SONA COLLEGE OF TECHNOLOGY, SALEM-5

(An Autonomous Institution)

B.E-Mechatronics 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: Mechatronics Engineering

S.No.	Course Code	Course Title	L	T	P	C	Category	Total Contact Hours
Theory								
1	U19ENG101B	English for Engineers-I	1	0	2	2	HS	45 (15L+30P)
2	U19MAT102A	Linear Algebra and Calculus	3	1	0	4	BS	60
3	U19PHY103B	Engineering Physics	3	0	0	3	BS	45
4	U19CHE104G	Engineering Chemistry	3	0	0	3	BS	45
5	U19PPR105	Problem solving using Python Programming	3	0	0	3	ES	45
6	U19EGR106	Engineering Graphics	2	0	2	3	ES	60 (30L+30P)
Practical								
7	U19PCL108B	Physics and Chemistry Laboratory	0	0	2	1	BS	30
8	U19PPL111	Python Programming Laboratory	0	0	2	1	ES	30
9	U19GE101	Basic aptitude-I	0	0	2	0	EEC	30
		Total Credits				**20**		
Optional Language Elective*								
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

Chairperson, Science and Humanities BoS	**Chairperson, Mechatronics Engineering BoS**	**Member Secretary, Academic Council**	**Chairperson, Academic Council & Principal**
Dr. M. Renuga	**Dr. P. Suresh**	**Dr. R. Shivakumar**	**Dr. S. R. R. Senthil Kumar**

Copy to:-

HOD/ Mechatronics Engineering, First Semester BE MCT 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: Mechatronics Engineering

S.N	Course Code	Course Title	L	T	P	C	Category	Total Contact Hours
Theory								
1	U19TAM201	தமிழர் மரபு / Heritage of Tamils	1	0	0	1	HSMC	15
2	U19ENG201B	English for Engineers -II	1	0	2	2	HSMC	45 (15L+30P)
3	U19MAT202A	Differential Equations and Vector Calculus	3	1	0	4	BSC	60
4	U19PHY203F	Physics for electron devices	3	0	0	3	BSC	45
5	U19CHE204E	Modern materials	3	0	0	3	BSC	45
6	U19MCT201	Engineering Mechanics	3	0	0	3	ESC	45
7	U19MCT202	Basic Electrical Engineering	3	0	0	3	ESC	45
Practical								
8	U19WPL212	Workshop Practice	0	0	2	1	ESC	30
9	U19MCT203	Basic Electrical Engineering and Devices Laboratory	0	0	4	2	ESC	60
10	U19GE201	Basic Aptitude – II	0	0	2	0	EEC	30
Total Credits						**22**		
Optional Language Elective*								
11	U19OLE1201	French	0	0	2	1	HSMC	30
12	U19OLE1202	German						
13	U19OLE1203	Japanese						

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

Approved by

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Dr. M. Renuga	**Dr. P. Suresh**	**Dr. R. Shivakumar**	**Dr. S. R. R. Senthil Kumar**

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HOD/ Mechatronics Engineering, Second Semester BE MCT Students and Staff, COE

MCT III

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

S. No	Course Code	Course Title	Lecture	Tutorial	Practical	Credit	Total Contact Hours
Theory							
1	U19MC301	Fluid Mechanics and Machinery	3	0	0	3	45
2	U19MC302	Strength of Materials	3	0	0	3	45
3	U19MC303	Manufacturing Technology	3	0	0	3	45
4	U19MC304	Electrical Drives and Control	3	0	0	3	45
5	U19MC305	Digital Electronics	3	0	0	3	45
6	U19TAM301	தமிழரும் தொழில்நுட்பமும்/ Tamils and Technology	1	0	0	1	15
7	U19GE304	Mandatory course: Constitution of India	2	0	0	0	30
Practical							
8	U19MC306	Fluid Mechanics and Strength of Materials Laboratory	0	0	4	2	60
9	U19MC307	Manufacturing Technology Laboratory	0	0	3	1.5	45
10	U19MC308	Electrical Drives and Control Laboratory	0	0	3	1.5	45
11	U19GE301	Soft Skills and Aptitude – I	0	0	2	1	30
					Total Credits	**22**	

Approved By

5/7/23

Chairman, Mechatronics Engineering BoS
Dr.P.Suresh

Member Secretary, Academic Council
Dr.R.Shivakumar

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

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HOD/ Mechatronics Engineering, Third Semester BE MCT Students and Staff, COE

MCT
IV

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

S. No	Course Code	Course Title	Lecture	Tutorial	Practical	Credit	Total Contact Hours
Theory							
1	U19MAT401B	Probability and Statistical Methods	3	1	0	4	60
2	U19MC401	Fluid Power Systems	3	0	0	3	45
3	U19MC402	Thermodynamics and Heat Transfer	3	0	0	3	45
4	U19MC403	Microprocessors and Microcontroller	3	0	0	3	45
5	U19MC902	Professional Elective: Sensors, Transducers and Instrumentation	3	0	2	4	75
6	U19GE402	Mandatory course: Environment and Climate Science	2	0	0	0	30
Practical							
7	U19MC404	Fluid Power Systems Laboratory	0	0	4	2	60
8	U19MC405	Microprocessor and Microcontroller Laboratory	0	0	4	2	60
9	U19GE401	Soft Skill and Aptitude – II	0	0	2	1	30
					Total Credits	**22**	**450**

Approved By

Chairperson, Mechatronics Engineering BoS
Dr.P.Suresh

Member Secretary, Academic Council
Dr.R.Shivakumar

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

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HOD/ Mechatronics Engineering, Fourth Semester BE MCT Students and Staff, COE

Sona College of Technology, Salem-5

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

Department:-Mechatronics Engineering

S.No	Course Code	Course Name	L	T	P	C
1.	U19MC901	Sensors and Instrumentation	3	0	2	4
2.	U19MC902	Sensors, Transducers and Instrumentation	3	0	2	4
3.	U19MC903	Embedded Systems and Internet of Things	3	0	0	3
4.	U19MC904	Electric and Hybrid Vehicles	3	0	0	3
5.	U19MC905	Digital Manufacturing	3	0	0	3
6.	U19MC906	Drone Technology	3	0	0	3
7.	U19MC907	Design Thinking and Product Innovation	3	0	0	3
8.	U19MC908	Virtual Instrumentation	3	0	0	3
9.	U19MC909	Agriculture Automation	3	0	0	3
10.	U19MC910	Medical Mechatronics	3	0	0	3
11.	U19MC911	Metrology and Measurements	3	0	0	3
12.	U19MC912	Automatic Control System	3	0	0	3
13.	U19MC913	Automation in HVAC	3	0	0	3
14.	U19MC914	Energy Storage System and Management	3	0	0	3
15.	U19MC915	Industrial Electronics and Applications	3	0	0	3
16.	U19MC916	Internet Tools and Java Programming	3	0	0	3
17.	U19MC917	Internet of Things	3	0	0	3
18.	U19MC918	Micro Electro Mechanical Systems	3	0	0	3
19.	U19MC919	Nanotechnology	3	0	0	3
20.	U19MC920	Smart Manufacturing Equipments	3	0	0	3
21.	U19MC921	Software Project Management	3	0	0	3

SONA COLLEGE OF TECHNOLOGY, SALEM-5

DEPARTMENT OF MECHATRONICS ENGINEERING

LIST OF PROFESSIONAL ELECTIVES FOR HONORS Degree **Date: 3.5.2023**

S.No	Vertical 1: APPLIED ROBOTICS	Vertical 2: SMART MANUFACTURING	Vertical 3: SMART MOBILITY SYSTEMS	Vertical 4: INTELLIGENCE SYSTEMS	Vertical 5: AUTOMATION	Vertical 6: AVIONICS AND DRONE TECHNOLOGY
1.	Robots and Systems in Smart Manufacturing	Robot and Machine Elements Design	Fundamentals of Mobility Systems	Applied Signal Processing	Cyber Physical Systems	Avionics
2.	Autonomous Mobile Robots	Design for X	Electric and Hybrid Vehicles	Applied Image Processing	Power Electronics and Drives	Control Engineering
3.	Soft Robotics	Computer Integrated Manufacturing	Automotive Mechatronics	Machine Learning for Intelligent Systems	Process Control	Guidance and Control
4.	Agricultural and Medical Robotics	Advanced Manufacturing Systems	Intelligent Vehicle Technology	Condition Monitoring and Fault Diagnostics	Total Integrated Automation	Navigation and Communication System
5.	Collaborative and Humanoid Robotics	Additive Manufacturing	Advanced Driver Assistance Systems	Immersive Technologies and Haptic	Industrial Internet of Things	Design of UAV
6.	Robot Operating Systems	Computer Aided Inspection and Testing	Drone Technology	Computer Vision and Deep Learning	Digital Twin and Industry 5.0	Aerodynamics

SONA COLLEGE OF TECHNOLOGY, SALEM-5

Department of Mechatronics Engineering

Honours Degree- Verticals & Courses

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

Vertical 1: APPLIED ROBOTICS

S.No	Course Code	Course Name	L	T	P	C
1	U19MC2001	Robots and Systems in Smart Manufacturing	3	0	0	3
2	U19MC2002	Autonomous Mobile Robots	3	0	0	3
3	U19MC2003	Soft Robotics	3	0	0	3
4	U19MC2004	Agricultural and Medical Robotics	3	0	0	3
5	U19MC2005	Collaborative and Humanoid Robotics	3	0	0	3
6	U19MC2006	Robot Operating Systems	3	0	0	3

Vertical 2: SMART MANUFACTURING

S.No	Course Code	Course Name	L	T	P	C
1	U19MC2007	Robot and Machine Elements Design	3	0	0	3
2	U19MC2008	Design for X	3	0	0	3
3	U19MC2009	Computer Integrated Manufacturing	3	0	0	3
4	U19MC2010	Advanced Manufacturing Systems	3	0	0	3
5	U19MC2011	Additive Manufacturing	3	0	0	3
6	U19MC2012	Computer Aided Inspection and Testing	3	0	0	3

Vertical 3: SMART MOBILITY SYSTEMS

S.No	Course Code	Course Name	L	T	P	C
1	U19MC2013	Fundamentals of Mobility Systems	3	0	0	3
2	U19MC904	Electric and Hybrid Vehicles	3	0	0	3
3	U19MC2014	Automotive Mechatronics	3	0	0	3
4	U19MC2015	Intelligent Vehicle Technology	3	0	0	3
5	U19MC2016	Advanced Driver Assistance Systems	3	0	0	3
6	U19MC906	Drone Technology	3	0	0	3

Vertical 4: INTELLIGENCE SYSTEMS

S.No	Course Code	Course Name	L	T	P	C
1	U19MC2017	Applied Signal Processing	3	0	0	3
2	U19MC2018	Applied Image Processing	3	0	0	3
3	U19MC2019	Machine Learning for Intelligent Systems	3	0	0	3
4	U19MC2020	Condition Monitoring and Fault Diagnostics	3	0	0	3
5	U19MC2021	Immersive Technologies and Haptic	3	0	0	3
6	U19MC2022	Computer Vision and Deep Learning	3	0	0	3

Vertical 5: AUTOMATION

S.No	Course Code	Course Name	L	T	P	C
1	U19MC2023	Cyber Physical Systems	3	0	0	3
2	U19MC2024	Power Electronics and Drives	3	0	0	3
3	U19MC2025	Process Control	3	0	0	3
4	U19MC2026	Total Integrated Automation	3	0	0	3
5	U19MC2027	Industrial Internet of Things	3	0	0	3
6	U19MC2028	Digital Twin and Industry 5.0	3	0	0	3

Vertical 6: AVIONICS AND DRONE TECHNOLOGY

S.No	Course Code	Course Name	L	T	P	C
1	U19MC2029	Avionics	3	0	0	3
2	U19MC2030	Control Engineering	3	0	0	3
3	U19MC2031	Guidance and Control	3	0	0	3
4	U19MC2032	Navigation and Communication System	3	0	0	3
5	U19MC2033	Design of UAV	3	0	0	3
6	U19MC2034	Aerodynamics	3	0	0	3

SONA COLLEGE OF TECHNOLOGY, SALEM-5

Department of Mechatronics Engineering

Minor Degree- Verticals & Courses

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

Minor Vertical: Robotics

S.No	Course Code	Course Name	L	T	P	C
1	U19MC2035	Introduction to Robotics	3	0	0	3
2	U19MC2036	Fundamentals of Robot Programming and Applications	3	0	0	3
3	U19MC2037	Machine Vision System	3	0	0	3
4	U19MC2038	Sensors and Actuators	3	0	0	3
5	U19MC2039	Fundamentals of Drones	3	0	0	3
6	U19MC2040	Industrial Robotics and Material Handling Systems	3	0	0	3
7	U19MC2041	Humanoid Robots and Collaborative Robotics	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: Mechatronics Engineering

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Theory								
1	U19ENG101B	English for Engineers-I	1	0	2	2	HS	45 (15L+30P)
2	U19MAT102A	Linear Algebra and Calculus	3	1	0	4	BS	60
3	U19PHY103B	Engineering Physics	3	0	0	3	BS	45
4	U19CHE104G	Engineering Chemistry	3	0	0	3	BS	45
5	U19PPR105	Problem solving using Python Programming	3	0	0	3	ES	45
6	U19EGR106	Engineering Graphics	2	0	2	3	ES	60 (30L+30P)
Practical								
7	U19PCL108B	Physics and Chemistry Laboratory	0	0	2	1	BS	30
8	U19PPL111	Python Programming Laboratory	0	0	2	1	ES	30
9	U19GE101	Basic aptitude-I	0	0	2	0	EEC	30
		Total Credits				**20**		
Optional Language Elective*								
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

Chairperson, Science and Humanities BoS	**Chairperson, Mechatronics Engineering BoS**	**Member Secretary, Academic Council**	**Chairperson, Academic Council & Principal**
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HOD/ Mechatronics Engineering, First Semester BE MCT Students and Staff, COE

L T P C
1 0 2 2

U19ENG101 B– **English for Engineers – I**

First year I semester

Common to MCT

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. Develop speaking skills for self-introduction, delivering speeches and technical presentation.
3. Speak effectively in real time and business situations
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													
		1	2	3	4	5	6	7	8	9	10	11	12	Ps o1	Ps o2
1	Use grammatical components effectively in both written and spoken communication	2	1	1	1	1	2	3	2	2	3	3	3	3	3
2	Develop speaking skills for self-introduction, delivering speeches and technical presentation	3	2	2	3	3	3	3	2	3	3	3	3	3	3
3	Speak effectively in real time and business situations	3	3	2	3	3	3	3	2	3	3	3	3	3	3
4	Write email, formal letters and descriptions of graphics	1	1	1	2	2	1	2	2	1	3	1	1	1	1
5	Develop skills for writing reports and proposals, and for general purpose and technical writing.	2	1	1	3	2	2	3	3	3	3	2	3	3	3

UNIT –I

- General Vocabulary, Parts of speech
- Self-introduction, personal information, name, home background, study details, area of interest, hobbies, strengths and weaknesses, projects and paper presentations, likes and dislikes in food, travel, clothes, special features of home town.

- Instructions, Email, fixing an appointment, cancelling appointments, conference details, hotel accommodation, order for equipment, training programme details, paper submission for seminars and conferences
- Paragraph writing – Describing – defining – providing examples or evidences

UNIT II

- Tenses, active and passive voice
- Welcome address, vote of thanks, special address on specific topic.
- Checklists, letter writing, business communication, quotations, placing orders, complaints, replies to queries from business customers, inviting dignitaries, accepting and declining invitations

UNIT – III

- Prefixes and Suffixes
- Mini presentation in small groups of two or three, office arrangements, facilities, office functions, sales, purchases, training recruitment, advertising, applying for financial assistance, applying for a job, team work, discussion, presentation.
- Job application letter and resume, recommendations,

UNIT - IV

- Modal verbs and probability, concord
- 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, receptionist and appointment seeker, new employee and manager, employee and employee, p.a. and manager, schedule for training
- Note making, Proposal

UNIT – V

- If conditionals
- Asking for directions, seeking help with office equipment, clarifying an error in the bill, job details, buying a product, selling a product, designing a website, cancelling and fixing appointments, hotel accommodation, training facilities, dress code, conference facilities.
- Memo, technical report writing, feasibility reports, accident report, survey report

TOTAL: 45 hours

Speaking test will be conducted for 20 marks externally and evaluated along with English for Engineers – I in the End Semester Valuation.

TEXT BOOK:

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

Extensive Reading

1. The Story of Amazon.com- Sara Gilbert, published by Jaico
2. The Story of Google – Sara Gilbert, published by Jaico

Reference

Norman Whitby, Business Benchmark – Pre-Intermediate to Intermediate, Students Book, Cambridge University Press, 2006.

A Course in Communication Skills, P. Kiranmai Dutt, Geetha Rajeevan, C. L. N. Prakash, published by Cambridge University Press India Pvt. Ltd.

HOD
Humanities and Languages
Dr. M.RENUGA,
Professor & Head,
Department of Humanities & Languages,
Sona College of Technology,
SALEM - 63

B. E. / MECHATRONICS ENGINEERING

SEMESTER – I	LINEAR ALGEBRA AND CALCULUS	L	T	P	C
U19MAT102A		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	3		3	2						3	2	3	3
CO2	3	3		3	2						3	2	3	3
CO3	3	3		3	2						3	2	3	3
CO4	3	3		3	2						3	2	3	3
CO5	3	3		3	2						3	2	3	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, 1st Edition, 2018.
2. T. Veerarajan, "Engineering Mathematics for Semesters I & II", McGraw Hill Publishers, 1st Edition, 2019.

REFERENCE BOOKS:

1. S. Lipschutz and M. L. Lipson, "Linear Algebra", McGraw Hill Publishers, 6th Edition, 2018.
2. E. Kreyszig, "Advanced Engineering Mathematics", Wiley Publishers, 10th Edition, Reprint, 2017.
3. C. Prasad and R. Garg, "Advanced Engineering Mathematics", Khanna Publishers, 1st Edition, 2018.
4. B. V. Ramana, "Higher Engineering Mathematics", McGraw Hill Publishers, 29th Reprint, 2017.
5. B. S. Grewal, "Higher Engineering Mathematics", Khanna Publishers, 44th 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

Course Code: U19PHY103B L T P C
Course Name: ENGINEERING PHYSICS 3 0 0 3 100

(Common to I semester B.E. Computer Science and Engineering, Computer Science and Engineering (Artificial Intelligence and Machine Learning), Computer Science and Design & Mechatronics Engineering)

(CSE, CSE(AIML), CSD & MCT)

COURSE OUTCOMES:

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

CO1 Discuss the dual nature of matter and radiation and the application of wave nature of particles.

CO2 Describe the basic components of lasers.

CO3 Analyse the relation between arrangement of atoms and material properties.

CO4 Deduce Maxwell's equations using the fundamentals of electromagnetism.

CO5 Elucidate the different modes of heat transfer.

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 Quantum Physics 9

Origin of quantum mechanics – Limitations of classical theory - Dual nature of matter and radiation.

Particle nature of radiation - Compton effect - Explanation based on quantum theory - Expression for Compton shift (no derivation).

Wave nature of matter - de Broglie waves - Schrödinger's time independent and time dependent wave equations - Physical significance of wave function - Energy and wave function of an electron trapped in one dimensional box.

Application of wave nature of particles - Electron microscope - Comparison of optical and electron microscope - Scanning electron microscope - Limitations of electron microscope.

Unit 2 Lasers 9

Basic terms - Energy level - normal population - induced absorption (pumping) - population inversion - meta stable state - spontaneous emission - stimulated emission.

Basic components of a laser - Active medium - pumping technique - optical resonator

Einstein's theory - stimulated absorption - spontaneous emission and stimulated emission.

Types of lasers - Solid lasers (Nd:YAG) - Gas lasers (CO_2 laser) - semiconductor laser (homojunction and hetero junction laser)

Holography - Construction and reconstruction of hologram.

Unit 3 Crystal Physics 9

Importance of crystals - Types of crystals - Basic definitions in crystallography (Lattice – space lattice - unit cell - lattice parameters – basis - crystallographic formula) - Seven crystal systems and fourteen Bravais lattices – Lattice planes and Miller indices – Interplanar distance - d spacing in cubic lattice - Calculation of number of atoms per unit cell - Atomic radius - Coordination number and Atomic Packing factor for SC, BCC, FCC and HCP Structures - Polymorphism and allotropy.

Crystal imperfections - Point, line and surface defects - burger vector.

Unit 4 Electromagnetism 9

Electrostatics - Electric field - Electric field intensity – Field due to discrete and continuous charges – Electric lines of forces – Electric flux – Gauss's law – Divergence of E – Applications of Gauss's law – Curl of E.

Magnetostatics – Magnetic fields – Magnetic Lorentz force – Force experienced by current carrying conductor in magnetic field – Steady currents – Magnetic field due to steady current - Biot - Savart Law - Straight line currents – Ampere's circuital law – Divergence and curl of B – Applications of Ampere's circuital law - Comparison of Magneto statics and Electrostatics.

Unit 5 Thermal Physics 9

Heat and temperature - Modes of heat transfer (Conduction, convection and radiation) - Specific heat capacity - thermal capacity and coefficient of linear thermal expansion.

Thermal conductivity - Measurement of thermal conductivity of good conductor - Forbe's

method - Measurement of thermal conductivity of bad conductor - Lee's disc method - Radial flow of heat - Cylindrical flow of heat - Practical applications of conduction of heat.

Thermal radiations - Properties of thermal radiations - Applications of thermal radiations.

Lecture: 45, Tutorial: 00, Total: 45 Hours

Text Book:

1. M.N.Avadhanulu, 'Engineering Physics' S.Chand & Company Ltd, New Delhi (2015)
2. D. K. Bhattacharya, Poonam Tandon "Engineering Physics" Oxford University Press 2017.

References:

1. Engineering Physics, Sonaversity, Sona College of Technology, Salem (Revised Edition 2018).
2. B. K. Pandey and S. Chaturvedi, Engineering Physics , Cengage Learning India Pvt. Ltd., Delhi, 2019
3. Rajendran, V, and Marikani A, 'Materials science' TMH Publications, (2004) New Delhi.
4. Palanisamy P.K, 'Materials science', SciTech Publications (India) Pvt. Ltd., Chennai, Second Edition (2007)

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I SEMESTER (Common to BME and MECHATRONICS)

COURSE CODE	**U19CHE104G**	L T P C
COURSE NAME	**ENGINEERING CHEMISTRY**	3 0 0 3

Course outcome:

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

CO1 Analyze the impurities of water, their removal methods and explain the conditioning methods for industrial uses.

CO2 Outline the principles and applications of electrochemistry to engineering and technology.

CO3 Analyze the types of corrosion and describe the methods of corrosion control.

CO4 Discuss the principle and applications of surface chemistry and catalysis in engineering and technology.

CO5 Describe the basics of nano chemistry, synthesis, properties and applications of nano materials in engineering and technology.

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
CO – 2	3	2												2
CO – 3	3	3												2
CO – 4	3	3												2
CO - 5	3	3												2

UNIT I WATER TECHNOLOGY **9**

Introduction - Characteristics – hardness – estimation of hardness by EDTA method, alkalinity and its estimation - Boiler feed water – requirements – disadvantages of using hard water in boilers – internal conditioning (colloidal, phosphate, calgon and carbonate conditioning methods) – external conditioning – zeolite process, demineralization process, desalination of brackish water by reverse osmosis.

UNIT II ELECTROCHEMISTRY **9**

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^{2+} vs dichromate) – conductometric titrations (acid-base – HCl vs NaOH).

Unit – III CORROSION AND CORROSION CONTROL 9

Chemical corrosion - Pilling-Bedworth rule – electrochemical corrosion – mechanism - galvanic corrosion – differential aeration corrosion – factors influencing corrosion – corrosion control – sacrificial anode and impressed cathodic current methods – corrosion inhibitors – protective coatings – preliminary treatment - Paints constituents and their functions – surface conversion coatings – Galvanizing and Tinning.

UNIT IV SURFACE CHEMISTRY AND CATALYSIS 9

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 – 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 V NANOCHEMISTRY 9

Basics - distinction between molecules, nanoparticles and bulk materials – size-dependent properties – nanoparticles: nano cluster, nano rod, nanotube (CNT) and nanowire – Synthesis: precipitation – thermolysis – hydrothermal – solvothermal – electrodeposition - chemical vapour deposition - sol-gel technique – properties and applications of nano materials.

TOTAL: 45 HOURS

Text Books:

1. P.C.Jain and Monica Jain, "Engineering Chemistry" Dhanpat Rai Pub, Co., New Delhi, 2010 (15th Edition).
2. T. Maruthavanan *et al.*, "Engineering Chemistry", Sonaversity, Sona College of Technology, Salem, Revised Edition 2018.

Reference Books:

1. H.K. Chopra, A. Parmer, "Chemistry for Engineers", Narosa Publishing House, New Delhi, 110002, 2016.
2. Kannan P., Ravikrishnan A., "Engineering Chemistry", Sri Krishna Hi-tech Publishing Company Pvt. Ltd., Chennai, 2009.
3. B. Sivasankar "Engineering Chemistry" Tata McGraw-Hill Pub.Co.Ltd, New Delhi, 2008.
4. Ozin G. A. and Arsenault A. C., "Nanochemistry: A Chemical Approach to Nanomaterials", RSC Publishing, 2005.

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U19PPR105 PROBLEM SOLVING USING PYTHON PROGRAMMING 3 0 0 3

(Common to ADS, IT, CSE, ECE, EEE, BME, MCT, AIML & CSD)

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	P09	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.

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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

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.

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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. JoIhe, 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.

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U19PCL108B	PHYSICS AND CHEMISTRY LABORATORY [For CSE & MCT]	L	T	P	C
		0	0	2	1

Course Outcomes

After successful completion of this course, the students should be able to

CO1:	Apply the principles of Optics, Thermal Physics, Electricity and Elasticity to determine the Engineering properties of materials.
CO2:	Identify hardness and suggest the quality of water suitable for domestic purpose and analyze the concentration of carbonate, bicarbonate and hydroxide present in the given sample of water.
CO3:	Determine the resistivity of the given copper turn used for house hold applications and determine the amount of pH of house hold water sample and suggest the remedial measures.

Pre-requisite: Capable of using Screw guage, Vernier calliper, Travelling microscope and Spectrometer

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	PO 2	P O3	PO 4	PO 5	PO 6	PO 7	PO 8	P09	PO1 0	PO1 1	PO12	PSO1	PSO2
CO1	3			1		1					1			2
CO2	3			1		1					1			2
CO3	3			1		1					1			2

Course Assessment methods

Direct		Indirect
Mean of 1st half of Experiment (10)	Quiz on 2nd half (5)	Course end

Quiz on 1st half (5) Internal test I (10) Mean of 2nd half of Experiment (10)	Internal test II (10) RTPS (10) End semester Examination (40)	survey

List of Experiments (Physics part) (Any five experiments from the below list)	
1	Determination of velocity of ultrasonic waves and compressibility of the given liquid using ultrasonic interferometer.
2	Determination of dispersive power of the prism for various pairs of colors in the mercury spectrum using a spectrometer.
3	Determination of laser wavelength, particle size of lycopodium powder, acceptance angle and numerical aperture of an optical fibre using diode laser.
4	Determination of specific resistance of a given wire using Carey Foster's bridge.
5	Determination of the thermal conductivity of a bad conductor using Lee's Disc apparatus.
6	Determination of band gap of the given semiconductor diode.
List of Experiments (Chemistry part) (Any five experiments from the below list)	
7	Estimation of hardness of water sample by EDTA method.
8	Estimation of alkalinity of water sample by indicator method.
9	Estimation of HCl by pH metry.
10	Estimation of HCl by conductometry. (HCl vs NaOH)
11	Estimation of ferrous ion by potentiometric titration.
12	Evaluate the iron content of the water by spectrophotometry.
	Total Hours: 30 Hrs

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U19PPL111 **PYTHON PROGRAMMING LABORATORY** 0 0 2 1

(Common to ADS, IT, CSE, ECE, EEE, BME, MCT, AIML & CSD)

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	P09	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

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Semester-I U19GE101	Basic Aptitude – I (Common to All Departments)	L	T	P	C	Marks
		0	0	2	0	100

Course Outcomes U19GE101

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	**Solving simple problems with reference to the following topics:** 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	**Demonstrating plain English language skills with reference to the following topics:** a. Synonyms b. Antonyms c. Verbal analogy d. Editing passages e. Sentence filler words

30 hours

S. Anita

Dr.S.Anita

Head/Training

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Sona College of Technology, Salem – 636 005
(An Autonomous Institution)
Courses of Study for BE / B Tech Semester II under Regulations 2019 (CBCS)
Branch: Mechatronics Engineering

S.N	Course Code	Course Title	L	T	P	C	Category	Total Contact Hours
Theory								
1	U19TAM201	தமிழர் மரபு / Heritage of Tamils	1	0	0	1	HSMC	15
2	U19ENG201B	English for Engineers -II	1	0	2	2	HSMC	45 (15L+30P)
3	U19MAT202A	Differential Equations and Vector Calculus	3	1	0	4	BSC	60
4	U19PHY203F	Physics for electron devices	3	0	0	3	BSC	45
5	U19CHE204E	Modern materials	3	0	0	3	BSC	45
6	U19MCT201	Engineering Mechanics	3	0	0	3	ESC	45
7	U19MCT202	Basic Electrical Engineering	3	0	0	3	ESC	45
Practical								
8	U19WPL212	Workshop Practice	0	0	2	1	ESC	30
9	U19MCT203	Basic Electrical Engineering and Devices Laboratory	0	0	4	2	ESC	60
10	U19GE201	Basic Aptitude – II	0	0	2	0	EEC	30
Total Credits						**22**		
Optional Language Elective*								
11	U19OLE1201	French	0	0	2	1	HSMC	30
12	U19OLE1202	German						
13	U19OLE1203	Japanese						

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

Approved by

Chairperson, Science and Humanities BoS	**Chairperson, Mechatronics Engineering BoS**	**Member Secretary, Academic Council**	**Chairperson, Academic Council & Principal**
Dr. M. Renuga	**Dr. P. Suresh**	**Dr. R. Shivakumar**	**Dr. S. R. R. Senthil Kumar**

Copy to:-
HOD/ Mechatronics Engineering, Second Semester BE MCT Students and Staff, COE

U19TAM201 **HERITAGE OF TAMILS** **L T P C**
1 0 0 1

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 ofArchaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by: The Author)
11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

HOD

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U19TAM201 தமிழர் மரபு **LTPC 1001**

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 திருவள்ளுவர் சிலை – இசைக் கருவிகள் – மிருதங்கம், பறை, வீணை, யாழ், நாதஸ்வரம் – தமிழர்களின் சமூக பொருளாதார வாழ்வில் கோவில்களின் பங்கு.

அலகு III நாட்டுப்புறக் கலைகள் மற்றும் வீர விளையாட்டுகள்: 3

தெருக்கூத்து, கரகாட்டம், வில்லுப்பாட்டு, கணியான் கூத்து, ஒயிலாட்டம், 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, கையெழுத்துப்படிகள் – தமிழ்ப் புத்தகங்களின் அச்சு 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. 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 C ivilization on the banks of river Vaigai' (Jointly Published by: Department ofArchaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by: The Author)
11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

HOD

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L T P C
1 0 2 2

U19ENG201B - English for Engineers – II
First year II semester
MCT

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

1. Frame sentences correctly, both in written and spoken forms of language with accuracy and fluency.
2. Develop and demonstrate listening skills for academic and professional purposes.
3. Draw conclusions on explicit and implicit oral information.
4. Develop effective reading skills and reinforce language skills required for using grammar and building vocabulary.
5. Read for gathering and understanding information, following directions and giving responses.

	COURSE OUTCOMES	PROGRAMME OUTCOMES													
		1	2	3	4	5	6	7	8	9	10	11	12	Pso1	Pso2
1	Frame sentences correctly, both in written and spoken forms of language with accuracy and fluency	2	1	2	3	2	3	3	3	3	3	3	3	3	3
2	Develop and demonstrate listening skills for academic and professional purposes	2	2	2	3	2	3	3	3	3	3	3	3	3	3
3	Draw conclusions on explicit and implicit oral information	3	2	2	3	2	3	3	3	3	3	3	3	3	3
4	Develop effective reading skills and reinforce language skills required for using grammar and building vocabulary	3	3	2	3	2	3	3	3	3	3	3	3	3	3
5	Read for gathering and understanding information, following directions and giving responses.	3	3	2	3	2	3	3	3	3	3	3	3	3	3

UNIT –I **9**

- Cause and effect expressions, adjectives, comparative adjectives
- Listening to conversations, welcome speeches, lectures and description of equipment
- Listening to different kinds of interviews (face-to-face, radio, TV and telephone interviews)
- Understanding notices, messages, timetables, advertisements, graphs, etc.
- Reading passages for specific information transfer

UNIT – II 9

- Prepositions and dependent prepositions
- Understanding short conversations or monologues
- Taking down phone messages, orders, notes etc
- Listening for gist, identifying topic, context or function
- Reading documents for business and general contexts and interpreting graphical representations

UNIT – III 9

- Collocations
- Listening comprehension, entering information in tabular form
- Error correction, editing mistakes in grammar, vocabulary, spelling, etc.
- Reading passage with multiple choice questions, reading for gist and reading for specific information, skimming for comprehending the general idea and meaning and contents of the whole text

UNIT – IV 9

- Articles, adverbs
- Intensive listening exercises and completing the steps of a process.
- Listening exercises to categorise data in tables.
- Short reading passage: gap-filling exercise related to grammar, testing the understanding of prepositions, articles, auxiliary verbs, modal verbs, pronouns, relative pronouns and adverbs, short reading passage with multiple choice questions.

UNIT – V 9

- Pronouns
- Listening to extended speech for detail and inference
- Listening and developing hints
- gap-filling exercise testing the knowledge of vocabulary, collocations, dependent prepositions, grammatical structures
- Short reading passages for sentence matching exercises, picking out specific information in a short text

(Theory: 15 hours: Practical: 30 hours) TOTAL: 45 hours

The listening test will be conducted for 20 marks and reading for 20 marks internally and evaluated along with English for Engineers – II in the End Semester Valuation.

Textbook:

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

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B. E. / MECHATRONICS 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	P09	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3		3	2						3	2	3	3
CO2	3	3		3	2						3	2	3	3
CO3	3	3		3	2						3	2	3	3
CO4	3	3		3	2						3	2	3	3
CO5	3	3		3	2						3	2	3	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 parallelopiped.

Theory: **45 Hours** Tutorial: **15 Hours** Total: **60 Hours**

TEXT BOOKS:

1. T. Veerarajan, "Linear Algebra and Partial Differential Equations", McGraw Hill Publishers, 1st Edition, 2018.
2. T. Veerarajan, "Engineering Mathematics for Semesters I & II", McGraw Hill Publishers, 1st Edition, 2019.

REFERENCE BOOKS:

1. J. Stewart, "Calculus", Cengage Publishers, 8th Edition, 2016.
2. C. Prasad and R. Garg, "Advanced Engineering Mathematics", Khanna Publishers, 1st Edition, 2018.
3. E. Kreyszig., "Advanced Engineering Mathematics", Wiley Publishers, 10th Edition, Reprint, 2017.
4. B. S. Grewal, "Higher Engineering Mathematics", Khanna Publishers, 44th Edition, 2018.
5. B. V. Ramana, "Higher Engineering Mathematics", McGraw Hill Publishers, 29th Reprint, 2017.

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

Course Code: U19PHY203F **L T P C**
Course Name: Physics for Electron Devices **3 0 0 3 100**

(for Mechatronics Engineering)

COURSE OUTCOMES:
At the end of the course, the students will be able to,

CO1 Differentiate the electrical and thermal conductivity of metals.

CO2 Elucidate the classification and theory of semiconducting materials.

CO3 Discuss the applications of diode as rectifier, photodiode, LED and solar cell.

CO4 Elucidate the application of bipolar transistor as amplifier.

CO5 Evaluate the novel properties of metallic glasses, shape memory alloys and nanomaterials.

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 Conducting materials 9

Usage of conducting materials - basic definitions (electrical resistance - conductance - resistivity - conductivity).

Classical free electron theory of metals - postulates of classical free electron theory - microscopic form of Ohm's law - Electrical conductivity - definition and expression for electrical conductivity - thermal conductivity - definition and expression for thermal conductivity - Wiedemann - Franz law and Lorentz number - Success and failure of classical free electron theory.

Quantum free electron theory - Drawbacks of quantum free electron theory - origin of energy bands - band theory of solids (qualitative treatment only) - Fermi energy and Fermi distribution function - Effect of temperature on Fermi function - Density of energy states - carrier concentration in metals.

Unit 2 Semiconducting Materials 9

Properties of semiconductors - Classification of semiconductors - Intrinsic and extrinsic semiconductors - Elemental and compound semiconductors.

Intrinsic semiconductor - two types of charge carriers - Energy band diagram of intrinsic semiconductors (at T= 0 K and T > 0 K) - Expression for number of electrons in conduction band - Expression for number of holes in valence band - Law of mass action and intrinsic carrier concentration - Fermi level - Variation of Fermi level with temperature - electrical conductivity - band gap determination.

Extrinsic semiconductors - Draw backs of intrinsic semiconductors – Types of extrinsic semiconductors – 'n'-type and 'p'-type semiconductors – Energy band diagram of 'n' type and 'p' type semiconductors (at T= 0 K and T > 0 K) – Carrier concentration of extrinsic semiconductors (Qualitative Treatment only) – Hall effect –Determination of Hall coefficient – Applications.

Unit 3 PN junction diode and optoelectronic devices 9

PN junction diode - Formation of p-n junction - p-n junction diode- p-n junction diode under forward bias- p-n junction diode under reverse bias-Application of junction diode as rectifier-Half wave rectifier- full wave rectifier- bridge rectifier-Zener diode- Zener diode as voltage regulator.

Optoelectronic devices - Photo diodes- types of photo diodes- Photo detector-PIN diode-Avalanche photo diode-Light emitting diode (LED) - LED- principle –construction- working-Solar cell- principle –construction- working.

Unit 4 Bipolar junction transistors and amplifiers 9

Bipolar junction transistors - npn and pnp transistors- Unbiased npn transistor – Biased npn transistor –Transistor currents-Transistor configuration- common base configuration-common emitter configuration-common collector configuration.

Amplifiers - Transistor as amplifier-introduction to Field effect transistors (FET) - Types of field effect transistors- Junction field effect transistor (JFET) –Metal oxide field effect transistor (MOSFET).

Unit 5 New Engineering Materials: 9

Metallic glasses -Preparation, properties and applications.

Shape memory alloys (SMA) - Characteristics, properties of NiTi alloy, application, advantages and disadvantages of SMA.

Nanoscience and Nanotechnology - Significance of nanoscale - different types of nanostructures (0-D, 1-D, 2-D and 3-D) – Fabrication of nanomaterials - Ball milling and Chemical vapour deposition technique (CVD).

Carbon nanotubes – structure - properties and applications – fabrication - pulsed laser deposition method.

Lecture: 45, Tutorial: 00, Total: 45 Hours

Text Book:

1. M.N.Avadhanulu, 'Engineering Physics' S.Chand &Company Ltd, New Delhi (2015)
2. B. K. Pandey and S. Chaturvedi, Engineering Physics, Cengage Learning India Pvt. Ltd., Delhi, 2012.

References:

1. Physics for Electrical and Electronics Engineering, Sonaversity, Sona College of Technology, Salem (Revised Edition 2016).
2. Rajendran, V, and Marikani A, 'Materials science' TMH Publications, (2004) New Delhi.
3. Palanisamy P.K, 'Materials science', SciTech Publications (India) Pvt. Ltd., Chennai, Second Edition (2007)
4. M. Arumugam, 'Materials Science' Anuradha Publications, Kumbakonam, (2006).

30.6.2022

Dr. C. Shanthi
HOD / Science

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Professor of Physics
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II Semester (MCT)

COURSE CODE	**U19CHE204E**	**L T P C**
COURSE NAME	**MODERN MATERIALS**	**3 0 0 3**

COURSE OUTCOMES

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

CO1: Analyze the types of polymers, polymerization reactions, polymerization techniques and fabrication methods of polymers for engineering applications.

CO2: Analyze the types and methods of preparing conducting polymers.

CO3: Explore different methodologies to synthesize nanostructured composites materials.

CO4: Analyze the different types of electrochemical processes carried out in electronic industries.

CO5: Compare the working principles of various organic electronic devices.

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
CO – 2	3	3												3
CO – 3	3	3												3
CO – 4	3	3												3
CO - 5	3	3												3

UNIT I: POLYMER CHEMISTRY 09

Nomenclature of Polymers – Functionality – Types of Polymerization-addition-condensation and copolymerization – Classification of Polymers – Free Radical mechanism of addition polymerization – Properties of Polymers- Tg – tacticity - Methods of Polymerization: emulsion and suspension – Plastics: Moulding constituents of plastic – Moulding of plastics into articles-Injection-Compression and Blow moulding – Thermoplastic and Thermosetting Resins.

UNIT II: CONDUCTING POLYMERS 09

Introduction – Structural characteristics and doping concept in metals and metal oxide nanoparticles - Charge carriers and conducting mechanism – Classification of conducting polymers: Intrinsic and extrinsic conducting polymers – Synthesis of conducting polymers - bulk and solution polymerization – Applications of conducting polymers in corrosion protection and sensors.

UNIT III: NANOSTRUCTURED COMPOSITES **09**

Definition of nanocomposites – Nanofillers: Classification of nanofillers, Synthesis and properties of nanofillers – Synthesis of nanocomposites by physical methods - direct mixing and solution mixing - Chemical methods - Microemulsion synthesis, Microwave assisted synthesis and Sonochemical assisted synthesis - Types of nanocomposites - Core-Shell nanostructure, Organic-Inorganic hybrid nanocomposites, Quantum dot (QDs) synthesis.

UNIT IV: ELECTROCHEMICAL PROCESSES IN THE FABRICATION OF ELECTRONIC DEVICES **09**

Electroplating – Principle and process - plating parameters- current and energy efficiency - Electroplating of Nickel - Fundamentals of electro less deposition – electro less plating of Nickel, fabrication of PCB's - Electrochemical etching of copper from PCBs - Anodizing - definition, principle and working methodology of anodized aluminium - Chemical sensors - optical and heat sensors – definitions and applications.

UNIT V: ORGANIC ELECTRONIC MATERIALS **09**

Organic semiconducting materials – working principle and advantages over inorganic semiconducting materials - p-type and n-type organic semiconducting materials - Pentacene Fullerenes-C-60 – Organic dielectric material – definition - working principle and examples - Polystyrene – PMMA – Organic Light Emitting Diodes (OLEDs): construction, working principle and applications – Organic transistors: construction, working principle and applications in electronic industries.

TOTAL: 45 HOURS

Text Books

1. Hagen Klauk, Organic Electronics: Materials, Manufacturing and Applications, Wiley – VCH. 2006.
2. A.P. Uthirakumar et.al, "Modern Materials", Sonaversity, Sona College of Technology, 2019.

Reference Books

1. H.K. Chopra, A. Parmer, "Chemistry for Engineers", Narosa Publishing House, New Delhi, 110 002, 2016.
2. Nanostructured Materials and Nanotechnology – II, Eds. Sanjay Mathur and Mrityunjay Singh, Willey, 2008.
3. Gowariker V.R, Viswanathan N.V. and Jayadev Sreedhar, Polymer Scinece, New age International P (Ltd), Chennai, 2006.
4. Nanostructured Materials and Nanotechnology – II, Eds. Sanjay Mathur and Mrityunjay Singh, Willey, 2008.

30.6.2022

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HOD / Sciences

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U19MCT201	ENGINEERING MECHANICS	L	T	P	C
		3	0	0	3

Course Outcomes

After successful completion of this course, the students should be able to

CO1:	Analyse the forces in statically determinate structures using scalar and vector analytical techniques.
CO2:	Examine the condition for equilibrium of rigid body using free body diagram.
CO3:	Evaluate the effect of friction of bodies under equilibrium condition.
CO4:	Determine the centroid, moment of inertia and polar moment of inertia of simple and composite sections.
CO5:	Analyse the motion of a body with force and without force causing the motion.

Pre-requisite

Engineering Physics

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	P09	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	2		2	2			1		1	3	2
CO2	3	3	3	2		2	2			1		2	3	2
CO3	3	3	3	2		2	2			1		2	3	2
CO4	3	3	3	2		2	2			1		1	3	2
CO5	3	3	3	2		2	2			1		2	3	2

Course Assessment methods

Direct		Indirect
Internal test I (8) Internal test II (8) Internal test III (8) Assignment/seminar/Quiz (5)	Online test (6) Attendance (5) End semester Examination (60)	Course end survey

Unit 01: BASICS & STATICS OF PARTICLES — **9 Hours**

Introduction – Units and Dimensions – Laws of Mechanics – Lame's theorem, Parallelogram and triangular Law of forces – Vectors – Vectorial representation of forces and moments – Coplanar Forces – Resolution and Composition of forces – Equilibrium of a particle - Forces in space – Equilibrium of a particle in space – Equivalent systems of forces – Principle of transmissibility – Single equivalent force.

Unit 02: EQUILIBRIUM OF RIGID BODIES IN 2 DIMENSIONS — **9 Hours**

Free body diagram – Types of supports and their reactions – requirements of stable equilibrium – Moments and Couples – Moment of a force about a point – Varignon's theorem – Equilibrium of Rigid

bodies in two dimensions.			
Unit 03: FRICTION			**9 Hours**
Frictional force – Laws of Coulomb friction – Angle of friction – cone of friction – Equilibrium of bodies on inclined plane.			
Unit 04: PROPERTIES OF SURFACES AND SOLIDS			**9 Hours**
Determination of Areas and Volumes – First moment of area and the Centroid of sections – Rectangle, circle, triangle from integration – T section, I section, Hollow section by using standard formula. Second and product moments of plane area – Rectangle, triangle, circle from integration – T section, I section by using standard formula – Parallel axis theorem and perpendicular axis theorem – Polar moment of inertia.			
Unit 05: DYNAMICS OF PARTICLES			**9 Hours**
Displacements, Velocity and acceleration, their relationship – Rectilinear and Curvilinear motion – Newton's law – Work Energy Equation of particles – Impulse and Momentum– Impact of elastic bodies.			
Theory: 45 Hrs	**Tutorial: --**	**Practical: --**	**Total Hours: 45 Hrs**

TEXT BOOKS

1. Beer, F.P and Johnson Jr. E.R. "Vector Mechanics for Engineers: Statics and Dynamics", McGraw–Hill International 10th Edition, 2013.
2. Dr. N. Kottiswaran, "Engineering Mechanics (Statics and Dynamics)" ,Sri Balaji Publications 10th edition 2010.

REFERENCES

1. Rajasekaran, S, Sankarasubramanian, G., "Fundamentals of Engineering Mechanics", Vikas Publishing House Pvt. Ltd., (2011).
2. Hibbeller, R.C., "Engineering Mechanics", Vol. 1 Statics, Vol. 2 Dynamics, Pearson Education Asia Pvt. Ltd., (2015).
3. Palanichamy, M.S., Nagam, S., "Engineering Mechanics – Statics & Dynamics", Tata McGraw–Hill, (2004).
4. MeriamJ.L,KraigeL.G,"Engineering Mechanics-Statics"6th Edition, Wiley, 2017.
5. Irving H. Shames, "Engineering Mechanics – Statics and Dynamics", IV Edition– Pearson Education Asia Pvt. Ltd., (2006).
6. Kumar, K.L., "Engineering Mechanics", 3rd Revised Edition, Tata McGraw-Hill Publishing company, New Delhi (2008)

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U19MCT202	BASIC ELECTRICAL ENGINEERING	L	T	P	C
		3	0	0	3

Course Outcomes

After successful completion of this course, the students should be able to

CO1:	Evaluate the behaviour of circuit elements in electric circuits.
CO2:	Explain the principles of operation of magnetics circuits and transformers
CO3:	Outline the construction and working principles of DC machines and synchronous machines.
CO4:	Evaluate the electromagnetic energy conversion and operating principle of three phase induction motors.
CO5:	Explain the principles of operations of single-phase induction and stepper motors.

Pre-requisite

Engineering Physics

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	P09	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	2			2			2			3	2
CO2	3	3	3	2			2			2			3	2
CO3	3	3	3	2			2			2			3	2
CO4	3	3	3	2			2			2			3	2
CO5	3	3	3	2			2			2			3	2

Course Assessment methods

Direct		Indirect
Internal test I (8) Internal test II (8) Internal test III (8) Assignment/seminar/Quiz (5)	Online test (6) Attendance (5) End semester Examination (60)	Course end survey

UNIT I FUNDAMENTAL LAWS OF ELECTRICAL ENGINEERING AND CIRCUIT ELEMENTS	9 Hours

Electric Current – Coulomb's Law – Ohm's Law – Faraday's Law of Electromagnetic Induction – Kirchhoff's Laws–Energy and Power – Resistance Parameter – Inductance Parameter –Capacitance

Parameter – Series and Parallel Combinations of Resistances —RLC Series-Parallel Circuits – Resonance			
UNIT II MAGNETIC CIRCUITS AND TRANSFORMERS			**9 Hours**
Ampere's Law – Basic Definition: Flux, Flux Density, Field Strength, Permeability, Reluctance, Permeance – Theory of Magnetism –Hysteresis and Eddy-Current Losses - Magnetic Circuit -Self Inductance, Mutual inductance, Co-efficient of Coupling- Transformers – Equivalent Circuit–Parameters from No-Load Tests – Efficiency and Voltage Regulation.			
UNIT III DC MACHINES AND THREE PHASE SYNCHRONOUS MACHINES			**9 Hours**
DC Machines- DC Generator-construction–working principle- EMF equation-Types of DC Generator, DC motor-working principle –Types of DC Motor-Motor Speed torque Characteristics-starters for DC Motors -Generation of a Three Phase Voltage– Synchronous Generator-construction and working principle.			
UNIT IV ELECTROMAGNETIC ENERGY CONVERSION AND THREE PHASE INDUCTION MOTOR			**9 Hours**
Introduction-Basic Analysis of Electromagnetic Torque - Three Phase Induction Motor – Revolving Magnetic Field – Construction- Working Principle- Types- Speed-Torque Characteristic – Parameters from No Load and Blocked rotor Tests – Equivalent Circuit – Applications of Three phase Induction Motors.			
UNIT V SINGLE PHASE INDUCTION MOTORS AND SPECIAL MACHINES			**9 Hours**
Single Phase Induction Motor-Construction-working principle- Switched reluctance motor- Stepper Motors –working principle- Stepper Motors -PM Brushless DC motors - Servo motor- Applications			
Theory: 45 Hrs	**Tutorial: --**	**Practical: -- Hr**	**Total Hours: 45 Hrs**

Text Books

1. B.L. Theraja and A. K. Theraja, "A Text Book of Electrical Technology", S.Chand Publication, Vol 2, 2014.
2. A. Sudhakar and S.P Shyam Mohan, "Circuits, Network Analysis and Synthesis", Tata McGraw Hill, Fifth Edition, 2015.

REFERENCES

1. D.P. Kothari and I.J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, Fourth Edition, 2011.
2. V.K.Metha, Rohit Metha, "Principles of Electrical Engineering and Electronics", Second edition, S.Chand Publication, 2015.
3. S.K.Bhattacharya "Basic Electrical and Electronics Engineering" Pearson Education India, 2012.
4. V.N. Mittle and Aravind Mittal "Basic Electrical Engineering", Tata McGraw Hill, Second edition, 2005.

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U19WPL212 - WORKSHOP PRACTICE

L	T	P	C
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: 30 hours

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U19MCT203	BASIC ELECTRICAL ENGINEERING AND DEVICES LABORATORY	L	T	P	C
		0	0	4	2

Course Outcomes

After successful completion of this course, the students should be able to

CO1:	Understand the usage of common electrical measuring instruments and basic characteristics of transformers and electrical machines.
CO2:	Evaluate the characteristics of semiconductor devices.
CO3:	Interpret the solutions for real time applications of electrical machines and semiconductor devices.

Pre-requisite

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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	P09	PO10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	3	3	3						2			3	2
CO2	3	3	3	3						2			3	2
CO3	3	3	3	3						2			3	2

Course Assessment methods

Direct		Indirect
CIE TEST-I (20) Quiz-I (5) CIE TEST-II (20)	Quiz-II (5) RTPS (10) End semester Examination (40)	Course end survey

List of Experiments

1. Verification of ohm's Law.
2. Verification of Kirchoff's law.
3. Measurement of power and power factor of RLC circuit.
4. Loading of a transformer: measurement of primary and secondary voltages and currents, and power.
5. Three-phase transformers: Star and Delta connections.
6. Torque Speed Characteristic of DC shunt motor.
7. Synchronous speed of two and four-pole, three-phase induction motors.
8. Torque-Slip Characteristic of an induction motor.
9. Verify the VI Characteristics of PN diode
10. Verify the VI Characteristics of Zener diode
11. Verify the VI Characteristics of SCR.
12. Verify the VI Characteristics of MOSFET.

Total Hours: 60 Hrs

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Semester-II	Basic Aptitude – II - U19GE201 (Common to All Departments)	L	T	P	C	Marks
		0	0	2	0	100

Course Outcomes

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

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

1.Quantitative Aptitude and Logical Reasoning	**Solving quantitative aptitude and logical reasoning problems with reference to the following topics:** a. Profit & loss b. Partnership c. Chain rule d. Numbers e. Ages f. Percentages g. Logarithms h. Geometry i. Direction sense j. Symbols and series
2.. Verbal Aptitude	**Demonstrating verbal aptitude skills in English with reference to the following topics:** a. Jumbled sentences b. Reconstructions of sentences (PQRS) c. Sentence fillers two words d. Idioms and phrases e. Spotting errors f. Writing captions for given pictures

S. Anita

Dr.S.Anita

Head/Training

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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, cachier d'activités)
3. Reference books : La conjugaison, Dondon, Echo

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BoS – Chairperson,
Science & Humanities
HOD / H&L

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

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

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HOD / H&L

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Sona College of Technology,
SALEM - 636 .

Course Code: U19OLE1203 Japanese Language: Level – II 0 0 2 1
First year II semester

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.

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MCT III

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

S. No	Course Code	Course Title	Lecture	Tutorial	Practical	Credit	Total Contact Hours
Theory							
1	U19MC301	Fluid Mechanics and Machinery	3	0	0	3	45
2	U19MC302	Strength of Materials	3	0	0	3	45
3	U19MC303	Manufacturing Technology	3	0	0	3	45
4	U19MC304	Electrical Drives and Control	3	0	0	3	45
5	U19MC305	Digital Electronics	3	0	0	3	45
6	U19TAM301	தமிழரும் தொழில்நுட்பமும்/ Tamils and Technology	1	0	0	1	15
7	U19GE304	Mandatory course: Constitution of India	2	0	0	0	30
Practical							
8	U19MC306	Fluid Mechanics and Strength of Materials Laboratory	0	0	4	2	60
9	U19MC307	Manufacturing Technology Laboratory	0	0	3	1.5	45
10	U19MC308	Electrical Drives and Control Laboratory	0	0	3	1.5	45
11	U19GE301	Soft Skills and Aptitude – I	0	0	2	1	30
					Total Credits	**22**	

Approved By

5/7/23

Chairman, Mechatronics Engineering BoS
Dr.P.Suresh

Member Secretary, Academic Council
Dr.R.Shivakumar

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

Copy to:-

HOD/ Mechatronics Engineering, Third Semester BE MCT Students and Staff, COE

U19MC301	FLUID MECHANICS AND MACHINERY	L	T	P	C
		3	0	0	3

Course Outcomes

After successful completion of this course, the students should be able to

CO1:	Apply mathematical knowledge to predict the properties of fluid and analyse the pressure measurement.
CO2:	Evaluate the fluid flow problems using continuity equation and Bernoulli's equation with their applications. Distinguish laminar and turbulent flow through circular pipes.
CO3:	Perform the dimensional analysis by using Buckingham's ∏ theorem.
CO4:	Analyze the performances of the hydraulic turbines.
CO5:	Describe the working principle of centrifugal pumps & reciprocating pumps and analyze their performances.

Pre-requisite

1. Engineering Physics
2. Differential equations and vector calculus

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	P09	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	2	1	1				1			3	2
CO2	3	3	2	2		2				1			3	2
CO3	3	3	3	2	1	1				1			3	2
CO4	3	3	3	2		2	1	1		1		1	3	2
CO5	3	3	3	2		2	1	1		1		1	3	2

Course Assessment methods

Direct		Indirect
Internal test I (8) Internal test II (8) Internal test III (8) Assignment/seminar/Quiz (5)	Online test (6) Attendance (5) End semester Examination (60)	Course end survey

Unit 01: FLUID PROPERTIES AND PRESSURE MEASUREMENT — **09 Hours**

Units & Dimensions. Properties of fluids – mass density, specific weight, specific volume, viscosity, capillarity and surface tension, compressibility, vapor pressure and cavitation. Pressure Measurement-Pascal law-measurement of pressure through simple and differential manometers.

Unit 02: FLOW CHARACTERISTICS AND FLOW THROUGH PIPES — **09 Hours**

Types of fluid flow- application of continuity equation, Euler's equation-Bernoulli's equation- Orifice

meter, Venturi meter. Boundary layer concept-Laminar flow though circular pipes -Hagen-Poiseuille equation- Turbulent flow though circular pipes- Darcy Weisbach equation –friction factor-Energy losses in flow through pipes (description only)-Power transmission through pipes.	
Unit 03: DIMENSIONAL ANALYSIS	**09 Hours**
Need for dimensional analysis – methods of dimensional analysis – Buckingham's ∏ theorem, Dimensionless parameters- application of dimensionless parameters. Models and Similitude.	
Unit 04: HYDRAULIC TURBINES	**09 Hours**
Turbines: definition and classification – impulse and reaction- Pelton turbine - Francis turbine -Kaplan turbine - working principles - velocity triangles - work done - efficiencies and performance calculations-specific speed.	
Unit 05: HYDRAULIC PUMPS	**09 Hours**
Pumps: Definition and classifications. Centrifugal pump- working principle, velocity triangle, head and efficiencies, performance calculations. Reciprocating pump – classification, working principle-performance calculations, function of air vessel-Rotary pumps- gear and vane pump- working principle.	

Theory: 45Hrs	**Practical: -**	**Total Hours: 45 Hrs**

TEXT BOOKS

1. Bansal, R.K., Fluid Mechanics and Hydraulics Machines, (9th edition), Laxmi publications (P) Ltd, New Delhi, 2015

REFERENCES

1. Sukumar Pati., "Fluid Mechanics and Hydraulics Machines", Tata McGraw Hill publications (P) Ltd, New Delhi, 2012.
2. C.S.P.Ojha, R.Berndtsson, P.N.Chandramouli., Fluid Mechanics and Machinery, Oxford University Press, New Delhi, 2010.
3. Modi P.N. and Seth, S.M. "Hydraulics and Fluid Mechanics", Standard Book House, New Delhi 2004
4. Streeter, V. L. and Wylie E. B., "Fluid Mechanics", McGraw Hill Publishing Co. 2010
5. Ramamritham. S, Fluid Mechanics, Hydraulics and Fluid Machines, Dhanpat Rai & Sons, Delhi, 2011

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U19MC302	STRENGTH OF MATERIALS	L	T	P	C
		3	0	0	3

Course Outcomes

After successful completion of this course, the students should be able to

CO1:	Analyse the state of stresses and strains in engineering components as a result of different loading conditions in the machine members and structures.
CO2:	Investigate the effect of various loading combinations by determining the principal stresses, principal planes and maximum shear stress u on machine and structural parts using Mohr's circle.
CO3:	Apply the principles and equations, necessary tools to analyze structural members under axial loads, bending, shear, and torsion.
CO4:	Evaluate the material behaviour under pure torsion on circular shafts.
CO5:	Design the structural beams, columns, long mechanical members under compression and different loading condition.

Pre-requisite

1.Engineering Mechanics

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	P09	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	2		2				2			3	2
CO2	3	3	3	2		2				2			3	2
CO3	3	3	3	2		2				2		2	3	2
CO4	3	3	3	2		2				2			3	2
CO5	3	3	3	2		2				2		2	3	2

Course Assessment methods

Direct		Indirect
Internal test I (8) Internal test II (8) Internal test III (8) Assignment/seminar/Quiz(5)	Online test (6) Attendance (5) End semester Examination (60)	Course end survey

Unit 01: Stress, Strain and Deformation of Solids	**09 Hours**

Simple stress and strain – Stresses and strains due to axial force - Mechanical properties of materials – Stress-strain curve — Hooke's law - Factor of safety – Stepped shafts – Uniformly varying sections – Stresses in composite sections - Temperature stresses – Poisson's ratio - shear modulus, bulk modulus, relationship between elastic constants.

Unit 02: Analysis of Stresses in Two Dimensions	09 Hours
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 03: Beams - Loads and Stresses	**09 Hours**
Beams – types of supports – simple and fixed, types of load – concentrated, uniformly distributed, varying distributed load, combination of above loading – relationship between bending moment and shear force – bending moment, shear force diagram for simply supported, cantilever and over hanging beams – Point of contra flexure. Introduction to Theory of simple bending.	
Unit 04: Torsion in Shafts and springs	**09 Hours**
Analysis of torsion of circular bars – Shear stress distribution – Bars of Solid and hollow circular section – Stepped shaft – Twist and torsion stiffness – Compound shafts 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 05: columns and Deflection of Beams	**09 Hours**
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 Deflection of beams – double integration method – Macaulay's method – slope and deflection using moment area method.	

Theory: 45 Hrs	Practical: -	Total Hours: 45 Hrs

TEXT BOOKS

1. R K Bansal, "A text book of Strength of Materials", Lakshmi Publications (P) Limited, New Delhi, 2007.
2. R K Rajput, "Strength of Materials", S Chand & Co., New Delhi, 2006.

REFERENCES

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, 1997.

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U19MC303	MANUFACTURING TECHNOLOGY	L	T	P	C
		3	0	0	3

Course Outcomes

After successful completion of this course, the students should be able to

CO1:	Elaborate the sand casting, pattern materials and welding, different welding processes.
CO2:	Describe the various bulk deformation processes, different sheet metal operations and shaping of plastics using different moulding methods.
CO3:	Identify the cutting tool materials and its specific purpose and explain about lathe details, main dissimilarity of capstan and turret lathes.
CO4:	Illustrate the principle of reciprocating machine tools.
CO5:	Explain the working principle of milling and grinding processes.

Pre-requisite

1. Engineering Physics

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	P09	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	1	1	2	1	1		1		1	3	2
CO2	3	3	3	1	1	2	1	1		1		1	3	2
CO3	3	3	3	2	1	2	1	1		1		1	3	2
CO4	3	3	3	2	1	2	1	1		1		1	3	2
CO5	3	3	3	2	1	2	1	1		1		1	3	2

Course Assessment methods

Direct		Indirect
Internal test I (8) Internal test II (8) Internal test III (8) Assignment/seminar/Quiz (5)	Online test (6) Attendance (5) End semester Examination (60)	Course end survey

Unit 01: METAL CASTING AND METAL JOINING PROCESS — **09 Hours**

Sand Casting- Moulding Tools- Types of Patterns- Pattern Materials- Moulding Sand- Properties- Melting Furnaces: Cupola, Crucible and Electric arc furnace- Special Casting Process: Shell, Investment Casting - Lost Wax Process- Gas welding- Arc welding -TIG welding- MIG welding.

Unit 02: SHEET METAL AND PLASTIC COMPONENTS — **09 Hours**

Drawing Process: Wire drawing, Tube drawing, Metal Spinning, Rolling: Type of rolling mills- Extrusion: Principles of Extrusion – Types – Hot and Cold extrusion, Sheet metal: Rubber pad forming- Explosive forming. Moulding of thermoplastics- injection moulding- blow moulding –

Rotational moulding		
Unit 03: CENTRE LATHE		**09 Hours**
Centre lathe: constructional features- various operations, tool and work holding devices- taper turning methods, thread cutting, special attachments. Special Purpose Lathe: Capstan and turret lathes – automats – single spindle- Swiss type- automatic screw type, multi spindle, Bar feed mechanism		
Unit 04: SPECIAL MACHINE TOOLS		**09 Hours**
Construction, Types, Operations and mechanisms of Shaper, Planner and Slotter. Hole making: drilling – Reaming, Boring- Tapping operations. Broaching machines: broach construction – push, pull, surface and continuous broaching machines.		
Unit 05: MILLING AND GEAR PROCESS		**09 Hours**
Milling operations-types of milling cutter. Gear cutting – forming and generation principle and construction of gear milling, hobbing and gear shaping processes –finishing of gears. Grinding: types of grinding process- types of grinding wheel – Abrasives - cylindrical grinding, surface grinding, centreless grinding – honing, lapping and buffing.		
Theory: 45Hrs	**Practical: -**	**Total Hours: 45 Hrs**

TEXT BOOKS

1. Hajra Choudhury, "Elements of Workshop Technology, Vol. I and II", Media promoters Pvt Ltd., Mumbai, 2001.
2. Mikell P Groover, " Principles of Modern Manufacturing" Wiley India Pvt Ltd. 2014.

REFERENCES

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, 2002.
3. J.P .Kaushish "Manufacturing Processes" PHI Learning Private limited, second edition 2010.
4. P. C. Sharma, "A text book of production technology", S. Chand and company, IV Edition, 2003.
5. Begma, 'Manufacturing process", John Wilely & sons, VII Edition, 2005.
6. Serope Kalpajian, Steven R.Schmid, Manufacturing Engineering and Technology, Pearson Education, Inc. 2002 (Second Indian Reprint)
7. Beddoes. J and Bibby M.J. 'Principles of Metal Manufacturing Processes', Elsevier, 2006.
8. Rajput R.K, 'A text book of Manufacturing Technology', Lakshmi Publications, 2007.

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U19MC304	ELECTRICAL DRIVES AND CONTROL	L	T	P	C
		3	0	0	3

Course Outcomes

After successful completion of this course, the students should be able to

CO1:	To learn the General characteristics of different types of electrical AC & DC Motors with respect to the applications.
CO2:	Explain the nature of speed torque characteristic of various types of loads and drive motor
CO3:	Describe the different starting methods of AC & DC motors.
CO4:	Explain various solid-state speed controls of single and three phase DC drives.
CO5:	Explain the working of various 3 phase induction motor drives for precise variable speed control.

Pre-requisite

1. Basic Electrical Engineering

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	P09	PO 10	PO 11	PO 12	PSO1	PSO2
CO1	3	3	3	2	1	1	2	1	1	2			3	2
CO2	3	3	3	2	1	1	2	1	1	2			3	2
CO3	3	3	3	2	1	1	2	1	1	2			3	2
CO4	3	3	3	2	1	1	2	1	1	2			3	2
CO5	3	3	3	2	1	1	2	1	1	2			3	2

Course Assessment methods

Direct		Indirect
Internal test I (8) Internal test II (8) Internal test III (8) Assignment/seminar/Quiz (5)	Online test (6) Attendance (5) End semester Examination (60)	Course end survey

Unit 01: INTRODUCTION OF ELECTRIC DRIVES — **09 Hours**

Basic Elements – Types of Electric Drives – factors 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. Drive consideration for Textile mills, Steel rolling mills, Cement mills, Paper mills

Unit 02: STARTING AND SPEED CONTROL OF DRIVES — **09 Hours**

Types of D.C Motor starters – Braking of Electrical motors –Induction Motor starters- Speed control of DC series and shunt motors – Armature and field control, Ward- Leonard control system applications. Conventional Speed Control of Induction Motors: Stator Voltage Control, Stator Frequency Control, Rotor Resistance Control

Unit 03: CONVENTIONAL AND SOLID-STATE SPEED CONTROL OF DC DRIVES — **09 Hours**

Single Phase and Three Phase Fully Controlled Converter: Principle of operation and waveforms

of single phase and three phase fully controlled converter fed DC drive – Choppers Fed DC Motor Drive – Applications.		
Unit 04: CONVENTIONAL AND SOLID-STATE SPEED CONTROL OF AC DRIVES		**09 Hours**
Speed control of three phase induction motor-Voltage control, Voltage/ frequency control, Slip power recovery scheme- VSI fed Three Phase Induction Motors–CSI Fed Three Phase Induction Motors- and AC voltage regulators-Applications.		
Unit 05: SPECIAL MOTOR DRIVES		**09 Hours**
Speed control of Stepper motors – Permanent magnet, Variable reluctance, Single and multi-stack configurations, Hybrid motor. Speed control of Switched reluctance motor – AC & DC Servo motors – Brushless DC motors		
Theory: 45 Hrs	**Practical: -**	**Total Hours: 45 Hrs**
TEXT BOOKS		
1. U.A.Bakshi, M.V.Bakshi, "Electrical Drives and Control", Technical Publications, 2009.		
2. G.K dubey , "Fundamentals of Electrical Drives ",Narosa Publishing House, New Delhi ,2 nd Edition, 2001		
REFERENCES		
1. M. D. Singh, "Power electronics", Tata McGraw-Hill Education, 2011.		
2. Bimbhra, P.S., "Power Electronics", Second edition, Khanna Publishers, New Delhi 5 th Edition, 2015.		
3. P.C.Sen "Principles of Electric Machines and Power Electronics" John Wiley & Sons, 2007.		
4. Vedam Subramaniam "Electric drives", Tata McGraw-Hill.2001.		

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U19MC305	DIGITAL ELECTRONICS	L	T	P	C
		3	0	0	3

Course Outcomes

After successful completion of this course, the students should be able to

CO1:	Discuss the different number systems, error correcting codes and implement Boolean functions using logic gates.
CO2:	Design and analyse the combinational logic circuits.
CO3:	Design and analyse sequential circuits using flip flops.
CO4:	Design and implement various logic functions using ROM, PLA and PAL.
CO5:	Discuss the different types of basic electronics circuits.

Pre-requisite

Physics for Electron devices

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	PO 8	P0 9	PO 10	PO 11	PO12	PSO 1	PSO 2
CO1	3	3	3	2	2				2				3	2
CO2	3	3	3	2	2				2				3	2
CO3	3	2	3	2	2				2				3	2
CO4	3	3	3	2	2				2				3	2
CO5	3	3	3	2	2				2				3	2

Course Assessment methods

Direct		Indirect
Internal test I (8) Internal test II (8) Internal test III (8) Assignment/seminar/Quiz (5)	Online test (6) Attendance (5) End semester Examination (60)	Course end survey

Unit 01: BINARY SYSTEMS AND BOOLEAN ALGEBRA — **09 Hours**

Number systems – Base conversion – Binary codes – Parity and hamming code – Logic gates – Boolean laws and theorems – Minimization of Boolean expressions – SOP and POS forms, minterms and maxterms – Karnaugh map minimization (up to 5 variables) – Realization of circuits using logic gates.

Unit 02: COMBINATIONAL CIRCUITS — **09 Hours**

Design of Half and Full Adder, Half and Full Subtractor, Parallel Adder / Subtractor, Comparator, Parity generator and checker – Priority Encoder, Decoder, Demultiplexer and Multiplexer – Implementation of combinational logic circuits using decoder, de-multiplexer and multiplexer.

Unit 03: SEQUENTIAL CIRCUITS — **09 Hours**

Flip flops – SR, JK, D and T – Master-Slave flip-flop – Realization of one flip flop using other flip flops – Asynchronous Up / Down counter – Design of synchronous counters: Binary counters, Modulo–n counter, Decade Counter, Ring counter and Johnson counter - Shift registers.

Unit 04: MEMORIES AND PLDs — **09 Hours**

Classification of memories – Random Access Memory (RAM) – Read Only Memory (ROM) – Memory decoding– Programmable Array Logic (PAL) – Programmable Logic Array (PLA) – Field Programmable Gate Arrays (FPGA) – Implementation of logic functions with PROM, PLA and PAL.

Unit 05: DIGITAL CIRCUIT APPLICATIONS		09 Hours
Digital to analog and Analog to digital convertors: R-2R Ladder and Successive approximation techniques – Operational amplifier: Inverting, Non-inverting, Integrator, Differentiator - Schmitt trigger- Multivibrators using Op-amp –555 timer		
Theory: 45 Hrs	**Practical: -**	**Total Hours: 45 Hrs**
TEXT BOOKS		
1. M. Morris Mano and Michael D. Ciletti, "Digital Design: With an Introduction to the Verilog HDL, VHDL, and System Verilog", Pearson Education, 6th edition, 2018.		
2. D.P. Kothari and J.S. Dhillon, "Digital Circuits and Design", Pearson Education, 2015.		
REFERENCES		
1. A. Anand Kumar, "Fundamentals of Digital Circuits", PHI India, 4th edition, 2016.		
2. Charles H.Roth and Larry L. Kinney "Fundamentals of Logic Design", 7th Edition, Cengage Learning, 2014.		
3. Donald D. Givone, "Digital Principles and Design", McGraw Hill Education, 2016		

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U19GE304	Mandatory course: Constitution of India	L	T	P	C
		2	0	0	0

Course Outcomes	
After successful completion of this course, the students should be able to	
CO1:	Demonstrate a capacity to work efficiently and with critical engagement with complex and sophisticated primary constitutional law texts
CO2:	Exhibit the capacity to craft coherent and persuasive constitutional law arguments in an adversarial context ,also recognizing the limitations of such argumentation
CO3:	Apply a contextual understanding of (i) the function of the High Court as the final arbiter of constitutionality and (ii) the techniques of judicial review as applied
CO4:	Practice a thorough and contextual knowledge of constitutional law doctrine particularly in its application to real or hypothetical constitutional law problems
CO5:	Demonstrate a high level of skill on academic and professional legal writing

Course Assessment methods	
Direct	**Indirect**
Internal test I Internal test II Internal test III (Total of 100 marks)	Course end survey

Unit 01: Introduction to Constitution of India	**06 Hours**
Constitutional law – meaning – importance Constitutionalism – features – elements Constitution of India – concept – importance – historical perspective – characteristics	
Unit 02: Fundamental Rights and Equality	**06 Hours**
Fundamental rights – scheme – benefits Fundamentals duties – importance – and its legal status	
Unit 03: Structure, Policies, Principles	**06 Hours**
State policy – the directive principles and its importance-The implementation of directive principles- Parliamentary form of government in India- Constitution power and status of the President- Federal structure and distribution of legislative	
Unit 04: Emergency rule	**06 Hours**
Financial powers between the union and the states- Amendment of the constitutional powers – procedure- Emergency provisions : articles of Indian constitution that has provisions to proclaim emergency- Emergency powers of President – national emergency President rule, financial emergency	
Unit 05: Types and Concepts of Local Self Government	**06 Hours**
The concept of local self –government and its types Comparison of the Indian constitutional scheme Directive principles of state policy and fundamental duties noted in the Indian constitution	

Scheme of the fundamental rights to certain freedom under Article 19 Scope of the right to life and personal liberty under Article 21		
Theory: 30 Hrs	**Practical: -**	**Total Hours: 30 Hrs**
REFERENCE BOOKS		
1. The Constitution of India, 1950 (Bare Act), Government Publication.		
2. Dr. S. N. Busi, Dr. B. R. Ambedkar framing of Indian Constitution, 1st Edition, 2015.		
3. M. P. Jain, Indian Constitution Law, 7th Edn., Lexis Nexis, 2014.		
4. D.D. Basu, Introduction to the Constitution of India, Lexis Nexis, 2015.		

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U19MC306	FLUID MECHANICS AND STRENGTH OF MATERIALS LABORATORY	L	T	P	C
		0	0	4	2

Course Outcomes

After successful completion of this course, the students should be able to

CO1:	Understand the working principles of flow measuring instruments, determine the Coefficient of discharge of orifice/venturi meters and evaluate the fluid machines performance.
CO2:	Investigate the mechanical properties of materials.
CO3:	Evaluate the real time problems in the fluid flow and material strength analysis.

Pre-requisite

Engineering Physics

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	P09	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	2	2			1	3	2	1	2	3	2
CO2	3	3	3	2	2			1	3	2	1	2	3	2
CO3	3	3	3	2				1	3	2			3	2

Course Assessment methods

Direct		Indirect
CIE TEST-I (20) Quiz-I (5) CIE TEST-II (20) Quiz-II (5)	RTPS (10) End semester Examination (40)	Course end survey

List of Experiments

Part-A: Fluid Mechanics laboratory

1. Determination of the Coefficient of discharge of given Orifice meter / Venturi meter.
2. Conducting experiments and drawing the characteristic curves of centrifugal pump / submersible pump
3. Conducting experiments and drawing the characteristic curves of reciprocating pump / Gear pump.
4. Conducting experiments and drawing the characteristic curves of Pelton wheel.
5. Conducting experiments and drawing the characteristics curves of Francis turbine.
6. Conducting experiments and drawing the characteristic curves of Kaplan turbine.

Part-B: Strength of Materials laboratory

1. Tension Test on MS Steel.

2. Compression test – MS Steel.
3. Double shear test in UTM.
4. Tests on spring – Tension and Compression.
5. Hardness test on various machines.
6. Impact test – Charpy and Izod.
Total Hours: 60 Hrs

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U19MC307	MANUFACTURING TECHNOLOGY LABORATORY	L	T	P	C
		0	0	3	1.5

Course Outcomes

After successful completion of this course, the students should be able to

CO1:	Demonstrate the working of general purpose machine tools and do turning process for a given job
CO2:	Work on drilling machine and make drilling on steel plate.
CO3:	Perform an ARC welding equipment and make various joints

Pre-requisite

1. Workshop practice laboratory

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	P09	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3						2			3	2
CO2	3	3	3	3						2			3	2
CO3	3	3	3	3						2			3	2

Course Assessment methods

Direct		Indirect
CIE TEST-I (20) Quiz-I (5) CIE TEST-II (20)	Quiz-II (5) RTPS (10) End semester Examination (40)	Course end survey

List of Experiments

1. Exercise on simple facing & Turning.
2. Exercise on Step turning.
3. Exercise on taper turning.
4. Exercise on thread cutting operation.
5. Exercise on Knurling and Grooving.
6. Exercise on Drilling, Boring and Chamfering.
7. Exercise on radial drilling (Drilling, Tapping, Reaming and Counter Sink).
8. Exercise on surface machining using shaper.
9. Exercise on Gear milling.
10. Exercise on cylindrical grinding.

Total Hours: 45 Hrs

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U19MC308	ELECTRICAL DRIVES AND CONTROL LABORATORY	L	T	P	C
		0	0	3	1.5

Course Outcomes

After successful completion of this course, the students should be able to

CO1:	Understand the concept of starters and starting of motor and experiment the Controlling of DC and AC motors.
CO2:	Test the motors and generators and draw the speed torque performance curves. Discuss the Speed and torque control of DC motors and AC motors.
CO3:	Give the solution for real time problems in electrical machines.

Pre-requisite

1.Basic Electrical Engineering Laboratory

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	P09	PO10	PO 11	PO12	PSO1	PSO2
CO1	3	3	3	3						2			3	2
CO2	3	3	3	3						2			3	2
CO3	3	3	3	3						2			3	2

Course Assessment methods

Direct		Indirect
CIE TEST-I (20) Quiz-I (5) CIE TEST-II (20)	Quiz-II (5) RTPS (10) End semester Examination (40)	Course end survey

List of Experiments

1. Speed control of DC shunt motor (Armature, Field control).
2. Study of V/f control operation of induction motor drive.
3. Speed control of three phase slip ring Induction Motor.
4. Speed control of chopper-controlled DC series motor.
5. Speed control of Chopper controlled DC shunt motor.
6. Speed control of PWM inverter-based induction motor drive.
7. PLC based Speed control of induction motor.
8. Speed control steeper motor.
9. DSP controller-based speed control of induction motor drive.
10. Speed control of controlled rectifier-based DC motor drive.
11. Speed control of Brushless Dc Motor.

Total Hours: 45 Hrs

U19TAM301 தமிழரும் தொழில்நுட்பமும் L T P C
1 0 0 1

அலகு I நெசவு மற்றும் பானைத் தொழில்நுட்பம்: 3

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

அலகு II வடிவமைப்பு மற்றும் கட்டிடத் தொழில்நுட்பம்: 3

சங்க காலத்தில் வடிவமைப்பு மற்றும் கட்டுமானங்கள் & சங்க காலத்தில் வீட்டுப் பொருட்களில் வடிவமைப்பு– சங்க காலத்தில் கட்டுமான பொருட்களும் நடுகல்லும் – சிலப்பதிகாரத்தில் மேடை அமைப்பு பற்றிய விவரங்கள் – மாமல்லபுரச் சிற்பங்களும், கோவில்களும் – சோழர் காலத்துப் பெருங்கோயில்கள் மற்றும் பிற வழிபாட்டுத் தலங்கள் – நாயக்கர் காலக் கோயில்கள் – மாதிரி கட்டமைப்புகள் பற்றி அறிதல், மதுரை மீனாட்சி அம்மன் ஆலயம் மற்றும் திருமலை நாயக்கர் மஹால் – செட்டிநாட்டு வீடுகள் – பிரிட்டிஷ் காலத்தில் சென்னையில் இந்தோ–சாரோசெனிக் கட்டிடக் கலை.

அலகு III உற்பத்தித் தொழில் நுட்பம்: 3

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: 3

அணை, ஏரி, குளங்கள், மதகு – சோழர்காலக் குமுழித் 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: 3

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. 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 C ivilization 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 1/9/23.

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U19TAM301 **TAMILS AND TECHNOLOGY** **L T P C**
1 0 0 1

UNIT I WEAVING AND CERAMIC TECHNOLOGY **3**

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 beats - Archeological evidences - Gem stone types described inSilappathikaram.

UNIT IV AGRICULTURE AND IRRIGATION TECHNOLOGY **3**

Dam, Tank, ponds, Sluice, Significance of Kumizhi Thoompu 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. 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 C ivilization 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 1/9/23

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U19GE3014 - Constitution of India

Course Outcomes **2 0 0 0**

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

CO 1 Demonstrate a capacity to work efficiently and with critical engagement with complex and sophisticated primary constitutional law texts

CO 2 Exhibit the capacity to craft coherent and persuasive constitutional law arguments in an adversarial context ,also recognizing the limitations of such argumentation

CO 3 Apply a contextual understanding of (i) the function of the High Court as the final arbiter of constitutionality and (ii) the techniques of judicial review as applied

CO 4 Practice a thorough and contextual knowledge of constitutional law doctrine particularly in its application to real or hypothetical constitutional law problems

CO 5 Demonstrate a high level of skill on academic and professional legal rights.

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													
CO – 2	2													
CO – 3	2													
CO – 4	2													
CO - 5	2													

UNIT – I Introduction to Constitution of India **6**

- Constitutional law – meaning – importance
- Constitutionalism – features – elements
- Constitution of India – concept – importance – historical perspective – characteristics

UNIT – II Fundamental Rights and Equality **6**

- Fundamental rights – scheme – benefits
- Fundamentals duties – importance – and its legal status

UNIT – III Structure, Policies, Principles **6**

State policy – the directive principles and its importance-The implementation of directive principles- Parliamentary form of government in India- Constitution power and status of the President- Federal structure and distribution of legislative

UNIT –IV Emergency rule 6

Financial powers between the union and the states- Amendment of the constitutional powers – procedure- Emergency provisions : articles of Indian constitution that has provisions to proclaim emergency- Emergency powers of President – national emergency President rule, financial emergency

UNIT – V Types and Concepts of Local Self Government 6

- The concept of local self –government and its types
- Comparison of the Indian constitutional scheme
- Directive principles of state policy and fundamental duties noted in the Indian constitution
- Scheme of the fundamental rights to certain freedom under Article 19
- Scope of the right to life and personal liberty under Article 21

Reference Books

1. The Constitution of India, 1950 (Bare Act), Government Publication.
2. Dr. S. N. Busi, Dr. B. R. Ambedkar framing of Indian Constitution, 1st Edition, 2015.
3. M. P. Jain, Indian Constitution Law, 7th Edn., Lexis Nexis, 2014.
4. D.D. Basu, Introduction to the Constitution of India, Lexis Nexis, 2015.

Total: 30 hours

29/8/22

Dr. M. Raja
Course Coordinator / Sciences

29/8/2022

Dr. C. Shanthi
HOD / Sciences

29.8.

Dr. M. Renuga
Chairperson BOS,
Science and Humanities

III-Sem

Semester-III	U19GE301-SOFT SKILLS AND APTITUDE – I	L T P C Marks 0 0 2 1 100

Course Outcomes
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	**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 f. Group discussions
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,Tens 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, Case lets, 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

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.

MCT
IV

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

S. No	Course Code	Course Title	Lecture	Tutorial	Practical	Credit	Total Contact Hours
Theory							
1	U19MAT401B	Probability and Statistical Methods	3	1	0	4	60
2	U19MC401	Fluid Power Systems	3	0	0	3	45
3	U19MC402	Thermodynamics and Heat Transfer	3	0	0	3	45
4	U19MC403	Microprocessors and Microcontroller	3	0	0	3	45
5	U19MC902	Professional Elective: Sensors, Transducers and Instrumentation	3	0	2	4	75
6	U19GE402	Mandatory course: Environment and Climate Science	2	0	0	0	30
Practical							
7	U19MC404	Fluid Power Systems Laboratory	0	0	4	2	60
8	U19MC405	Microprocessor and Microcontroller Laboratory	0	0	4	2	60
9	U19GE401	Soft Skill and Aptitude – II	0	0	2	1	30
					Total Credits	**22**	**450**

Approved By

Chairperson, Mechatronics Engineering BoS
Dr.P.Suresh

Member Secretary, Academic Council
Dr.R.Shivakumar

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

Copy to:-

HOD/ Mechatronics Engineering, Fourth Semester BE MCT Students and Staff, COE

B. E / MECHATRONICS ENGINEERING

SEMESTER – IV	PROBABILITY AND STATISTICAL METHODS	L	T	P	C
U19MAT401B		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	P09	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3		3	2						3	2	3	3
CO2	3	3		3	2						3	2	3	3
CO3	3	3		3	2						3	2	3	3
CO4	3	3		3	2						3	2	3	3
CO5	3	3		3	2						3	2	3	3

UNIT – I BASIC STATISTICS **12**

Measures of central tendency (simple arithmetic mean, median, mode) – quartile's – 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.

UNIT – V TESTING OF HYPOTHESIS **12**

Sampling distributions – testing of hypothesis for proportion, mean, standard deviation and differences using normal distribution– t-test for single mean and difference between means - χ^2- tests for independence of attributes and goodness of fit and F-test for equality of two variances.

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, 11th Edition, Reprint, 2019.
2. T. Veerarajan, "Probability, Statistics and Random Processes with Queueing Theory and Queueing Networks", McGraw Hill Publishers, 4th Edition, 7th Reprint, 2018.

REFERENCE BOOKS:

1. R. A. Johnson and C. B. Gupta, "Miller and Freund's, Probability and Statistics for Engineers", Pearson Publishers, 9th Edition, 2018.
2. S. Ross, "A First Course in Probability", Pearson Publishers, 9th 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, 3rd Edition, 2008.

Prof. S. JAYABHARATHI
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Dr. M. RENUGA
BoS - Chairperson
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Sona College of Technology
Salem – 636 005

U19MC401	FLUID POWER SYSTEMS	L	T	P	C
		3	0	0	3

Course Outcomes

After successful completion of this course, the students should be able to

CO1:	Apply the pump theory and classifications and able to use the fluid power in his/her professional career.
CO2:	Demonstrate the principle of hydraulic cylinders and fluid motors, Gear, Vane and Piston motors.
CO3:	Compare accumulators and intensifiers and justify the usage of accumulators on real time feedback circuits in their professional career.
CO4:	Differentiate the different Pneumatic approaches for simple applications and able to synthesis the new approach specific to their application.
CO5:	Define fluidic devices applications with basic trouble shooting methodologies and types of Servo systems.

Pre-requisite

Fluid Mechanics and machinery

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	P09	PO 10	PO 11	PO 12	PSO1	PSO2
CO1	3	2	3	3	3	1							3	3
CO2	3	3	3										3	3
CO3	2	3	1	3	2							3	3	3
CO4	3	3	3	3		3							3	3
CO5	3	2	3	3	3	3		3				3	3	3

Course Assessment methods

Direct		Indirect
Internal test I (8) Internal test II (8) Internal test III (8) Assignment/seminar/Quiz (5)	Online test (6) Attendance (5) End semester Examination (60)	Course end survey

Unit 01: INTRODUCTION TO FLUID POWER — **09 Hours**

Introduction to fluid power, Advantages of fluid power, Application of fluid power system. Types of fluid power systems, Fluid power symbols.

Sources of Hydraulic Power: Pumping theory – Pump classification – Gear pump, Vane Pump, piston pump, construction and working of pumps – pump performance – Variable displacement pumps	
Unit 02: CONTROL AND ACTUATION ELEMENTS	**09 Hours**
Construction of Control Components: Direction control valves – 3/2 way valve – 4/2 way valve –4/3 valve-5/3 valve- Shuttle valve – check valve – pressure control valve – pressure reducing valve, sequence valve, Flow control valve – Fixed and adjustable - electrical control solenoid valves, Relays. Fluid Power Actuators: Linear hydraulic actuators – Types of hydraulic cylinders – Single acting, Double acting -special cylinders: tandem, rod-less, telescopic, cylinder cushioning mechanism-construction of double acting cylinder - Rotary actuators: fluid motors-gear, vane and piston motors.	
Unit 03: HYDRAULIC CIRCUITS	**09 Hours**
Hydraulic circuits-reciprocating–quick return-pressure sequencing circuit- Regeneration circuit Drilling circuit, synchronizing circuit, speed control-meter in, meter out and bleed off circuit, safety circuits Accumulators and Intensifiers: Types of accumulators – Accumulators circuits, intensifier – Applications of Intensifier – Intensifier circuit.	
Unit 04: PNEUMATIC SYSTEMS AND CIRCUITS	**09 Hours**
Pneumatic Components: Properties of air – Compressors – Filter, Regulator, and Lubricator Unit – Air control valves, Quick exhaust valves, and pneumatic actuators. Fluid Power Circuit Design, Pneumo-hydraulic circuit, Sequential circuit design for simple applications using cascade method.	
Unit 05: SPECIAL SYSTEM AND MAINTENANCE	**09 Hours**
Servo systems – Hydro Mechanical servo systems, Electro-hydraulic servo systems and hydro pneumatic circuits -Introduction to logic circuits. Introduction to fluidic devices, simple circuits, ladder diagrams, PLC applications in fluid power control circuit –fault finding -Failure and troubleshooting. Low cost automation.	

Theory: 45 Hrs	**Tutorial: -**	**Total Hours: 45 Hrs**

Text Books

1. Anthony Esposito, "Fluid Power with Applications", Pearson Education,7th edition, 2013.
2. Majumdar S.R., "Oil Hydraulics Systems- Principles and Maintenance", Tata McGraw-Hill, 2011.

REFERENCES

1. Dudelyt, A. Pease and John T. Pippenger, "Basic Fluid Power", Prentice Hall, 2007
2. Michael J, Prinches and Ashby J. G, "Power Hydraulics", Prentice Hall, 2009.
3. Anthony Lal, "Oil hydraulics in the service of industry", Allied publishers, 2002.
4. Shanmugasundaram.K, "Hydraulic and Pneumatic controls", Chand & Co, 2006.

U19MC402	THERMODYNAMICS AND HEAT TRANSFER	L	T	P	C
		3	0	0	3

Course Outcomes

After successful completion of this course, the students should be able to

CO1:	Express the basic concepts and laws of thermodynamics
CO2:	Perform the analysis of air standard cycles
CO3:	Evaluate the conduction heat transfer for a given system
CO4:	Demonstrate the types of convection and determine heat transfer coefficient
CO5:	Investigate the radiation effect among different surfaces

Pre-requisite

1.Engineering Physics

2.Fluid Mechanics and machinery

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	P09	PO 10	PO 11	PO 12	PSO1	PSO 2
CO1	3	3	3	2	1	1	2	1	1	2	1	1	3	2
CO2	3	3	3	2	1	1	2	1	1	2	1	1	3	2
CO3	3	3	3	2	1	1	2	1	1	2	1	1	3	2
CO4	3	3	3	2	1	1	2	1	1	2	1	1	3	2
CO5	3	3	3	2	1	1	2	1	1	2	1	1	3	2

Course Assessment methods

Direct		Indirect
Internal test I (8) Internal test II (8) Internal test III (8) Assignment/seminar/Quiz (5)	Online test (6) Attendance (5) End semester Examination (60)	Course end survey

Unit 01: LAWS OF THERMODYNAMICS — **9 Hours**

Systems-closed and open systems - properties, processes, cycles- equilibrium- work and heat transfers - zeroth law - first law for a closed system and flow process - enthalpy - second law – entropy.

Unit 02: AIR STANDARD CYCLES AND VAPOUR POWER CYCLE — **9 Hours**

Air standard cycles: Carnot cycle - Otto cycle - Diesel cycle - Brayton cycle - vapour power cycle:

Rankine cycle- cycle efficiency			
Unit 03: INTRODUCTION TO HEAT TRANSFER AND CONDUCTION			**9 Hours**
Basic Concepts- mechanism of heat transfer – conduction: Fourier Law of conduction - general differential equation of heat conduction - Cartesian and cylindrical coordinates - one dimensional steady state heat conduction-introduction to transient heat conduction.			
Unit 04: CONVECTION			**9 Hours**
Boundary layer concept - heat transfer coefficient - types of convection - forced convection - external flow: flow over plates, cylinders and spheres - internal flow introduction to free convection.			
Unit 05: RADIATION			**9 Hours**
Laws of Radiation - Stefan Boltzmann Law, Kirchhoff's Law -black body radiation- radiation shield-radiation between surfaces.			
Theory: 45 Hrs	**Tutorial: --**	**Practical: --**	**Total Hours: 45 Hrs**

TEXT BOOKS

1. P. K. Nag, Engineering Thermodynamics, Tata McGraw-Hill Publishing Company Limited, New Delhi, 2013
2. R.C Sachdeva, Fundamentals of Engineering Heat and Mass Transfer, New Age International Publishers, New Delhi, 2017

REFERENCES

1. P. K. Nag, Applied Thermodynamics, Tata McGraw-Hill Publishing Company Limited, New Delhi, 2nd edition ISBN: 9780070151314, 0070151318
2. Yunus A. Cengel and Michael A. Boles, Thermodynamics - An Engineering Approach in SI Units, Tata McGraw Hill Publishing Company, New Delhi, 2010
3. Frank P. Incropera and David P. DeWitt, Fundamentals of Heat and Mass Transfer, John Wiley and Sons Pvt. Ltd., Singapore, 2006.
4. T. D. Eastop and Mc Conkey, Applied Thermodynamics for Engineering Technologists, Pearson, New Delhi, 2004.
5. C. P. Kothandaraman, S. Domkundwar and A. V. Domkundwar, A course in Thermal Engineering, Dhanpatrai and Co. Pvt. Ltd., New Delhi, 2012

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U19MC403	MICROPROCESSORS AND MICROCONTROLLER	L	T	P	C
		3	0	0	3

Course Outcomes

After successful completion of this course, the students should be able to

CO1:	Outline the architecture, discuss the addressing modes, instruction set interrupt structure and develop skill in simple program writing of Intel 8085 microprocessor
CO2:	Discuss various Peripheral Interfacing function and interface with 8085 processor
CO3:	Outline the architecture, discuss the addressing modes, instruction set interrupt structure and develop skill in simple program writing of Intel 8086 microprocessor
CO4:	Explain the architecture, discuss the addressing modes, instruction set interrupt structure and develop skill in simple program writing of Intel 8051 microcontroller
CO5:	Apply the interfacing techniques in motors and traffic light controller for microcontroller based simple applications

Pre-requisite

Digital electronics

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	P09	PO10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	3	3	2	2				2				3	2
CO2	3	3	3	2	2				2				3	2
CO3	3	2	3	2	2				2				3	2
CO4	3	3	3	2	2				2				3	2
CO5	3	3	3	2	2				2				3	2

Course Assessment methods

Direct		Indirect
Internal test I (8) Internal test II (8) Internal test III (8) Assignment/seminar/Quiz (5)	Online test (6) Attendance (5) End semester Examination (60)	Course end survey

Unit 01: 8085 MICROPROCESSOR — **09 Hours**

8085 architecture – instruction set – addressing modes– machine cycles and timing diagrams – interrupts - memory interfacing, typical EPROM and RAM Interfacing.

Unit 02: PERIPHERALS INTERFACING OF 8085	09 Hours
Architecture and programming of ICs: 8255 PPI, 8259 PIC, 8251 USART, 8279 keyboard display controller ,8254 timer/ counter.	
Unit 03: 8086 MICROPROCESSOR	**09 Hours**
8086 architecture – 8086 addressing modes – memory organization instruction set – 8086 assembly language programming – interrupts.	
Unit 04: MICROCONTROLLER	**09 Hours**
8051: Architecture, I/O pins – ports and circuits – memory organization (internal and external) – counters and timers – serial data I/O – interrupts. PIC18F: Architecture, I/O pins – ports and circuits	
Unit 05: 8051 PROGRAMMING AND APPLICATIONS	**09 Hours**
8051 addressing modes – instruction set –Interfacing of stepper motor, speed control of DC motor, Introduction to raspberry and arduino boards.	

Theory: 45 Hrs	Tutorial: -	Practical: -	Total Hours: 45 Hrs

Text Books

1. Krishna Kant, "Microprocessor and Microcontrollers", Eastern Company Edition, Prentice Hall of India, New Delhi, 2007.
2. R.S. Gaonkar, 'Microprocessor Architecture Programming and Application', with 8085, Wiley Eastern Ltd., New Delhi, 2013.
3. Soumitra Kumar Mandal, Microprocessor & Microcontroller Architecture, Programming & Interfacing using 8085,8086,8051, McGraw Hill Edu,2013.

REFERENCES

1. Muhammad Ali Mazidi & Janice Gilli Mazidi, R.D.Kinely 'The 8051 Micro Controller and Embedded Systems', PHI Pearson Education, 5th Indian reprint, 2003.
2. N.Senthil Kumar, M.Saravanan, S.Jeevananthan, 'Microprocessors and Microcontrollers', Oxford University Press, 2010.

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U19MC902	Professional Elective: SENSORS, TRANSDUCERS AND INSTRUMENTATION	L	T	P	C
		3	0	2	4

Course Outcomes

After successful completion of this course, the students should be able to

CO1:	Analyse the characteristics of a sensor or transducer.
CO2:	Identify the different types of mechanical sensors.
CO3:	Predict the different types of sensors for Industrial variables.
CO4:	Design a signal conditioning circuit and data acquisition system
CO5:	Implement smart sensors in digital Industries.

Pre-requisite

1. Basic Electrical and Electronics Engineering

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	P09	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	2			2			2			3	2
CO2	3	2	3	2			2			2			3	2
CO3	3	2	3	2			2			2			3	2
CO4	3	3	2	2			2			2			3	2
CO5	3	3	3	2			2			2			3	2

Course Assessment methods

Direct		Indirect
Internal test I (6) Internal test II (6) Internal test III (6) Internal test IV (6)	Assignment/Seminar/Quiz (5) Online test (6) Attendance (5) End Semester Examination (60)	Course end survey

Unit 01: INTRODUCTION TO MEASUREMENT SYSTEMS	**09 + 06 Hours**

Sensors & Transducer: Definition – Classification – selection of sensors – Static and Dynamic Characteristics – Errors in Measurements – Problems on error measurements – Transduction principles: Resistive, Inductive and Capacitive.

Unit 02: SENSORS FOR AUTOMATION I	**09 + 06 Hours**

Measurement of displacement using Potentiometer, LVDT & Optical Encoder – Measurement of force using strain gauge – Measurement of pressure using LVDT based on diaphragm & piezoelectric sensor – Position sensors – Angular rate sensors.

Unit 03: SENSORS FOR AUTOMATION II	09 +06 Hours
Measurement of temperature using Thermistor, Thermocouple & RTD – Concept of thermal imaging – Measurement of position using Hall effect sensors – Proximity sensors: Inductive & Capacitive, Inertial sensors – Flow Sensors: Ultrasonic & LASER – Level Sensors: Ultrasonic & Capacitive.	
Unit 04: SIGNAL CONDITIONING AND DATA ACQUISITION	**09 +06 Hours**
Signal Conditioning: Basic block diagram of Signal conditioning Analog and Digital IO – Types of ADC: successive approximation and sigma-delta – Types of DAC: Weighted Resistor and R-2R Ladder type – Data acquisition: Elements of data acquisition and control - Overview of I/O process - single channel & multichannel data acquisition.	
Unit 05: INTELLIGENT SENSORS	**09 +06 Hours**
Intelligent Sensors: General Structure of smart sensors & its components – Characteristic of smart sensors: Self calibration, Self-testing & self-communicating – Application of smart sensors: Automatic robot control, automobile engine control & Digital industries.	

Theory: 45 Hrs	Tutorial: --	Practical: 30Hrs	Total Hours: 75 Hrs

TEXT BOOKS

1. D Patranabis, "Sensors and Transducers", PHI 2nd Edition, 2015.
2. DVS Murthy, "Transducers and Instrumentation", PHI 2nd Edition 2013.

REFERENCES

1. Sawney A K and Puneet Sawney, "Measurements and Instrumentation and control", 12th edition, Dhanpat Rai and Co, New Delhi, 2013.
2. S. Gupta, J.P. Gupta "PC interfacing for Data Acquisition & Process Control", 2nd ED Instrument Society of America, 1994.
3. A.D. Helfrick and W.D. Cooper, "Modern Electronic Instrumentation & Measurement Techniques", PHI, 2001.
4. Deoblin E.O. "Measurement Systems - Application and Design", McGraw Hill, 4th Edition, 2005.

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U19MC404	FLUID POWER SYSTEMS LABORATORY	L	T	P	C
		0	0	4	2

Course Outcomes

After successful completion of this course, the students should be able to

CO1:	Demonstrate the working principles of Hydraulic, Pneumatic pump and various actuators.
CO2:	Construct various hydraulic and, Pneumatic circuits using valves.
CO3:	Perform Industrial based circuit operations.

Pre-requisite:

1.Fluid Mechanics and fluid machinery

2.Fluid Mechanics and fluid machinery laboratory

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)													
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	P09	PO 10	PO 11	PO 12	PS O1	PSO 2
CO1	3	3	3		3		2			3		2	2	2
CO2	3	3	3		3		2			2		2	2	2
CO3	3	3	3		3		3			2		2	3	3

Course Assessment methods

Direct		Indirect
CIE TEST-I (20) Quiz-I (5) CIE TEST-II (20)	Quiz-II (5) RTPS (10) End semester Examination (40)	Course end survey

List of Experiments

1. [A] Study of Construction and working of Hydraulic equipments
   [B] Study of Construction and working Pneumatic equipments
2. Design and testing of hydraulic circuit for pressure control using pressure relief valve
3. Design and testing of hydraulic circuit for flow control using pressure /non-pressure compensated flow control valve.
4. Design and testing of hydraulic circuit for direction control using two-way valves
5. Design and testing of pneumatic circuit for single acting cylinder.
6. Design and testing of pneumatic circuit for double acting cylinder.
7. Design and testing of pneumatic circuit for flow control using meter in circuit.

8. Design and testing of pneumatic circuit for flow control using meter out circuit
9. Design and testing of pneumatic circuit for logic controls
10. Design and testing of pneumatic circuit for with multiple cylinder sequences
11. Modelling and analysis of hydraulic and pneumatic system using software
Total Hours: 60 Hrs

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U19MC405	MICROPROCESSOR AND MICROCONTROLLER LABORATORY	L	T	P	C
		0	0	4	2

Course Outcomes

After successful completion of this course, the students should be able to

CO1:	Write an assembly language program to perform some basic arithmetic operations and to interface various devices using 8085 instructions.
CO2:	Write an assembly language program to execute basic arithmetic operations using 8086 processor and 8051 microcontroller.
CO3:	Solve the real time problems using microprocessor and microcontroller.

Pre-requisite

1. Electron devices and circuits
2. Electron devices and circuits Laboratory

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	P09	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	3	3	3						2		2	3	2
CO2	3	3	3	3						2		2	3	2
CO3	3	3	3	3						2		2	3	2

Course Assessment methods

Direct		Indirect
CIE TEST-I (20) Quiz-I (5) CIE TEST-II (20)	Quiz-II (5) RTPS (10) End semester Examination (40)	Course end survey

List of Experiments

1. Assembly Language Programming of 8-bit binary addition and subtraction using 8085 processor.
2. Assembly Language Programming of 8-bit binary multiplication and division using 8085 processor.
3. Assembly Language Programming of 16-bit addition and multiplication using 8085 processor.
4. Assembly Language Programming of 8-bit Minimum / Maximum number, Ascending / Descending order using 8085 processor.
5. Assembly Language Programming of Code converter (BCD to Binary and Binary to BCD)

	using 8085 processor.
6.	Assembly Language Programming of Interface Experiments (A/D and D/A interface) using 8085 processor.
7.	Interfacing and Programming of Stepper Motor control using 8085 processor.
8.	Assembly Language Programming of 16-bit binary addition and subtraction using 8086 processor.
9.	Assembly Language Programming of 16-bit binary multiplication and division using 8086 processor.
10.	Assembly Language Programming of 8-bit binary addition and subtraction using 8051 microcontrollers.
11.	Study and Interface of Arduino board.
12.	Study and Interface of raspberry board.
	Total Hours: 60 Hrs

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COURSE CODE	**U19GE402**	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,
2. "Environmental Science and Engineering" New Age International Publication, 4thMulticolour 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. ErachBharucha, "Textbook of Environmental Studies for Undergraduate Courses", 2005, University Grands Commission, Universities Press India Private Limited, Hyderguda, Hyderabad – 500029.

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Semester – IV	U19GE401 - SOFT SKILLS AND APTITUDE – II	L	T	P	C	Marks
		0	0	2	1	100

Course Outcomes
At the end of the course the student will be able to:

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

1.Soft Skills	**Demonstrating soft-skill capabilities with reference to the following topics:** a. SWOT b. Goal setting c. Time management d. Stress management e. Interpersonal skills and Intrapersonal skills f. Presentation skills g. Group discussions
2. Quantitative Aptitude and Logical Reasoning	**Solving problems with reference to the following topics:** a. Equations: Basics of equations , Linear, Quadratic Equations of Higher Degree and Problem on ages. b. Logarithms, Inequalities and Modulus c. Sequence and Series: Arithmetic Progression, Geometric Progression, Harmonic Progression, and Special Series. d. Time and Work: Pipes & Cistern and Work Equivalence. e. Time, Speed and Distance: Average Speed, Relative Speed, Boats & Streams, Races and Circular tracks and Escalators. f. Arithmetic and Critical Reasoning: Arrangement, Sequencing, Scheduling, Network Diagram, Binary Logic, and Logical Connection. g. Binary Number System.- Binary to decimal, Octal, Hexadecimal
3. Verbal Aptitude	**Demonstrating English language skills with reference to the following topics:** a. Critical reasoning b. Theme detection c. Verbal analogy d. Prepositions e. Articles f. Cloze test g. Company specific aptitude questions

Total: 30 Hours

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