGA,**  
Professor & Head,  
Department of Humanities & Languages,  
Sona College of Technology,  
SALEM - 636 001

**Course Outcomes:** At the end of completion of this course, students will be able to,

- 1.0 Use verbs in polite conversation or for dissuasion and describe two different activities
- 2.0 Demonstrate the application of causative verbs and those that express ability or possibility, and describe experiences
- 3.0 Use plain-style expressions, those that state opinions, and verbs and adjectives that go with nouns
- 4.0 Express sentences that use ‘when’ and ‘if’ and those that describe how services are given and received
- 5.0 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

•••

**Unit-I 6 hours**

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

**Unit-II 6 hours**

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

**Unit-III 6 hours**

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

**Unit-IV 6 hours**

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

**Unit-V 6 hours**

Hr 25-26: Preparing for JLPT N5

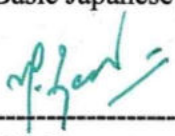
Hr 27-28: Preparing for JLPT N5

Hr 29-30: Preparing for JLPT N5

**Total : 30 hours**

**Text Books**

1. The course faculty will provide handouts / notes / course material.
2. Books on Basic Japanese language available in the college library.

  
-----  
**Dr. M. Renuga**  
BoS – Chairperson,  
Science & Humanities  
HOD / H&L

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

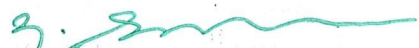



Mech  
111

**Sona College of Technology, Salem**  
(An Autonomous Institution)  
**Courses of Study for B.E/B.Tech. Semester III Regulations 2019**  
**Branch: Mechanical Engineering**

S. No	Course Code	Course Title	Lecture	Tutorial	Practical	Credit	Total Contact Hours
<b>Theory</b>							
1	U19MAT301B/	Probability and Statistics	3	1	0	4	60 ✓
2	U19ME301/	Engineering Mechanics - Statics and Dynamics	3	1	0	4	60 ✓
3	U19ME302/	Engineering Thermodynamics	3	1	0	4	60 ✓
4	U19ME303/	Fluid Mechanics and Machinery	3	0	0	3	45 ✓
5	U19ME304/	Conventional and Smart Manufacturing	3	0	0	3	45 ✓
6	U19ME305/	Instrumentation and Control Systems	3	0	0	3	45 ✓
7	U19TAM301/	தமிழ்ரும் தொழில்நுட்பமும்/ Tamils and Technology	1	0	0	1	15 ✓
8	U19GE302/	Mandatory course: Environment and Climate Science	2	0	0	0	30 ✓
<b>Practical</b>							
9	U19ME306/	Fluid Mechanics and Machinery Laboratory	0	0	2	1	30 ✓
10	U19ME307/	Special Machines Laboratory	0	0	2	1	30 ✓
11	U19GE301/	Soft Skills and Aptitude – I	0	0	2	1	30 ✓
<b>Total Credits</b>						<b>25</b> ✓	

Approved By

  
Chairperson, Mechanical Engineering BoS  
Dr.D.Senthilkumar

  
Member Secretary, Academic Council  
Dr.R.Shivakumar

  
Chairperson, Academic Council & Principal  
Dr.S.R.R.Senthil Kumar

Copy to:-

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

11.08.2023

Regulations-2019

B. E / MECHANICAL ENGINEERING

SEMESTER - III	PROBABILITY AND STATISTICS	L	T	P	C
U19MAT301B		3	1	0	4

COURSE OUTCOMES

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

1. apply the concepts of measures of central tendency, dispersion, correlation to the given data and analyze the results.
2. apply the concepts of random variables and their properties to generate the moments.
3. fit the suitable distribution and its properties to the real world problems and interpret the results.
4. apply the concepts of joint probability distribution and its properties to find the covariance.
5. test the hypothesis of the population using sample information.

CO / PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
COs	Programme Outcomes (POs) and Programme Specific Outcome (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

UNIT - I BASIC STATISTICS

12

Measures of central tendency (simple arithmetic mean, median, mode) - Quartiles - Measures of dispersion (range, inter-quartile range, quartile deviation, mean deviation, standard deviation, coefficient of variation) - Simple correlation - Curve fitting (straight line and parabola).

UNIT - II RANDOM VARIABLES

12

Discrete and continuous random variables - Probability mass function, probability density function, moments, moment generating function and their properties.

UNIT - III THEORETICAL DISTRIBUTIONS

12

Binomial, Poisson, geometric, uniform, exponential and normal distributions and their properties - Applications.

UNIT - IV TWO DIMENSIONAL RANDOM VARIABLES

12

Joint distributions, marginal and conditional distributions - Covariance - Correlation - Central limit theorem.

20.05.2020

B. E. / B. Tech. Regulations 2019

Sona College of Technology

Department of Mathematics

**UNIT - V TESTING OF SIGNIFICANCE**

12

Sampling distributions - Testing of hypothesis for mean, standard deviation, variance, proportion and differences using normal and  $t$  distributions -  $\chi^2$ - tests for independence of attributes and goodness of fit and  $F$  distribution.

Theory: 45 Hours

Tutorial: 15 Hours

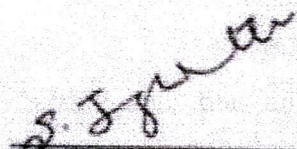
Total: 60 Hours

**TEXT BOOKS:**

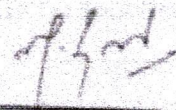
1. S. C. Gupta and V. K. Kapoor, "Fundamentals of Mathematical Statistics", Sultan Chand and Sons Publishers, 11<sup>th</sup> Edition, Reprint, 2019.
2. T. Veerarajan, "Probability, Statistics and Random Processes with Queuing Theory and Queuing Networks", McGraw Hill Publishers, 4<sup>th</sup> Edition, 7<sup>th</sup> Reprint, 2018.

**REFERENCE BOOKS:**

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. P. G. Hoel, S. C. Port and C. J. Stone, "Introduction to Probability Theory", Universal Book Stall Publishers, Reprint, 2003.
4. W. Feller, "An Introduction to Probability Theory and its Applications - Volume I", Wiley Publishers, 3<sup>rd</sup> Edition, 2008.
5. S. P. Gupta, "Statistical Methods", Sultan Chand and Sons Publishers, 15<sup>th</sup> Edition, 2012.



**Prof. S. JAYABHARATHI**  
Head / Department of Mathematics  
Sona College of Technology  
Salem - 636 005



**Dr. M. RENUGA**  
BoS - Chairperson  
Science and Humanities  
Sona College of Technology  
Salem - 636 005

20. 05. 2020

B. E. / B. Tech. Regulations 2019

**COURSE CODE**      **U19ME301**      **L T P C**  
**COURSE NAME**      **ENGINEERING MECHANICS – STATICS AND DYNAMICS**      **3 1 0 4**

**Course Outcomes**

Upon completion of this course the students will be able to

- C01** Summarize the basic quantities and idealizations of mechanics and examine the standard procedures for performing numerical calculations.
- C02** Solve particle equilibrium problems using the equations of equilibrium and analyze the forces acting on the members of frames.
- C03** Compute the centroid of plane surfaces and develop a method for determining the moment of inertia.
- C04** Examine the principles of relative motion of two particles and to analyze the mechanics of elastic body impact
- C05** Analyze the mechanics of friction

CO / PO, PSO Mapping														
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
Programme Outcomes (POs) and Programme Specific Outcome (PSOs)														
COs, POs PSOs Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO - 1	3	3											2	
CO - 2	3	3											2	
CO - 3	3	3											2	
CO - 4	3	3											2	
CO - 5	3	3											2	

**Unit - I      FUNDAMENTAL CONCEPTS OF MECHANICS      L 9 T 3**

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

**Unit – II EQUILLIBRIUM OF RIGID BODIES & STRUCTURAL ANALYSIS L 9 T 3**

Conditions for Rigid-Body Equilibrium – Free-Body Diagrams – Equations of Equilibrium – Two and Three-Force Members – Equations of Equilibrium – Constraints and Statical Determinacy – Introduction to truss elements – Analysis of simple trusses by the method of joints.

**Unit – III CENTRIODS AND AREA MOMENT OF INERTIA L 9 T 3**

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 and T-Section.

**Unit – IV KINETICS AND KINEMATICS OF PARTICLES L 9 T 3**

Concept of displacement, velocity and acceleration – Newton's laws of motion(fundamentals) – Work-Energy principle – introduction to Impulse and momentum – analyses of impact of elastic bodies – Introduction to principle of virtual work (Qualitative treatment only).

**Unit – V FRICTION L 9 T 3**

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 inclined plane – Ladder friction- Applications of friction: Wedge and Belt.


**Total Number of hours: 60**

**Learning Resources****Text Books**

1. Bansal R K, "A Textbook of Engineering Mechanics"- 6<sup>th</sup> edition,2022, Laxmi publications (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).

### Reference books

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 th 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).

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

**COURSE CODE** U19ME302 L T P C  
**COURSE NAME** ENGINEERING THERMODYNAMICS 3 1 0 4

**Course Outcomes**

Upon completion of this course the students 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 and thermodynamic cycles.
- CO3** Determine the thermodynamic properties of pure substance in flow and non-flow processes.
- CO4** Compare the ideal and real gases and its thermodynamic relations and formulate Maxwell’s relation, Clausius Clapeyron equations.
- CO5** Calculate the cooling, heating and humidifier capacities for air-conditioner using psychrometric chart.

CO / PO, PSO Mapping														
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
Programme Outcomes (POs) and Programme Specific Outcome (PSOs)														
COs, POs PSOs Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO - 1	3	3	2										2	
CO - 2	3	3		2									2	
CO - 3	2	3												
CO - 4	3	2												
CO - 5	2	2	3			1							3	2

**UNIT I BASIC CONCEPTS AND FIRST LAW OF THERMODYNAMICS** L 9 T 3

Basic concepts of thermodynamics, macroscopic and microscopic concepts, system, surroundings, Concept of Universe and control volume, properties of system-Intensive and Extensive, state, process and cycle, Definition of Thermodynamic Work -- Units for Work -- Forms of Work – Definition of Heat -- Inter Convertibility of Heat/work into Work/heat -- Governing Principles -- Sign Convention, temperature, law of conservation of mass, momentum and energy, - Concept of Quasi static process, thermodynamic equilibrium, zeroth law of thermodynamics, Statement of First Law of Thermodynamics , The Constant

Volume and Constant Pressure Specific Heats -- The internal Energy, Enthalpy and Specific Heats of An Ideal Gas, application of first law to non-flow processes and steady flow systems.

**UNIT II SECOND LAW OF THERMODYNAMICS AND CONCEPTS OF ENTROPY L 9 T 3**

Definition of Heat Engine and Reservoirs -- Kelvin-Planck and Clausius Statements of the Second Law -- Reversible and Irreversible Engines and processes -- Causes of Irreversibility -- Internal and External Irreversibility, heat pump and refrigerator, The Efficiency of a Carnot Cycle -- The Thermodynamic Temperature Scale -, Clausius theorem and third law of thermodynamics, Clausius Inequality -- Entropy -- A Property of A System -- The Entropy of A Pure Substance -- Entropy Change in Reversible Process -- Principle of Increase of Entropy, availability and irreversibility (theory only).

**UNIT III PROPERTIES OF PURE SUBSTANCE L 9 T 3**

Properties of pure substance, thermodynamic properties of pure substance in solid, liquid and vapour phases, phase rule, Formation of steam and its thermodynamic properties, p-v, p-T, T-v, T-s, h-s diagrams. p-v-T surface. Use of Steam Table and Mollier Chart. thermodynamic properties of steam. Calculations of work done and heat transfer in non flow and flow processes. Determination of steam quality.

**UNIT IV IDEAL AND REAL GASES, THERMODYNAMIC RELATIONS L 9 T 3**

Properties of Ideal gas- Ideal and real gas comparison- Equations of state for ideal and real gases- Reduced properties. Compressibility factor-.Principle of Corresponding states. - Generalized Compressibility Chart and its use-. Maxwell relations, Tds Equations, Difference and ratio of heat capacities, Joule-Thomson Coefficient, Clausius Clapeyron equation.

**UNIT V PSYCHROMETRY L 9 T 3**

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.

**Total Number of hours: 60**




## Learning Resources

### Text book

1. Chattopadhyaya,P. Engineering Thermodynamics, Oxford university press, New Delhi,2016.
2. Cengel, 'Thermodynamics – An Engineering Approach' eighth Edition, Tata McGraw Hill, New Delhi, 2014.

### Reference books

1. Sonntag, R.E., Borgnakke, C., and Van Wylen, G.J., Fundamentals of Thermodynamics, 6<sup>th</sup> ed., John Wiley, 2003.
2. Nag.P.K., "Engineering Thermodynamics", Tata McGraw-Hill, New Delhi, 2015.
3. Holman.J.P., "Thermodynamics", 4th Ed. McGraw-Hill, 2008.
4. Michael J Moran, Howard N. Shapiro, Daisie D. Boettner, Margaret B. Baily, "Fundamentals of Engineering Thermodynamics" 8th Edition, John Wiley& sons, 2014
5. Arora C.P, "Thermodynamics", Tata McGraw-Hill, New Delhi, 2004.



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

**COURSE CODE** U19ME303 **L T P C**  
**COURSE NAME** FLUID MECHANICS AND MACHINERY **3 0 0 3**

**Pre-requisites subject:** Engineering Physics and Transforms & Partial differential equations.

**Course Outcomes**

Upon completion of this course the students will be able to

- CO1** Apply mathematical knowledge to predict the properties and concept of pressure measurement.
- CO2** Analyze the fluid flow problems using continuity equation and Bernoulli's equation with their applications.
- CO3** Distinguish laminar and turbulent flow through circular pipes and power transmission through pipes.
- CO4** Solve the real time problems with help of dimensional analysis by using Buckingham's  $\Pi$  theorem.
- CO5** Analyze the performance of hydraulic turbines and pumps.

CO / PO, PSO Mapping														
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
Programme Outcomes (POs) and Programme Specific Outcome (PSOs)														
COs, POs PSOs Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO - 1	3	2	2									1		
CO - 2	3	3	3										2	2
CO - 3	3	3	3										2	2
CO - 4	3	3	3										2	2
CO - 5	3	3	3										2	2

**Unit - I FLUID PROPERTIES AND PRESSURE MEASUREMENT L 9**

Definitions - Fluid - Properties of fluids- mass density, specific weight, specific volume, specific gravity, viscosity, compressibility, vapor pressure, surface tension, cavitation and capillarity - Pressure measurement- manometry, buoyancy, stability of floating bodies, forces on submerged bodies.

**Unit – II FLUID KINEMATICS AND DYNAMICS**

L 9

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.

**Unit – III FLOW THROUGH PIPES**

L 9

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.

**Unit – IV DIMENSIONAL ANALYSIS**

L 9

Need for dimensional analysis – methods of dimensional analysis – Buckingham's  $\pi$  theorem, Dimensionless parameters - application of dimensionless parameters. Models and Similitude - Model laws.

**Unit – V HYDRAULIC TURBINES AND PUMPS**

L 9

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.

**Total Number of hours: 45****Learning Resources****Text Books**

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.

**Reference Books**

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.

**COURSE CODE**      **U19ME304**      **L T P C**  
**COURSE NAME**      **CONVENTIONAL AND SMART MANUFACTURING**      **3 0 0 3**

**Pre-requisites subject:** Manufacturing Process

**Course Outcomes**

Upon completion of this course the students will be able to

- CO1**      Acquire knowledge about principle of special machine tools and its operating mechanisms.
- CO2**      Demonstrate the working of various bulb deformation processes involving drawing, forging, rolling, and extrusion process.
- CO3**      Acquire knowledge and analyze the various sheet metal processes.
- CO4**      Classify additive manufacturing process and identify suitable RP process for product manufacturing.
- CO5**      Enhance and adopt smart manufacturing knowledge towards industry development.

CO / PO, PSO Mapping														
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
Programme Outcomes (POs) and Programme Specific Outcome (PSOs)														
COs, POs PSOs Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO - 1	3								2				1	
CO - 2	3			2									1	
CO - 3	3												1	
CO - 4	3				2				1			2	2	
CO - 5	3				3				1			2	2	

**Unit - I      SPECIAL MACHINE TOOLS      L 9**

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 and gear shaping. Grinding: cylindrical grinding, surface grinding, Centreless grinding - honing, lapping and buffing.

**Unit - II      SHEET METAL PROCESSES      L 9**

Sheet metal: characteristics-typical shearing operations-bending and drawing operations - stretch forming operations - formability of sheet metal - test methods-working principle and application of special forming processes -hydro forming - Rubber pad forming - Metal

spinning-Introduction to Explosive forming - Magnetic pulse forming-peen forming - super plastic forming.

**Unit – III BULK DEFORMATION PROCESSES** L 9

Hot and Cold working Process- Drawing Process: Wire drawing, Tube drawing, Metal Spinning, Embossing- Coining- **Forging Process:** Open and closed die forging- operations- Forging machine, **Rolling:** Type of rolling mills- Principle of rod and wire drawing – Tube drawing- Defects in rolling parts, **Extrusion:-** Principles of Extrusion – Types – Hot and Cold extrusion.

**Unit – IV DIGITAL MANUFACTURING** L 9

Introduction, Classification, Fusion Deposition Modeling, Stereo-lithography, Solid Ground Curing, Selective Laser Sintering, 3D printers: Principle – process parameters – process details – machine details, Software's, Applications.

**Unit – V SMART MANUFACTURING** L 9

Introduction, Industry 4.0, Internet of Things (IoT) for manufacturing, IoT enabling technologies, IoT design methodology, logical design, IoT physical devices. Cloud computing-introduction, Cloud services and platforms, Case studies: Industrial automation, Production Monitoring, Applications.

**Total Number of hours: 45**

**Learning Resources**

**Text Book**

1. Mikell P Groover, " Principles of Modern Manufacturing" Wiley India Pvt Ltd. 2016.
2. S. Jeschke, C Brecher, H. Song and D.B Rawat, "Industrial Internet of Things: Cyber manufacturing Systems", Springer, 1st edition, 2013.
3. Pham D.T. & Dimov.S.S., "Rapid manufacturing", Springer-Verlag, London, 2001.

**Reference Books**

1. P.N. Rao, "Manufacturing Technology: Metal Cutting and Machine Tools, Volume 2"
2. Published by Tata McGraw-Hill Education Pvt. Ltd (2013)
3. B.L. Juneja,G.S. Sekhon, Nitin Seth, "Fundamentals of Metal Cutting and Machine Tools" Published by New Age International (P) Limited (2014)
4. P.C. Sharma, "A Text Book of Production Engineering", S. Chand and Company Ltd, revised edition, 2011.
5. Rajput R.K, 'A text book of Manufacturing Technology', Lakshmi Publications, 2007.
6. Ian Gibson, "Advanced Manufacturing Technology for Medical applications: Reverse Engineering, Software conversion and Rapid Prototyping", Wiley, 2006.

**COURSE CODE** U19ME305 L T P C  
**COURSE NAME** INSTRUMENTATION AND CONTROL SYSTEMS 3 0 0 3

**Pre-requisites subject:** Physics for Mechanical Engineering

**Course outcome:**

Upon completion of this course the students will be able to

- CO1** Explain the fundamental elements of instrumentation, measurement and control systems.
- CO2** Measure the parameters and performance of transducers.
- CO3** Develop the measurement techniques used for mechanical systems.
- CO4** Apply control engineering techniques to the automatic control systems found in modern manufacturing, processing and transportation environments.
- CO5** Design the mechanical control system for automation.

CO / PO, PSO Mapping														
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
Programme Outcomes (POs) and Programme Specific Outcome (PSOs)														
COs, POs PSOs Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO - 1								3						
CO - 2					3									3
CO - 3					3								3	3
CO - 4					3									3
CO - 5					3			3		3			3	3

**Unit - I MEASURING SYSTEM**

L 9

General concepts of Mechanical measuring instruments – Elements of a measuring system – Requirements of measuring instruments – Static and dynamic characteristics of measuring instruments – Errors in measurements - Loading effect and impedance matching- statistical analysis-Least square method- uncertainty analysis- Zero and first order system- step response and impulse response.

**Unit - II TRANSDUCER ENGINEERING**

L 9

Transducers and Sensors–Classification and types- Mathematical model of transducer-static and dynamic characteristics- resistive transducers- Inductive and capacitive transducers - Transducer Troubleshooting- special transducers-Smart sensors-Nano sensors.

**Unit – III INDUSTRIAL INSTRUMENTATION**

L 9

Measurement of vibrations – Accelerometer – Measurement of Low, Medium, and High pressures- Measurement of temperature: pyrometer, Fiber optics sensor for temperature measurement – Measurement of flow- hot wire anemometer – magnetic flow meter- ultrasonic meter. Measurement of displacement – Measurement of Force –Strain gauge, Load cells- Measurement of torque – Measurement of Speed – Case study assignments.

**Unit – IV CONTROL SYSTEM**

L 9

Introduction to Control systems – Open and Closed loop systems – servomechanisms. Transfer function: Block diagram reduction algebra, signal flow graphs – Pollution Control system- Basics of Controllers and response analysis- Problems.

**Unit – V DESIGN OF AUTOMATION AND CONTROLS SYSTEM**

L 9

Automated systems- introduction to systems –design of hydraulic and pneumatic control system controls- sequence operations- Applications of relays/switches- design of – electro pneumatics - Programmable controllers - Design of components for assembly - Cost considerations - programmable logic controllers - PLC languages- case studies.

**Total Number of hours: 45****Learning Resources****Text Book**

1. Ernest O. Doebelin, Dhanesh N. Manik (2019) Doebelin's Measurement Systems: 7th Edition, McGraw-Hill; Seventh edition, ISBN-13: 978-9353168711.
2. Alan S. Morris, Reza Langari (2016) Measurement and Instrumentation: Theory and application, Academic Press, ISBN No. 978-0-12-3819604.

**Reference Books**

1. D. Patranabis (2017) Transducers and Instrumentation, McGraw Hill education; 3 edition, ISBN- 13: 978-0070699717
2. Arun K. Ghosh (2012) Introduction to measurements and instrumentation, PHI Learning Pvt. Ltd.
3. U.A.Bakshi A.V. Bakshi (2009) Measurements and instrumentation, Technical Publications, ISBN No. 9788184315295
4. Zoran Gajić, M. Lelic (2013) Modern control systems Engineering, Dover Publications.

**COURSE CODE** U19GE302 L T P C  
**COURSE NAME** MANDATORY COURSE:  
**ENVIRONMENT AND CLIMATE SCIENCE** 2 0 0 0

**Course outcome:**

Upon completion of this course the students 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 appropriate 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.

CO / PO, PSO Mapping														
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
Programme Outcomes (POs) and Programme Specific Outcome (PSOs)														
COs, POs PSOs Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO - 1	3	2				2	2							
CO - 2	2													
CO - 3	3	2				2	2							2
CO - 4	3	2				2	2							2
CO - 5	3	2				2	2							2

**Unit I INTRODUCTION TO ENVIRONMENTAL STUDIES AND NATURAL RESOURCES**

L 6

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 II ECOSYSTEMS AND BIODIVERSITY**

L 6

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.

### Unit III ENVIRONMENTAL POLLUTION

L 6

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.

### Unit IV FUNDAMENTALS OF CLIMATE CHANGE

L 6

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 -Rain Water Harvesting - .Effect of climate change due to air pollution Case study - CNG vehicles in Delhi.

### Unit V EFFECT OF CLIMATE CHANGE

L 6

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.

**Total Number of hours: 30**

### Learning Resources

#### Text Book

1. Miller, T.G. Jr., "Environmental Science", Wadsworth Pub. Co. 2018
2. Anubha Kaushik and Kaushik, "Environmental Science and Engineering" New Age International Publication, 4th Multicolour Edition, New Delhi, 2014.

#### Reference Books

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., 2nd 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.

<b>COURSE CODE</b>	<b>U19ME306</b>	L	T	P	C
<b>COURSE NAME</b>	<b>FLUID MECHANICS AND MACHINERY LABORATORY</b>	0	0	2	1

**Course Outcomes**

Upon completion of this course the students will be able to

- CO1** Calibrate the various flow measuring instruments.
- CO2** Analyze the energy losses occur in flow of fluid through pipes.
- CO3** Analyze the performance of the various pumps and turbines (Pelton, Francis and Kaplan turbine).

CO / PO, PSO Mapping														
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
Programme Outcomes (POs) and Programme Specific Outcome (PSOs)														
COs, POs PSOs Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO - 1	2	2											2	
CO - 2	2	3											2	
CO - 3	3	3											2	

**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.

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

1. Orifice meter setup.
2. Venturi meter setup.
3. Friction loss setup.
4. Fitting loss setup.
5. Pitot-tube setup.
6. Pelton wheel turbine setup.
7. Francis turbine setup.
8. Kaplan turbine setup.
9. Centrifugal pump.
10. Reciprocating pump.

**Total Number of hours 30**

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

**COURSE CODE** U19ME307 L T P C  
**COURSE NAME** SPECIAL MACHINES LABORATORY 0 0 2 1

**Pre-requisites subject:** Manufacturing technology Laboratory  
**Course Outcomes**

Upon completion of this course the students will be able to

- CO1** Perform various metal cutting operations to generate gears.
- CO2** Do grinding operations using commonly used machine tools.
- CO3** Demonstrate shaping and slotting operations using commonly used machine tools.

CO / PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
Programme Outcomes (POs) and Programme Specific Outcome (PSOs)														
COs, POs PSOs Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO - 1	3		3						3	3			3	
CO - 2			3						3	3			3	
CO - 3	3		3						3	3			3	

**LIST OF EXPERIMENTS**

1. Exercises on Horizontal milling machine –gear generating.
2. Exercises on Vertical milling machine –key way generating.
3. Grinding of flat surface using surface grinder machine.
4. Grinding of cylindrical surfaces using cylindrical grinding machine.
5. Shaping operations- two or more Exercises (Round to square, Hexagonal Shape and dovetail)
6. Internal key way slotting in slotting machine.
7. Exercises on capstan or turret lathe and study of bar feed mechanism in turret lathe.

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

- |                                 |   |        |
|---------------------------------|---|--------|
| 1. Turret and Capstan Lathes    | - | 1 No   |
| 2. Horizontal Milling Machine   | - | 1 No   |
| 3. Vertical Milling Machine     | - | 1 No   |
| 4. Surface Grinding Machine     | - | 1 No   |
| 5. Cylindrical Grinding Machine | - | 1 No   |
| 6. Shaper                       | - | 2 Nos. |
| 7. Slotter                      | - | 1 No   |

**Total Number of hours 30**

**COURSE CODE** U19GE301 L T P C  
**COURSE NAME** SOFT SKILLS AND APTITUDE – I 0 0 2 1

**Course Outcomes**

Upon completion of this course the students will be able to

- CO1** Demonstrate capabilities in specific soft-skill areas using hands-on and/or case-study approaches
- CO2** Solve problems of greater intricacy in stated areas of quantitative aptitude and logical reasoning
- CO3** Demonstrate higher levels of verbal aptitude skills in English with regard to specific topics.

CO / PO, PSO Mapping														
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
Programme Outcomes (POs) and Programme Specific Outcome (PSOs)														
COs, POs PSOs Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
<b>CO – 1</b>	1	2	2	2	1	3	3	3	3	1	1	3	2	2
<b>CO – 2</b>	3	3	1	1	2	3	2	3	3	2	2	3	3	3
<b>CO – 3</b>	1	2	1	2	1	1	1	3	3	3	1	3	3	3

**LIST OF EXPERIMENTS**

**1. SOFT SKILLS**

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

- a. Attitude building
- b. Dealing with criticism
- c. Innovation and creativity
- d. Problem solving and decision making
- e. Public speaking

## 2. QUANTITATIVE APTITUDE AND LOGICAL REASONING

Solving problems with reference to the following topics:

- a. Vedic Maths: Fast arithmetic, multiplications technique, Criss cross, Base technique, Square root, Cube root, Surds, Indices, Simplification.
- b. Numbers: Types, Power cycle, Divisibility, Prime factors & multiples, HCF & LCM, Remainder theorem, Unit digit, highest power.
- c. Averages: Basics of averages and weighted average.
- d. Percentages: Basics of percentage and Successive percentages.
- e. Ratio and proportion: Basics of R &P, Alligations, Mixture and Partnership.
- f. Profit ,Loss and Discount: Basic & Advanced PLD
- g. Data Interpretation: Tables, Bar diagram, Venn diagram, Line graphs, Pie charts, Caselets, Mixed varieties, Network diagram and other forms of data interpretation.
- h. Syllogism: Six set syllogism using Venn diagram and tick and cross method.

## 3. VERBAL APTITUDE

Demonstrating English language skills with reference to the following topics:

- a. Verbal analogy
- b. Tenses
- c. Prepositions
- d. Reading comprehension
- e. Choosing correct / incorrect sentences
- f. Describing pictures
- g. Error spotting

**Total Number of hours: 30**

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

**அலகு I நெசவு மற்றும் பானைத் தொழில்நுட்பம்:**

சங்க காலத்தில் நெசவுத் தொழில் - பானைத் தொழில்நுட்பம் - கருப்பு சிவப்பு பாண்டங்கள் - பாண்டங்களில் கீறல் குறியீடுகள்.

**அலகு II வடிவமைப்பு மற்றும் கட்டிடத் தொழில்நுட்பம்:**

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 இந்நதோ-சாரோசெனிக் கட்டிடக் கலை.

**அலகு III உற்பத்தித் தொழில் நுட்பம்:**

கப்பல் கட்டும் கலை - உலோகவியல் - இரும்புத் தொழிற்சாலை - இரும்பை உருக்குதல், எஃகு - வரலாற்றுச் சான்றுகளாக செம்பு மற்றும் தங்க நாணயங்கள் - நாணயங்கள் அச்சடித்தல் - மணி உருவாக்கும் தொழிற்சாலைகள் - கல்மணிகள், கண்ணாடி மணிகள் - சுடுமண் மணிகள் - சங்கு மணிகள் - எலும்புத்துண்டுகள் - தொல்லியல் சான்றுகள் - சிலப்பதிகாரத்தில் மணிகளின் வகைகள்.

**அலகு IV வேளாண்மை மற்றும் நீர்ப்பாசனத் தொழில் நுட்பம்:**

அணை, ஏரி, குளங்கள், மதகு - 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.

**அலகு V அறிவியல் தமிழ் மற்றும் கணித்தமிழ்:**

அறிவியல் தமிழின் வளர்ச்சி - கணித்தமிழ் வளர்ச்சி - தமிழ் நூல்களை மின்பதிப்பு செய்தல் - தமிழ் மென்பொருட்கள் உருவாக்கம் - தமிழ் இணையக் கல்விக்கழகம் - தமிழ் மின் நூலகம் - இணையத்தில் தமிழ் அகராதிகள் - சொற்குவைத் திட்டம்.

**TOTAL : 15 PERIODS****TEXT-CUM-REFERENCE BOOKS**

1. தமிழக வரலாறு - மக்களும் பண்பாடும் - கே.கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணிணித் தமிழ் - முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்).
3. கீழடி - வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
4. பொருநை - 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, TamilNadu)
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

**Dr. M. RENUGA,**  
Professor & Head,

Department of Humanities & Languages,  
Anna College of Technology  
SALEM - 636

**UNIT I WEAVING AND CERAMIC TECHNOLOGY**

Weaving Industry during Sangam Age – Ceramic technology – Black and Red Ware Potteries (BRW) – Graffiti on Potteries.

**UNIT II DESIGN AND CONSTRUCTION TECHNOLOGY**

3

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.

**UNIT III MANUFACTURING TECHNOLOGY**

3

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 beads - Archeological evidences - Gem stone types described inSilappathikaram.

**UNIT IV AGRICULTURE AND IRRIGATION TECHNOLOGY**

3

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.


**UNIT V SCIENTIFIC TAMIL & TAMIL COMPUTING**

3

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.

**TOTAL : 15 PERIODS****TEXT-CUM-REFERENCE BOOKS**

1. தமிழக வரலாறு – மக்களும் பண்பாடும் – கே.கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணிணித் தமிழ் – முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்).
3. கீழடி – வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
4. பொருநை – 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, TamilNadu)
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.Ramakrishna) (Published by: RMRL) – Reference Book.

  
HOD 19/12/23

**Dr. M. RENUGA,**  
Professor & Head,  
Department of Humanities & Languages,  
Anna College of Technology,  
SALEM - 631



**COURSE CODE** U19GE302

L T P C

**COURSE NAME** MANDATORY COURSE:**ENVIRONMENT AND CLIMATE SCIENCE**

2 0 0 0

**Course outcome:**

Upon completion of this course the students 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 appropriate 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.

CO / PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak Programme Outcomes (POs) and Programme Specific Outcome (PSOs)														
COs, POs PSOs Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO - 1	3	2				2	2							-
CO - 2	2	-												-
CO - 3	3	2				2	2							2
CO - 4	3	2				2	2							2
CO - 5	3	2				2	2							2

**Unit I INTRODUCTION TO ENVIRONMENTAL STUDIES AND NATURAL RESOURCES** L 6

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 II ECOSYSTEMS AND BIODIVERSITY**

L 6

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.

**Unit III ENVIRONMENTAL POLLUTION**

L 6

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.

**Unit IV FUNDAMENTALS OF CLIMATE CHANGE**

L 6

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 -Rain Water Harvesting - .Effect of climate change due to air pollution Case study - CNG vehicles in Delhi.

**Unit V EFFECT OF CLIMATE CHANGE**

L 6

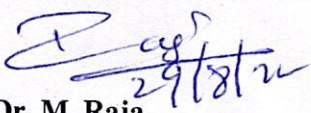
Fungal diseases in forests and agricultural crops due to climatic fluctuations - Growing energy needs - effect of climate change due to non-renewable energy resources. Renewable energy resources in the prevention of climatic changes- Effect of climatic changes in ground water table, garments, monuments, buildings, consumption of energy, agriculture and in electric power sector - Carbon credit - carbon footprint - disaster management -Role of an individual to reduce climate change.

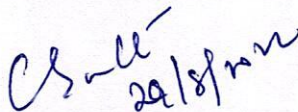
**Total Number of hours: 30****Learning Resources****Text Book:**

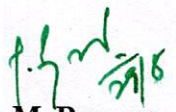
1. Miller, T.G. Jr., "Environmental Science", Wadsworth Pub. Co. 2018
2. Anubha Kaushik and Kaushik,  
"Environmental Science and Engineering" New Age International Publication, 4th Multicolour Edition, New Delhi, 2014.

**Reference Books:**

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., 2nd 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. Raja  
Course Coordinator / Sciences

  
Dr. C. Shanthi  
HOD / Sciences

  
Dr. M. Renuga  
Chairperson BOS,  
Science and Humanities

Semester-III	U19GE301-SOFT SKILLS AND APTITUDE – I	L T P C Marks 0 0 2 1 100
<b>Course Outcomes</b> At the end of the course the student will be able to:		
1. Demonstrate capabilities in specific soft-skill areas using hands-on and/or case-study approaches		
2. Solve problems of greater intricacy in stated areas of quantitative aptitude and logical reasoning		
3. Demonstrate good vocabulary skills, analyse comprehension and critical reasoning passages, spot errors and utilize language skills to describe pictures effectively.		
1.Soft Skills	<b>Demonstrating soft-skill capabilities with reference to the following topics:</b> <ol style="list-style-type: none"> <li>Attitude building</li> <li>Dealing with criticism</li> <li>Innovation and creativity</li> <li>Problem solving and decision making</li> <li>Public speaking</li> <li>Group discussions</li> </ol>	
2. Quantitative Aptitude and Logical Reasoning	<b>Solving problems with reference to the following topics:</b> <ol style="list-style-type: none"> <li>Vedic Maths: Fast arithmetic, multiplications technique, Criss cross, Base technique, Square root, Cube root, Surds, Indices, Simplification.</li> <li>Numbers: Types, Power cycle, Divisibility, Prime factors &amp; multiples, HCF &amp; LCM, Remainder theorem, Unit digit, Tens digit, highest power.</li> <li>Averages: Basics of averages and weighted average.</li> <li>Percentages: Basics of percentage and Successive percentages.</li> <li>Ratio and proportion: Basics of R &amp; P, Alligations, Mixture and Partnership.</li> <li>Profit, Loss and Discount: Basic &amp; Advanced PLD</li> <li>Data Interpretation: Tables, Bar diagram, Venn diagram, Line graphs, Pie charts, Case lets, Mixed varieties, Network diagram and other forms of data interpretation.</li> <li>Syllogism: Six set syllogism using Venn diagram and tick and cross method</li> </ol>	
3. Verbal Aptitude	<b>Demonstrating English language skills with reference to the following topics:</b> <ol style="list-style-type: none"> <li>Verbal analogy</li> <li>Tenses</li> <li>Prepositions</li> <li>Reading comprehension</li> <li>Choosing correct / incorrect sentences</li> <li>Describing pictures</li> <li>Error spotting</li> </ol>	

*S. Anita*  
31/4/2023  
Dr.S.Anita

Head/Training

**Dr. S. ANITA**

Professor and Head

Department of Training,

SONA COLLEGE OF TECHNOLOGY,  
SALEM-636 005.


mech  
TV

**Sona College of Technology, Salem**  
**(An Autonomous Institution)**  
**Courses of Study for B.E/B.Tech. Semester IV Regulations 2019**  
**Branch: Mechanical Engineering**

S. No	Course Code	Course Title	Lecture	Tutorial	Practical	Credit	Total Contact Hours
<b>Theory</b>							
1 /	U19ME401 /	Thermal Engineering /	3	0	0	3	45 /
2 /	U19ME402 /	Strength of Materials /	3	0	0	3	45 /
3 /	U19ME403 /	Engineering Materials and Metallurgy /	3	0	0	3	45 /
4 /	U19ME404 /	Object Oriented Programming for Mechanical Engineering /	3	0	0	3	45 /
5 /	U19ME405 /	Kinematics of Machines /	3	0	0	3	45 /
6 /	U19GE403 /	Mandatory Course: Essence of Indian Traditional Knowledge /	2	0	0	0	30 /
<b>Practical</b>							
7 /	U19ME406 /	Thermal Engineering Laboratory /	0	0	2	1	30 /
8 /	U19ME407 /	Strength of Materials Laboratory /	0	0	2	1	30 /
9 /	U19ME408 /	Object Oriented Programming Laboratory for Mechanical Engineering /	0	0	2	1	30 /
10 /	U19GE401 /	Soft Skills and Aptitude - II /	0	0	2	1	30 /
<b>Total Credits</b>						<b>19 /</b>	

Approved By

  
Chairperson, Mechanical Engineering BoS  
Dr. D. Senthilkumar

  
Member Secretary, Academic Council  
Dr. R. Shivakumar  
P-1-24

  
Chairperson, Academic Council & Principal  
Dr. S.R.R. Senthil Kumar

Copy to:-  
HOD/Mechanical Engineering, Fourth Semester BE Mechanical Students and Staff, COE

21.12.2023

Regulations-2019

**COURSE CODE** U19ME401 **L T P C**  
**COURSE NAME** THERMAL ENGINEERING **3 0 0 3**

**Pre-Requisites Subject:** Engineering Physics, Engineering Mathematics, Python Programming and Engineering Thermodynamics.

**Course Outcomes**

Upon completion of this course the students will be able to

- CO1** Calculate the mean effective pressure and air standard efficiency of various gas power cycles.
- CO2** 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 vapor compression refrigeration systems and solve cooling load estimation problems with python programming.

CO / PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
Programme Outcomes (POs) and Programme Specific Outcome (PSOs)														
Cos, POs, PSOs Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO-1	3	3	2	2			1					2	2	
CO-2	3	2	2	2								2	2	
CO-3	3	3	3	2								2	2	
CO-4	3	2	2	2								2	1	
CO-5	3	3	2	2	2		1					2	3	

**Unit – I GAS POWER CYCLES**

L 9

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

**Unit – II INTERNAL COMBUSTION ENGINES**

L 9

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 - Ignition system and fuel injection system. Cooling and lubrication system. Engine tests - performance, heat balance, and retardation - Morse test.

**Unit – III NOZZLES AND STEAM POWER CYCLES**

L 9

Steam nozzles- flow through steam nozzles, effect of friction, critical pressure ratio and super saturated flow. Steam power cycle-, Rankine, Reheat and regeneration cycle.

**Unit – IV AIR COMPRESSORS**

L 9

Classifications of compressors - Reciprocating air compressor - performance characteristics, effect of clearance volume, free air delivery and displacement, intercooler, -Description of Rotary compressor, vane, centrifugal and axial compressors.

**Unit – V REFRIGERATION AND AIR CONDITIONING**

L 9

Fundamentals of refrigeration - COP - Vapour compression refrigeration system - cycle, p-h chart, Vapour absorption system- comparison, properties of refrigerants. Fundamentals of air conditioning system, types and working principles. Python programming for solving cooling load estimation in air conditioning design (simple problems).

**Total Number of hours: 45****Learning Resources****Text Books**

1. R.K.Rajput, "Thermal Engineering" , Laxmi Publications, New Delhi, Sixth edition, 2005
2. Kothandaraman C.P, Domkundwar and A.V. Domkundwar, "A course in Thermal Engineering", Dhanpat Rai & Sons, Fifth Edition, 2002.
3. Ashok Namdev Kamthane, Amit Ashok Kamthane, "Programming and Problem Solving with Python", Mc-Graw Hill Education, 2018.

**Reference Books**

1. Sarkar B.K., "Thermal Engineering", Tata McGraw-Hill, New Delhi New Delhi, 2001
2. Arora C.P., "Refrigeration and Air conditioning", Tata McGraw-Hill, New Delhi, 2000.
3. Holman J.P. "Thermodynamics", McGraw-Hill, 1985.
4. V.Ganesan, "Internal Combustion Engines", Tata McGraw-Hill, New Delhi, 2008.
5. Robert Sedgewick, Kevin Wayne, Robert Dondero, "Introduction to Programming in Python: An Inter-disciplinary Approach", Pearson India Education Services Pvt. Ltd., 2016.

**COURSE CODE** U19ME402 **L T P C**  
**COURSE NAME** STRENGTH OF MATERIALS **3 0 0 3**

**Pre-requisite subjects:** Engineering Physics, Engineering Mechanics, Python Programming

**Course Outcomes**

Upon completion of this course the students will be able to

- CO1** Categorize the stresses and strains for various engineering components with different loading conditions.
- CO2** Determine the effect of the two-dimensional stresses under various loading combinations on structural parts and thin cylinders.
- CO3** Construct the shear force and bending moment diagrams for simply supported, cantilever and over hanging beams.
- CO4** Analyze pure torsion on solid and hollow circular shafts and Design of Leaf and closed coil helical springs.
- CO5** Evaluate slope and deflection of beams and buckling of columns using analytical methods and python programming.

CO / PO, PSO Mapping														
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
Programme Outcomes (POs) and Programme Specific Outcome (PSOs)														
COs, POs PSOs Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO - 1	3	3	3										2	2
CO - 2	3	3	3										2	2
CO - 3	3	3	3										2	2
CO - 4	3	3	3										2	2
CO - 5	3	3	3		1								2	2

**Unit - I STRESS, STRAIN AND DEFORMATION OF SOLIDS L 9**

Simple stress and strain - Stresses and strains due to axial force - Stress-strain curve - Hooke's law - Factor of safety - Stepped shafts - Uniformly varying sections - Stresses in composite sections - Temperature stresses - Poisson's ratio - elastic constants.

**Unit – II ANALYSIS OF STRESSES IN TWO DIMENSIONS**

L 9

State of stresses at a point – Normal and tangential stresses on inclined planes - Principal planes and stresses – Plane of maximum shear stress - Mohr's circle for biaxial stresses – Hoop and longitudinal stresses in thin cylinders and shells – under internal pressure – deformation of thin cylinders and shells.

**Unit – III BEAMS - LOADS AND STRESSES**

L 9

Beams – types of supports – simple and fixed, types of load – concentrated, uniformly distributed, varying distributed load, combination of above loading. Bending moment, shear force diagram for simply supported, cantilever and over hanging beams – Point of contra flexure. Introduction to Theory of simple bending.

**Unit – IV TORSION IN SHAFTS AND SPRINGS**

L 9

Analysis of torsion of circular bars – Shear stress distribution – Bars of Solid and hollow circular section – Stepped shaft – Twist and torsion stiffness. Springs- Classification – Leaf springs, closed coil helical springs - Application of various springs – Maximum shear stress in spring – Deflection of helical coil springs under axial loads.

**Unit – V DEFLECTION OF BEAMS**

L 9

Deflection of beams – double integration method – Macaulay's method – slope and deflection using moment area method. Columns: Buckling of long columns due to axial load – Equivalent length of a column – Euler's and Rankine's formulae for columns of different end conditions – Slenderness ratio. Introduction to Python- Write a Python program to find slope and deflection of Beams.

**Total Number of hours: 45**

**Learning Resources**


**Text Books**

1. SS Rattan, "Strength of Materials", McGraw Hill Education (India) Private Limited. Chennai, Third Edition, 2017.
2. R K Bansal, "A text book of Strength of Materials", Lakshmi Publications (P) Limited, New Delhi, Sixth Edition, 2018.
3. R K Rajput, "Strength of Materials", S Chand & Co., New Delhi, Sixth Edition 2018.



**Reference books**

1. Nash W.A, "Theory and problems in Strength of Materials", Schaum Outline Series, McGraw-Hill Book Co, New York, 1995.
2. Singh D.K "Mechanics of Solids" Pearson Education 2002.
3. Ryder G.H, "Strength of Materials", Macmillan India Ltd., Third Edition, 2002.
4. Popov E.P, "Engineering Mechanics of Solids", Prentice-Hall of India, New Delhi, Second Edition 2012.
5. Robert L Mott and Joseph A. Untener, "Applied Strength of Materials", CRC Press, Sixth Edition, 2016.
6. Nagar Sandeep. Introduction to Python: For Scientists and Engineers, independently published (2016)
7. Robert Sedgewick, Kevin Wayne, Robert Dondero, Introduction to Programming in Python: An Inter- disciplinary Approach, Pearson India Education Services Pvt. Ltd., 2016
8. Opensource documentation at <https://docs.python.org/3/library/index.html>



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

**COURSE CODE U19ME403**

L T P C

**COURSE NAME ENGINEERING MATERIALS AND METALLURGY**

3 0 0 3

**Pre-requisites subjects:** Chemistry for Mechanical Engineering, Physics for mechanical engineering.

**COURSE OUTCOME:**

Upon completion of this course the students will be able to

- CO1** Discuss constitutions of alloys with their formation reactions of solid solutions and phase diagrams.
- CO2** Analyze the various heat treatments process and different kinds of heat treatment diagrams for real time applications.
- CO3** Compare the Various ferrous & non-ferrous metals and its various alloys in the engineering scope.
- CO4** Discuss the various non-metallic materials with its properties and applications.
- CO5** Test the mechanical properties of various materials by different testing methods and identify suitable material for emerging products.

CO / PO, PSO Mapping														
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
Programme Outcomes (POs) and Programme Specific Outcome (PSOs)														
COs, POs PSOs Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO - 1	2	1										2		
CO - 2		1								1				
CO - 3		1								1		2	1	
CO - 4	1									1		2	1	
CO - 5	2									2			1	

**Unit I CONSTITUTION OF ALLOYS AND PHASE DIAGRAMS**

L 9

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

**Unit II HEAT TREATMENT**

L 9

Diffusion-steady-state and non-steady-state, Isothermal transformation diagrams – cooling curves superimposed on I.T diagram- CCR. Full annealing, recrystallization and spheroidising –normalizing, hardening, Jominy end quench test –Austempering, martempering – case hardening - carburizing, nitriding, cyaniding, carbonitriding, flame and induction hardening.

**Unit III FERROUS AND NONFERROUS METALS**

L 9

Effect of alloying elements on steel (Mn, Si, Cr, Mo, 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 and Al alloys – Bearing alloys.

**Unit IV NON-METALLIC MATERIALS**

L 9

Polymers – types of polymer, 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 -particle and fibre reinforced plastics. Ceramics, Cermets, Glass (amorphous) and Carbon Products.

**Unit V TESTING AND THE METHODOLOGY OF MATERIAL SELECTION**

L 9

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. Selection of Materials: part and material requirements- material system- list candidate materials- properties of requirements-select best match and specify it- case histories.

**Total Number of hours: 45****Learning Resources****Text books:**

1. O.P. Khanna, A text book of Materials Science and Metallurgy, Khanna Publishers, 2014.
2. Kenneth G.Budinski and Michael K.Budinski "Engineering Materials properties and selection" Pearson India Education Services Pvt ltd, 9 edition, 2017.
3. William D.Callister,Jr and David G.Rethwisch " Materials science and Engineering, An introduction" Wiley, 10th Edition, 2020.

**Reference books:**

1. R.K.Rajput "Engineering Materials & Metallurgy" S Chand Publications. 2006.
2. Sydney H.Avner "Introduction to Physical Metallurgy" McGraw Hill Book Company, 2007.
3. Zainul Huda, Robert Bulpett "Materials Science and Design for Engineers" Trans Tech Publications Limited, 2012.
4. T. DebRoy, H. K. D. H. Bhadeshia "Innovations in Everyday Engineering Materials" Springer International Publishing. 2021.



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

**COURSE CODE** U19ME404

L T P C

**COURSE NAME** OBJECT ORIENTED PROGRAMMING FOR  
MECHANICAL ENGINEERING

3 0 0 3

**Course Outcomes**

Upon completion of this course the students will be able to

- CO1** Demonstrate the use of various OOPs concepts in connection with C++.
- CO2** Describe arrays, function arguments and utilization of constructors and destructors.
- CO3** Write C++ program to solve real world problem with code reusability through inheritance.
- CO4** Write C++ programs for various applications with file handling.
- CO5** Illustrate the various templates and applications of exceptional handling.

CO / PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
Programme Outcomes (POs) and Programme Specific Outcome (PSOs)														
COs, POs PSOs Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO - 1	3	3	3	3	2				2				2	2
CO - 2	3	3	3	3	2				2				2	3
CO - 3	3	3	3	3	2				2				3	3
CO - 4	3	2	2		2				2				2	2
CO - 5	3	2	2	2	2				2				2	2

**Unit - I INTRODUCTION TO OOP'S**

L 9

Overview of C - Basic concepts and benefits of OOP - Structure of C++ program - Tokens- Keywords - Identifiers - constants - Data types - Basic, User defined, Derived - Reference variables - Scope resolution operator - Type casting - Function Prototyping - call by reference, return by reference - Inline function - Default arguments - Function overloading. Solve problems of Projectile's, Centroid of symmetrical, T - Section and Principal stresses by using user defined function.

**Unit - II CLASSES AND OBJECTS**

L 9

Class specification - Access qualifiers - Static data members and member functions - Array of objects - Objects as function arguments - Friend functions - Returning objects - Local classes - Constructors - Destructors - Operator Overloading: Operator function - Overloading unary and binary operator - Overloading the operator using friend function. Program for inventory management of Hydraulic pump, Air compressor and Electric vehicle industries.

**Unit – III INHERITANCE AND POINTERS**

L 9

Derived classes - Single Inheritance - Multiple Inheritance - Multi level inheritance - Hierarchical Inheritance - Hybrid Inheritance - Constructors in derived classes. Pointers - Pointers to objects - this pointer - Virtual functions. Program for vehicles production management of an automobile industry.

**Unit – IV MANAGING CONSOLES AND WORKING WITH FILES**

L 9

Stream classes - Formatted I/O - I/O Manipulators - User defined manipulators File handling - File pointer and manipulation - Sequential and random access - Error handling.

**Unit – V TEMPLATES AND EXCEPTION HANDLING**

L 9


Function templates, overloaded function templates, user defined template arguments, class templates. Exception Handling: Exception handling mechanism, multiple catch, nested try, re-throwing the exception.

**Total Number of hours: 45****Learning Resources****Text Books:**

1. E. Balagurusamy, "Object Oriented Programming with C++", Tata McGraw Hill, Sixth Edition, 2013.

**Reference Books:**

1. K.S. Easwarakumar, " Object Oriented Data Structures Using C++", Vikas Publication House Pvt Ltd, First Edition, 2000.
2. Hubbard John, "Programming with C++", Tata McGraw Hill, 2000.
3. Robert Lafore, "Object Oriented Programming in Turbo C++", Galgotia Publications, 2006.
4. K. R.Venugopal, Rajkumar, T.Ravishankar, "Mastering C++", Tata McGraw Hill, 2007.
5. B.Trivedi, "Programming with ANSI C++", Oxford University Press, 2007.
6. Bjarne Stroustrup, "The C++ Programming Language", Pearson Education, Fourth Edition, 2013.

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

**COURSE CODE** U19ME405 L T P C  
**COURSE NAME** KINEMATICS OF MACHINES 3 0 0 3

**Pre-requisites subject:** Engineering Mechanics, Problem Solving using Python Programming

**Course outcome:**

Upon completion of this course the students will be able to

- CO1** Apply Kutzbach and Gruebler’s criterion, Grashoff’s law to solve problems in various mechanisms using python.
- 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 geartrains.
- CO5** Synthesize a four-bar mechanism and analyze the characteristics of robot arm kinematics.

CO / PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
Programme Outcomes (POs) and Programme Specific Outcome (PSOs)														
COs, POs PSOs Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO - 1	3	3	3	2	3								3	
CO - 2	3	3	3	2									3	
CO - 3	3	3	3										3	
CO - 4	3	3	3										3	
CO - 5	3	3	3	3									3	

**Unit - I BASICS OF MECHANISMS L 9**

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 calculation using python programming - 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).

**Unit - II KINEMATICS OF LINKAGE MECHANISMS L 9**

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 centers of simple mechanisms (Single slider crank mechanism and four bar mechanism).

**Unit – III KINEMATICS OF CAM MECHANISMS**

L 9

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.

**Unit – IV GEARS AND GEAR TRAINS**

L 9

Classification of gears – Gear tooth terminology – involute tooth profile. Fundamental Law of toothed gearing and involute gearing – Length of 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.

**Unit – V SYNTHESIS OF MECHANISMS AND ROBOT ARM KINEMATICS**

L 9

Classification of synthesis – type, dimension, number, Synthesis of four bar mechanism - Chebyshev Method. Robot Arm kinematics – Denavit - Hartenberg Parameters - Forward and inverse kinematics of a two dimensional 2 degree of freedom manipulators (type RR).


**Total Number of hours: 45****Learning Resources****Text Book:**

1. Robert L. Norton, "Kinematics and Dynamics of Machinery", Tata McGraw-Hill, 2010. ISBN: 9789351340201
2. K.S. Fu, R.C Gonzalez, "Robotics control, sensing, Vision, and Intelligence", Tata McGraw-Hill, 2016, ISBN-13: 978-0-07-026510-3.
3. Reema Thareja, Problem Solving and Programming with Python: With Free Access to Coding Simulator, Oxford University Press, 2018, ISBN-13: 978-0-19-948949-7.



**Reference Books:**

1. Rao J.S and Dukkupati R.V, "Mechanism and Machine Theory", Wiley-Eastern Ltd., New Delhi, 2nd Edition, 1992, ISBN-13: 978-8122404265.
2. Sadhu Singh, "Theory of Machines", Pearson Education, New Delhi, 3rd Edition, 2011, ISBN-13: 978-8131760697.
3. S.S.Rattan, "Theory of Machines & Mechanisms", Tata Mcgraw hill publishers, 4th Edition, 2014, ISBN-13: 978-9351343479.
4. Uicker J.J.,Pennock G.R., Shigley J.E., "Theory of Machines and Mechanisms" (Indian Edition), Oxford University Press, 2014, ISBN-13: 978-0199454167.
5. John Hannah and Stephens R.C, "Mechanics of Machines", Viva Low-Prices, Student Edition, 1999.
6. P.L.Ballaney, "Theory of Machines", Khanna publishers, 23rd Edition, 2003, ISBN 817409122X, 9788174091222.
7. Thomas Bevan, "Theory of Machines", CBS Publishers and Distributors, 3rd Edition, 2005, ISBN-13: 978-8123908748.
8. Ghosh A and A.K.Mallick, "Theory of Mechanisms and Machines", Affiliated East- West Pvt. Ltd., New Delhi, 2008, ISBN-13: 978-8185938936.
9. Ramamurti,V., " Mechanism and Machine Theory", Second Edition, Narosa Publishing House, New Delhi, 3rd Edition, 2010, ISBN: 978-81-7319-892-2.

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

**COURSE CODE** U19ME406 L T P C  
**COURSE NAME** THERMAL ENGINEERING LABORATORY 0 0 2 1

**Pre-requisites subject:** Engineering thermodynamics and Thermal engineering.

**Course Outcomes**

Upon completion of this course the students will be able to

- CO1** Identify components and experience the function of each component of Internal combustion engine and analyze the suitability of fuels for engines.
- CO2** Compare the volumetric efficiency of IC engines and air compressors under various delivery pressures.
- CO3** Determine the COP of refrigeration and air conditioning systems for the given set of conditions.


CO / PO, PSO Mapping														
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
Programme Outcomes (POs) and Programme Specific Outcome (PSOs)														
COs, POs PSOs Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO - 1	3	3							3				1	
CO - 2	3	3							3				1	
CO - 3	3	3							3				1	

**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.
11. Demo on Morse Test on Multi cylinder Petrol Engine.

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

1. Single Cylinder 4-Stroke 5 HP Kirloskar Diesel Engines with Eddy Current Dynamometer.
2. Single Cylinder 4-Stroke 5 HP Kirloskar Diesel Engine With Electrical Loading.
3. Single Cylinder 4-Stroke 5 HP Kirloskar Diesel Engine With Mechanical Loading.
4. Multi-cylinder 4-Stroke Isuzu Petrol Engine with Hydraulic Dynamometer and Exhaust Gas Calorimeter.
5. Twin Cylinder 4-Stroke Texvel Diesel Engine with Bulb Loading and Exhaust Gas Calorimeter.
6. Cut Section Model of Actual Single Cylinder 4-Stroke Petrol Engine.
7. Cut Section Model of Actual Single Cylinder 4-Stroke Diesel Engine.
8. Section Model of Actual Single Cylinder 2-Stroke Petrol Engine.
9. Two Stage Air Compressor Test Rig.
10. Flash and Fire Point Apparatus.
11. Red Wood Viscometer.
12. Refrigeration Test Rig.
13. Air Conditioning Test Rig.
14. Bomb Calorimeter.

**Total Number of hours: 30**

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

**COURSE CODE U19ME407****L T P C****COURSE NAME STRENGTH OF MATERIALS LABORATORY****0 0 2 1****Course Outcomes**

Upon completion of this course the students will be able to

**CO1** Determine the compressive strength and tensile strength of various engineering.**CO2** Calculate various mechanical properties of materials using appropriate testing machines.**CO3** Analyze the real time bending moments for different beams.


CO / PO, PSO Mapping														
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
Programme Outcomes (POs) and Programme Specific Outcome (PSOs)														
COs, POs PSOs Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO - 1	3	3											2	2
CO - 2	3	3											2	2
CO - 3	3	3	2	2									2	2

**List of Experiments:**

1. Tension test on 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 30**

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

<b>COURSE CODE</b>	<b>U19ME408</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>COURSE NAME</b>	<b>OBJECT ORIENTED PROGRAMMING LABORATORY FOR MECHANICAL ENGINEERING</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>1</b>

**Course Outcomes**

Upon completion of this course the students will be able to

- CO1** Design and develop programs using the concept of classes, static members and constructors
- CO2** Apply polymorphism using operator overloading, virtual functions and inheritance.
- CO3** Develop file handling, exception handling and generic programming.

CO / PO, PSO Mapping														
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
Programme Outcomes (POs) and Programme Specific Outcome (PSOs)														
COs, POs PSOs Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO - 1	3	3	3	3	2				2				3	2
CO - 2	3	3	3	3	2				2				3	2
CO - 3	3	3	3	3	2				2				3	2

**List of Experiments:**

1. A projectile is launched at an angle  $\theta$  and speed of  $V_0$ . Write a C++ program to find the projectile's travel time, maximum travel distance and maximum height. The projectile's travel time  $t_{travel}$ , maximum travel distance  $x_{max}$ , and maximum height  $h_{max}$  are given by :

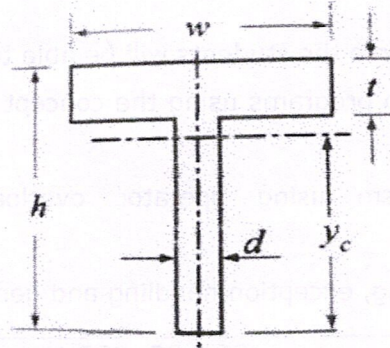
$$t_{travel} = 2 \frac{V_0}{g} \sin \theta \quad x_{max} = 2 \frac{V_0^2}{g} \sin \theta \cos \theta \quad h_{max} = \frac{V_0^2}{2g} \sin^2 \theta$$

2. Write a C++ program to implement the matrix operations using a class. a) Reading a matrix. b) Addition of matrices. c) Printing a matrix. d) Subtraction of matrices. e) Multiplication of matrices
3. A two dimensional state of stress at a point in a loaded material is defined by three components of stress  $\sigma_{xx}$ ,  $\sigma_{yy}$  and  $\tau_{xy}$ . The maximum and minimum nominal stresses  $\sigma_{max}$  and  $\sigma_{min}$  are calculated from the stress components by

$$\sigma_{max/min} = \frac{\sigma_{xx} + \sigma_{yy}}{2} \pm \sqrt{\left[\frac{\sigma_{xx} - \sigma_{yy}}{2}\right]^2 + \tau_{xy}^2}$$


Write a user defined function that determines the principal stresses from the stress components. For the function name and arguments use principalstress (Sxx,Syy,Sxy).

4. Write a user defined function that determines the coordinate  $y_c$  of the centroid of the T-shaped cross-sectional area shown in the figure. For the function name and arguments use  $y_c = \text{centroidT}(w,h,t,d)$ , where the input arguments  $w$ ,  $h$ ,  $t$  and  $d$  are the dimensions shown in the figure.



5. Write a C++ program to illustrate the usage of following: Default Constructor, Parameterized Constructor and Copy Constructor.
6. Write a C++ Program to create a class vehicle and then declare its two derived classes.
7. Write a C++ program that overloads the binary + operator and the unary ++ operators.
8. Write a C++ program to display the contents of a text file.
9. Write a program to define the function template for calculating the square of given numbers with different data types.
10. Write a program to raise an exception if any attempt is made to refer to an element whose index is beyond the array size.

Total Number of hours: 30

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

**Course Outcomes**

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

1. Analyze the basics of Indian traditional knowledge in modern scientific perspectives.
2. Explain the basics of Vedic science and its applications in modern days.
3. Discuss the introduction and objectives of modern science.
4. Describe the contribution of Noble laureates for India's achievements in Science and Technology.
5. Analyze the various traditional practices for holistic health care of human beings.

CO / PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak															
COs	Programme Outcomes (POs) and Programme Specific Outcome (PSOs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	2	-	-	2	-	-	-	-	-	-	-	-	2
CO2	2	2	2	-	-	2	-	-	-	-	-	-	-	-	2
CO3	3	2	2	-	-	2	-	-	-	-	-	-	-	-	2
CO4	3	2	2	-	-	2	-	-	-	-	-	-	-	-	2
CO5	2	2	2	-	-	2	-	-	-	-	-	-	-	-	2

**Unit I**

- Introduction to Vedas
- Traditional methodology of Veda – Sat Angas
- Types of Vedas and their application
- Sub Veda – Ayurveda - their modern day application

6

**Unit II**

- Basics of Applied Vedic Science
- Modern day application of Vedas and procedure
- Ancient Indian Scientific thoughts
- Introduction to the Vedic language "Sanskrit"

6

**UNIT – III- Modern Science**

- Introduction – modern science
- Objectives – modern science
- Architecture in ancient India

6



### **UNIT – IV Technology**

- India's contribution to science and technology (from ancient to modern)
- Nobel laureates of Indian origin and their contribution
- India in space
- Latest achievement from Jan - 2017

6

### **UNIT – V- Yoga and Holistic Health Care**

- Fundamentals of yoga and holistic health
- Human biology
- Diet and nutrition
- Life management
- Contemporary yogic models – case study

6

### **Reference Books**

1. V. Sivaramakrishna (Ed.), Cultural Heritage of India-Course Material, Bharatiya Vidya Bhavan, Mumbai, 5th Edition, 2014
2. Swami Jitatmanand, Modern Physics and Vedant, Bharatiya Vidya Bhavan
3. RN Jha, Science of Consciousness Psychotherapy and Yoga Practices, Vidyanidhi Prakasham, Delhi, 2016.
4. Roshan Dalal The Vedas: An Introduction to Hinduism's Sacred Texts, Penguin Books 2014. ISBN13: 9780143066385
5. Raja Ram Mohan Roy, Vedic Physics, Mount Meru Publication ISBN : 9781988207049

**Total: 30 hours**

*Shanthi*  
22/12/2023

**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*  
22/12/23

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

Semester – IV	U19GE401 - SOFT SKILLS AND APTITUDE – II	L	T	P	C	Marks
		0	0	2	1	100
<b>Course Outcomes</b>						
<b>At the end of the course the student will be able to:</b>						
1. Demonstrate capabilities in additional soft-skill areas using hands-on and/or case-study approaches						
2. 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						
3. Demonstrate greater than SSA-I level of verbal aptitude skills in English with regard to given topics and score 65-70% marks in company-specific internal tests						
<b>1.Soft Skills</b>	<b>Demonstrating soft-skill capabilities with reference to the following topics:</b> <ol style="list-style-type: none"> <li>SWOT</li> <li>Goal setting</li> <li>Time management</li> <li>Stress management</li> <li>Interpersonal skills and Intrapersonal skills</li> <li>Presentation skills</li> <li>Group discussions</li> </ol>					
<b>2. Quantitative Aptitude and Logical Reasoning</b>	<b>Solving problems with reference to the following topics:</b> <ol style="list-style-type: none"> <li>Equations: Basics of equations , Linear, Quadratic Equations of Higher Degree and Problem on ages.</li> <li>Logarithms, Inequalities and Modulus</li> <li>Sequence and Series: Arithmetic Progression, Geometric Progression, Harmonic Progression, and Special Series.</li> <li>Time and Work: Pipes &amp; Cistern and Work Equivalence.</li> <li>Time, Speed and Distance: Average Speed, Relative Speed, Boats &amp; Streams, Races and Circular tracks and Escalators.</li> <li>Arithmetic and Critical Reasoning: Arrangement, Sequencing, Scheduling, Network Diagram, Binary Logic, and Logical Connection.</li> <li>Binary Number System.- Binary to decimal, Octal, Hexadecimal</li> </ol>					
<b>3. Verbal Aptitude</b>	<b>Demonstrating English language skills with reference to the following topics:</b> <ol style="list-style-type: none"> <li>Critical reasoning</li> <li>Theme detection</li> <li>Verbal analogy</li> <li>Prepositions</li> <li>Articles</li> <li>Cloze test</li> <li>Company specific aptitude questions</li> </ol>					

Total: 30 Hours

*S. Anita*  
18/12/2023

**Dr.S.Anita**  
Professor and Head  
Department of Training

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