SONA COLLEGE OF TECHNOLOGY, SALEM-5

(An Autonomous Institution)

B.E-Biomedical Engineering

CURRICULUM and SYLLABI

[For students admitted in 2022-2023]

B.E / B.Tech Regulation 2019

Approved by BOS and Academic Council meetings

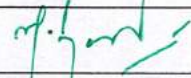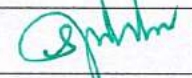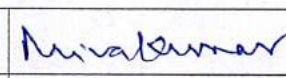# Sona College of Technology, Salem
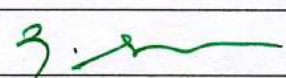
(An Autonomous Institution)

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

Branch: Biomedical 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	U19MAT102B	Linear Algebra and Multivariable Calculus	3	1	0	4	BS	60
3	U19PHY103E	Engineering Physics	4	0	0	4	BS	60
4	U19CHE104G	Engineering Chemistry	3	0	0	3	BS	45
5	U19PPR105	Problem Solving using Python Programming	3	0	0	3	ES	45
6	U19BEE106B	Basic Electrical and Electronics Engineering	3	0	0	3	PC	45
Practical								
7	U19PPL111	Python Programming Laboratory	0	0	2	1	ES	30
8	U19BEEL113B	Basic Electrical and Electronics Engineering Laboratory	0	0	2	1	PC	30
9	U19GE101	Basic Aptitude - I	0	0	2	0	EEC	30
Total Credits						21		
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, Bio Medical Engineering BoS	Member Secretary, Academic Council	Chairperson, Academic Council & Principal
Dr. M. Renuga	Dr. S. Prabakar	Dr. R. Shivakumar	Dr. S. R. R. Senthil Kumar

Copy to:-HOD/ Biomedical Engineering, First Semester BE BME Students and Staff, COE

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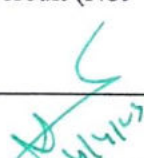## (An Autonomous Institution)
Courses of Study for BE / B Tech Semester II under Regulations 2019 (CBCS)
Branch: Biomedical Engineering

S. No	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 -Il	2	0	0	2	HSMC	30
3	U19MAT202C	Transforms and Differential Equations	3	1	0	4	BSC	60
4	U19CHE204D	Biochemistry	2	0	0	2	BSC	30
5	U19EGR206A	Engineering Graphics	2	0	2	3	ESC	60 (30L+30P)
6	U19BME201	Biology for Engineers	3	0	0	3	PCC	45
7	U19EC202	Circuit Theory	3	0	0	3	PCC	45
Practical								
8	U19WPL212	Workshop Practice	0	0	2	1	ESC	30
9	U19PCL208B	Physics and Chemistry Laboratory	0	0	4	2	BSC	60
10	U19GE201	Basic Aptitude – II	0	0	2	0	EEC	30
		Total Credits				21		
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, Biomedical Engineering BoS	Member Secretary, Academic Council	Chairperson, Academic Council & Principal
Dr. M. Renuga	Dr. S. Prabakar	Dr. R. Shivakumar	Dr. S. R. R. Senthil Kumar

Copy to:-HOD/ Biomedical Engineering, Second Semester BE BME Students and Staff, COE

03.03.2023

B.E/B.Tech Regulations-2019

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

S. No	Course Code	Course Title	Lecture	Tutorial	Practical	Credit	Total Contact Hours
		Theory					
1	U19MAT301B	Probability and Statistics	3	1	0	4	60
2	U19BM301	Electronic Devices and Circuits	3	0	0	3	45
3	U19EC301	Signals and Systems	3	1	0	4	60
4	U19BM302	Anatomy and Human Physiology	3	0	0	3	45
5	U19CS307	Programming in C	3	0	0	3	45
6	U19TAM301	தமிழரும் தொழில்நுட்பமும் / Tamils and Technology	1	0	0	1	15
7	U19GE303	**Mandatory Course:** Essence of Indian Traditional Knowledge	2	0	0	0	30
		Practical					
8	U19BM303	Electronic Devices and Circuits Laboratory	0	0	2	1	30
9	U19BM304	Anatomy and Human Physiology Laboratory	0	0	2	1	30
10	U19CS308	C Programming Laboratory	0	0	2	1	30
11	U19GE301	Soft Skills and Aptitude – I	0	0	2	1	30
					Total Credits	22	

Approved By

Chairman, Biomedical Engineering BoS
Dr.S.Prabakar

Member Secretary, Academic Council
Dr.R.Shivakumar

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

Copy to:-

HOD/ Biomedical Engineering, Third Semester BE BME Students and Staff, COE

05.07.2023

Regulations-2019

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

S. No	Course Code	Course Title	Lecture	Tutorial	Practical	Credit	Total Contact Hours
		Theory					
1	U19BM401	Analog and Digital Integrated Circuits	3	0	0	3	45
2	U19BM402	Biomedical Instrumentation	3	0	0	3	45
3	U19BM403	Control System for Biomedical Engineering	3	0	0	3	45
4	U19BM404	Biomaterials	3	0	0	3	45
5	U19CS406	Data Structures	3	0	0	3	45
6	U19GE402	Mandatory Course: Environment and Climate Science	2	0	0	0	30
		Practical					
7	U19BM405	Analog and Digital Integrated Circuits Laboratory	0	0	2	1	30
8	U19BM406	Biomedical Instrumentation Laboratory	0	0	2	1	30
9	U19CS407	Data Structures Laboratory	0	0	2	1	30
10	U19GE401	Soft Skills and Aptitude-II	0	0	2	1	30
					Total Credits	19	375

Approved By

Chairperson, Biomedical Engineering BoS
Dr.S.Prabakar

Member Secretary, Academic Council
Dr.R.Shivakumar

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

Copy to:-

HOD/ Biomedical Engineering, Fourth Semester BE BME Students and Staff, COE

22.12.2023

Regulations-2019

SONA COLLEGE OF TECHNOLOGY, SALEM-5

DEPARTMENT OF BIOMEDICAL ENGINEERING

<u>LIST OF PROFESSIONAL ELECTIVES</u>

B.E/B.TECH UNDER REGULATION 2019

Department:- BME

S.No	Course Code	Course Name	L	T	P	C
1	U19BM901	Hospital Management				
2	U19BM902	Medical physics				
3	U19BM903	Medical Optics				
4	U19BM904	Biometric systems technology				
5	U19BM905	Bio MEMS	3	0	0	3
6	U19BM906	Medical Ethics and Standards				
7	U19BM907	Biomedical waste Management				
8	U19BM908	Assist Devices				
9	U19BM909	Rehabilitation Engineering				
10	U19BM910	Medical Device Design	3	0	0	3
11	U19BM911	Hospital Planning and Management	3	0	0	3

SONA COLLEGE OF TECHNOLOGY, SALEM-5

DEPARTMENT OF BIOMEDICAL ENGINEERING

LIST OF PROFESSIONAL ELECTIVES FOR HONOURS DEGREE   **Date: 08.05.2023**

S.No	Vertical 1: BIO ENGINEERING	Vertical 2: HEALTHCARE MANAGEMENT INFORMATION SYSTEM	Vertical 3: MEDICAL DEVICE INNOVATION AND DEVELOPMENT	Vertical 4: BIOSIGNAL AND MEDICAL IMAGE TECHNOLOGIES	Vertical 5: HEALTHCARE TECHNOLOGY	Vertical 6: SPECIALIZED MEDICAL EQUIPMENT
1	Medical Physics	Clinical Engineering	Foundation Skills in integrated product development	Bio Signal Processing	Bio-Micro Electro Mechanical Systems	Intensive and Critical Care Equipment
2	Biomedical Optics and Photonics	Hospital Planning and Management	Research Methodology and IPR for Biomedical Engineers	Speech and Audio Signal Processing	Biomedical Nanotechnology	Eye and Dental Care Equipment
3	Principles of Tissue Engineering	Quality Management and Quality control for Medical Devices	Medical Device Design	Brain-Computer Interface and Applications	Wearable Healthcare Devices	Biomedicine for Sports
4	Basic Life Support and first Aid	Economics and Management for Engineers	Medical Device Innovation and Entrepreneurship	Pattern Recognition and Optimization Techniques	Telehealth Technology	Medical Textiles
5	Rehabilitation Engineering Techniques	Clinical safety and Standards	Physiological Modeling	Medical Image Analysis	Internet of Medical Things	Devices for Heritage Medicine
6	Artificial Organs and Implants	Medical Waste Management	Rapid Prototyping	Augmented Reality and Virtual Reality in Healthcare	Robotics in Medicine	Ergonomics & Haptics
7	Biometric System Technology	Computational Tools for Biomedical Engineering	Trouble Shooting of Medical Instruments	Medical Informatics	Biomimetics	Advancements in Medical Technology
8	Forensic Science In Healthcare	Fundamentals Of Medical Coding	Fundamentals of Healthcare Analytics	Principles of Communication Engineering	Bio-Virtual Instrumentation	Veterinary Medical Equipment

SONA COLLEGE OF TECHNOLOGY, SALEM-5

Department of Biomedical Engineering

<u>Honours Degree- Verticals & Courses</u>

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

Vertical 1: BIO ENGINEERING

S.No	Course Code	Course Name	L	T	P	C
1	U19BM902	Medical Physics	3	0	0	3
2	U19BM2001	Biomedical Optics and Photonics	3	0	0	3
3	U19BM2002	Principles of Tissue Engineering	3	0	0	3
4	U19BM2003	Basic Life Support and first Aid	3	0	0	3
5	U19BM2004	Rehabilitation Engineering Techniques	3	0	0	3
6	U19BM2005	Artificial Organs and Implants	3	0	0	3
7	U19BM904	Biometric System Technology	3	0	0	3
8	U19BM2006	Forensic Science In Healthcare	3	0	0	3

Vertical 2: HEALTHCARE MANAGEMENT INFORMATION SYSTEM

S.No	Course Code	Course Name	L	T	P	C
1	U19BM2007	Clinical Engineering	3	0	0	3
2	U19BM911	Hospital Planning and Management	3	0	0	3
3	U19BM2008	Quality Management and Quality control for Medical Devices	3	0	0	3
4	U19BM2009	Economics and Management for Engineers	3	0	0	3
5	U19BM2010	Clinical safety and Standards	3	0	0	3
6	U19BM2011	Medical Waste Management	3	0	0	3
7	U19BM2012	Computational Tools for Biomedical Engineering	3	0	0	3
8	U19BM2013	Fundamentals Of Medical Coding	3	0	0	3

Vertical 3: MEDICAL DEVICE INNOVATION AND DEVELOPMENT

S.No	Course Code	Course Name	L	T	P	C
1	U19BM2014	Foundation Skills in integrated product development	3	0	0	3
2	U19BM2015	Research Methodology and IPR for Biomedical Engineers	3	0	0	3
3	U19BM910	Medical Device Design	3	0	0	3
4	U19BM2016	Medical Device Innovation and Entrepreneurship	3	0	0	3
5	U19BM2017	Physiological Modeling	3	0	0	3
6	U19BM2018	Rapid Prototyping	3	0	0	3
7	U19BM2019	Trouble Shooting of Medical Instruments	3	0	0	3
8	U19BM2020	Fundamentals of Healthcare Analytics	3	0	0	3

Vertical 4: BIOSIGNAL AND MEDICAL IMAGE TECHNOLOGIES

S.No	Course Code	Course Name	L	T	P	C
1	U19BM2021	Bio Signal Processing	3	0	0	3
2	U19BM2022	Speech and Audio Signal Processing	3	0	0	3
3	U19BM2023	Brain-Computer Interface and Applications	3	0	0	3
4	U19BM2024	Pattern Recognition and Optimization Techniques	3	0	0	3
5	U19BM2025	Medical Image Analysis	3	0	0	3
6	U19BM2026	Augmented Reality and Virtual Reality in Healthcare	3	0	0	3
7	U19BM2027	Medical Informatics	3	0	0	3
8	U19BM2028	Principles of Communication Engineering	3	0	0	3

Vertical 5: HEALTHCARE TECHNOLOGY

S.No	Course Code	Course Name	L	T	P	C
1	U19BM2029	Bio-Micro Electro Mechanical Systems	3	0	0	3
2	U19BM2030	Biomedical Nanotechnology	3	0	0	3
3	U19BM2031	Wearable Healthcare Devices	3	0	0	3
4	U19BM2032	Telehealth Technology	3	0	0	3
5	U19BM2033	Internet of Medical Things	3	0	0	3
6	U19BM2034	Robotics in Medicine	3	0	0	3
7	U19BM2035	Biomimetics	3	0	0	3
8	U19BM2036	Bio-Virtual Instrumentation	3	0	0	3

Vertical 6: SPECIALIZED MEDICAL EQUIPMENT

S.No	Course Code	Course Name	L	T	P	C
1	U19BM2037	Intensive and Critical Care Equipment	3	0	0	3
2	U19BM2038	Eye and Dental Care Equipment	3	0	0	3
3	U19BM2039	Biomedicine for Sports	3	0	0	3
4	U19BM2040	Medical Textiles	3	0	0	3
5	U19BM2041	Devices for Heritage Medicine	3	0	0	3
6	U19BM2042	Ergonomics & Haptics	3	0	0	3
7	U19BM2043	Advancements in Medical Technology	3	0	0	3
8	U19BM2044	Veterinary Medical Equipment	3	0	0	3

SONA COLLEGE OF TECHNOLOGY, SALEM-5

Department of Biomedical Engineering

Minor Degree- Verticals & Courses

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

Minor Vertical: Healthcare Technology and Management

S.No	Course Code	Course Name	L	T	P	C
1	U19BME201	Biology for Engineers	3	0	0	3
2	U19BM1002	Basic Life Support	3	0	0	3
3	U19BM2045	Fundamentals Of Medical Equipment	3	0	0	3
4	U19BM1001	Hospital Management	3	0	0	3
5	U19BM907	Biomedical Waste Management	3	0	0	3
6	U19BM2046	Patient Safety, Standards And Ethics	3	0	0	3
7	U19BM2047	Home Medicare Technology	3	0	0	3
8	U19BM2048	Advancements In Medical Technology	3	0	0	3

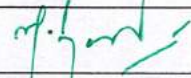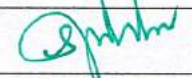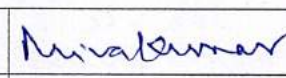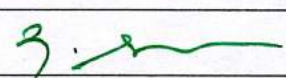# Sona College of Technology, Salem

(An Autonomous Institution)

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

Branch: Biomedical 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	U19MAT102B	Linear Algebra and Multivariable Calculus	3	1	0	4	BS	60
3	U19PHY103E	Engineering Physics	4	0	0	4	BS	60
4	U19CHE104G	Engineering Chemistry	3	0	0	3	BS	45
5	U19PPR105	Problem Solving using Python Programming	3	0	0	3	ES	45
6	U19BEE106B	Basic Electrical and Electronics Engineering	3	0	0	3	PC	45
Practical								
7	U19PPL111	Python Programming Laboratory	0	0	2	1	ES	30
8	U19BEEL113B	Basic Electrical and Electronics Engineering Laboratory	0	0	2	1	PC	30
9	U19GE101	Basic Aptitude - I	0	0	2	0	EEC	30
Total Credits						21		
Optional Language Elective*								
10	U19OLE1101	French						30
11	U19OLE1102	German	0	0	2	1	HS	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, Bio Medical Engineering BoS	Member Secretary, Academic Council	Chairperson, Academic Council & Principal
Dr. M. Renuga	Dr. S. Prabakar	Dr. R. Shivakumar	Dr. S. R. R. Senthil Kumar

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U19 ENG101B – **English for Engineers – I**

First year I semester

Common to BME

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												Ps o1	Ps o2
		1	2	3	4	5	6	7	8	9	10	11	12		
1	Use grammatical components effectively in both written and spoken communication	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:
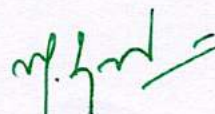Technical English I & II, Dr. M. Renuga et al. Sonaversity, 2016

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,
a College of Technology,
SALEM - 6

Sona College of Technology   Department of Mathematics

B. E. / BIOMEDICAL ENGINEERING

SEMESTER – I	LINEAR ALGEBRA AND	L	T	P	C
U19MAT102B	MULTIVARIABLE CALCULUS	3	1	0	4

COURSE OUTCOMES
At the end of the course, the students will be able to
1. apply the concepts of vector spaces and linear transformations in real world applications
2. 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
3. find the Taylor's series expansion, Jacobians and the maxima and minima of functions of two variables
4. apply appropriate techniques of multiple integrals to find the area and volume
5. apply the concepts of vector differentiation and integration to determine the line, surface and volume integrals.

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

UNIT – I   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 – II   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 – III   FUNCTIONS OF SEVERAL VARIABLES   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.

10. 05. 2019   B. E. / B. Tech. Regulations 2019

UNIT – IV   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.

UNIT – V   VECTOR CALCULUS   12

Vector differentiation: Scalar and vector valued functions – Gradient, directional derivative, divergence and curl – Scalar potential.
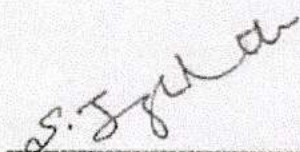
Vector integration: Line, surface and volume integrals – Statement of Green's, Stoke's and Gauss divergence theorems – Simple applications involving squares, rectangles, cubes and rectangular parallelopiped.

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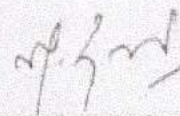
TEXT BOOKS:

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. 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

10. 05. 2019   B. E. / B. Tech. Regulations 2019

Course Code: **U19PHY103E**   L T P C   4 0 0 4
Course Name: **ENGINEERING PHYSICS**   3 0 0 4 100   L T P C.

(For I Semester B.E. Biomedical Engineering)

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   Explain the ultrasonic inspection technique in the field of medicine.

CO5   Elucidate the applications of X rays and radioactivity in the field of medicine.

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   12

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 –Transmission electron microscope - Scanning electron microscope - Limitations of electron microscope.

Unit 2 Lasers   12

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)

Applications - Holography - Construction and reconstruction of hologram - Applications of lasers in science and Engineering.

Unit 3 Crystal Physics   12

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.

Crystal Structure – Graphite Structure and Diamond Structure.

Unit 4 Ultrasonics   12

Introduction – Ultrasonic waves - Properties of ultrasonic waves.

Production of ultrasonic waves – Magneto striction method – Magnetostriction oscillator Piezo electric method – Piezo electric oscillator.

Ultrasonic imaging systems – Block diagram of ultrasonic imaging system – A scan, B scan and T-M mode display - Ultrasound pictures of human body – Ultrasonic technique to measure blood flow and heart beat – Physiological effects of ultrasound therapy – Phonocardiography.

Unit 5 Medical Physics   12

X – rays - Electromagnetic spectrum - Introduction to x- rays – Production of x- ray images – Producing live x- ray images – Radiation given to patients – Nuclear medicine – Sources of radioactivity – Radioisotopes for nuclear medicine – Statistical aspects of radioactivity decay

in radioisotopes – Nuclear imaging techniques – Basic instrumentation for nuclear imaging – Gamma ray camera – Positron emission tomography.

Lecture: 45, Tutorial: 15, Total: 60 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, 2019

References:

1. Engineering Physics, Sonaversity, Sona College of Technology, Salem (Revised Edition 2019).

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. Cameran. R, Medical Physics, John Wiley and Sons.

5. D. K. Bhattacharya, Poonam Tandon "Engineering Physics" Oxford University Press 2017.

6. M.Arumugam, "Applied Physics" Anuradha agencies, kumbakonam 2001

Dr. C. Shanthi
HOD / Science
Dr. C. SHANTHI, M.Sc.,M.E.,Ph.D.,
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Head, Department of Sciences
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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.

Dr. C. Shanthi
HOD / Sciences
Dr. C. SHANTHI, M.Sc.,M.E.,Ph.D.,
Professor of Physics
Head, Department of Sciences
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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).

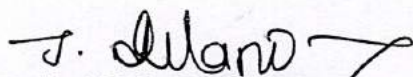**UNIT II -**   **BASICS OF PYTHON PROGRAMMING**   9

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.

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

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.
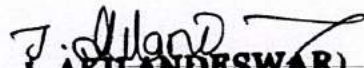
TOTAL: 45 HOURS

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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PROFESSOR & HEAD
Department of Information Technology
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U19BEE106B   BASIC ELECTRICAL AND ELECTRONICS ENGINEERING   3   0   0   3

COURSE OUTCOMES:

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

1. Realize the basic concepts of electrical quantities and components.
2. Understand the working of electrical machines.
3. Analyze the construction and characteristics of semiconductor devices.
4. Examine the BJT formation and its characteristics.
5. Enhance the knowledge on Special Devices
6.

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	1	3	1	1	2	3	2	2		1	2	3	3	2
CO2	1	1	2	2	1	3	2	1		3	1	3	1	
CO3	1	3	2	2	2	3	2	2		3	2	3	3	2
CO4	1	2	2	3	2	3	2	1		3	2	3	3	2
CO5	1	2	2	3	2	3	2	1		3	2	3	3	2

UNIT I: BASIC OF ELECTRICAL PERCEPTIONS   09

Definition of Electric Voltage, Current, Power, Energy, Ohms law, Limitations of Ohms law, Comparison of AC & DC Signals- Resistance in series and parallel combinations- comparison of series and parallel circuits- Series combination of capacitance and Inductance – Kirchhoff's Law – simple problems.

UNIT II : ELECTRICAL MACHINES   09

DC Generator: construction of DC Generator – working principle of DC Generator – EMF equation – DC Motor: Working principle of DC Motor –Transformer: Working principle of Transformer – EMF equation – Transformation ratio.

UNIT III: PN JUNCTION DIODE AND IT'S APPLICATIONS   09

Energy band theory-Conductor-Insulator-Semiconductor-Doping-formation of N-type and P-type materials-PN junction Diode-VI Characteristics- Zener diode- VI characteristics of Zener-Avalanche break down. - Zener effect-Zener diode as voltage regulator.

UNIT IV: BJT AND ITS APPLICATIONS   09

Bipolar Junction Transistor – construction-Working principle-Regions of transistor-CB, CE, CC Configurations and Characteristics —Application of transistor as a switch.

UNIT V: SPECIAL DEVICES   09

Construction & Characteristics of - Tunnel Diode-Varactor diode-Photo diode- Photo transistor- SCR-TRIAC-DIAC.

Total: 45 Hours

30.06.2022   B.E / B.Tech Regulations 2019

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Professor and Head of Department
Electronics and Communication Engineering
SONA COLLEGE OF TECHNOLOGY,
Salem - 636 005. Tamilnadu, India.

TEXT BOOK

1. D P Kothari and I J Nagrath, "Basic Electrical and Electronics Engineering", Mc Graw Hills (India) Private Limited, 2014.

REFERENCES

1. D. Devaraj, S. K. Bhattacharya, "Basic Electrical and Electronics Engineering", Pearson India, 2016
2. AbhiChakrabarti, Sudipta Debnath, Soumitra Kumar Mandal, "Basic Electrical & Electronics Book ",Mc Graw Hill Education; Fifth Edition, 2016.
3. Ravish Singh, " Basic Electrical & Electronics Engineering", McGraw Hill Education, 2014

Chairperson

BOS-ECE

(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
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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PROFESSOR & HEAD
Department of Information Technology
SONA COLLEGE OF TECHNOLOGY
SALEM - 636 005

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

1. Identify the active, passive components and measuring instruments
2. Analyze the electrical quantity at any point of circuit.
3. Design the circuit based on PN junction diode and BJT.

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	3	3	3	2	2	2	1	2	2	3	3	2
CO2	3	3	3	3	3	2	3	2	2	2	3	3	3	3
CO3	3	3	3	3	3	2	3	2	1	2	3	3	3	3

List of Experiments

1. Identification of active and passive electronic components.

2. Study on CRO, Ammeter, Voltmeter, Multi-meter, Function Generator, and DSO.

3. Measurement of DC and AC power supply using measuring instruments.

4. Realization and design problems on ohms law.

5. Realization and design problems on KCL, KVL.

6. VI characteristics analysis of PN junction diode.

7. Input and output characteristics of BJT in CB configuration

8. Input and output characteristics of BJT in CE configuration

9. Input and output characteristics of BJT in CC configuration

10. Realization of transistor as switch.
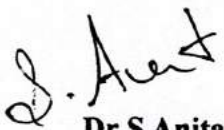
TOTAL : 30 HOURS

Chairperson

BOS-ECE
Dr.R.S.SABEENIAN, M.E.,MBA,Ph.D.,FIETE,
Professor and Head of Department
Electronics and Communication Engineering
SONA COLLEGE OF TECHNOLOGY,
Salem - 636 005, Tamilnadu, India.

30.06.2022   B.E / B.Tech Regulations 2019.

Semester-I U19GE101	Basic Aptitude – I (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:

U19GE101

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

Dr.S.Anita

Head/Training

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

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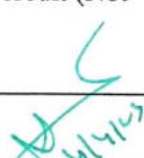
S. No	Course Code	Course Title	L	T	P	C	Category	Total Contact Hours
		Theory						
1	U19TAM201	தமிழர் மரபு / Heritage of Tamils	1	0	0	1	HSMC	15
2	U19ENG201B	English for Engineers -II	2	0	0	2	HSMC	30
3	U19MAT202C	Transforms and Differential Equations	3	1	0	4	BSC	60
4	U19CHE204D	Biochemistry	2	0	0	2	BSC	30
5	U19EGR206A	Engineering Graphics	2	0	2	3	ESC	60 (30L+30P)
6	U19BME201	Biology for Engineers	3	0	0	3	PCC	45
7	U19EC202	Circuit Theory	3	0	0	3	PCC	45
		Practical						
8	U19WPL212	Workshop Practice	0	0	2	1	ESC	30
9	U19PCL208B	Physics and Chemistry Laboratory	0	0	4	2	BSC	60
10	U19GE201	Basic Aptitude – II	0	0	2	0	EEC	30
		Total Credits				21		
		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, Biomedical Engineering BoS	Member Secretary, Academic Council	Chairperson, Academic Council & Principal
Dr. M. Renuga	Dr. S. Prabakar	Dr. R. Shivakumar	Dr. S. R. R. Senthil Kumar

Copy to:-HOD/ Biomedical Engineering, Second Semester BE BME Students and Staff, COE

03.03.2023

B.E/B.Tech Regulations-2019

U19TAM201　　　　　　HERITAGE OF TAMILS　　　　　　　LT 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.
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8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
9. Keeladi - 'Sangam City Civilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by: The Author)
11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

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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 பிறபகுதிகளில் 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)
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U19ENG201B - English for Engineers – II
First year II semester
BME

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												Ps o1	Ps o2
		1	2	3	4	5	6	7	8	9	10	11	12		
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   6

- 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
6

- 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
6

- 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
6

- 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
6

- 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

TOTAL: 30 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. / BIOMEDICAL ENGINEERING

SEMESTER – II	TRANSFORMS AND DIFFERENTIAL EQUATIONS	L	T	P	C
U19MAT202C		3	1	0	4

COURSE OUTCOMES

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

1. apply the classical method to solve linear ordinary differential equations with constant coefficients.

2. apply the Laplace transforms technique and its properties to solve an ordinary differential equation.

3. express a periodic signal as an infinite sum of sine and cosine wave components using Fourier series.

4. apply the Fourier transform techniques to convert the signal in terms of the frequencies of the waves.

5. find the general and singular solutions of linear and nonlinear partial differential equations.

	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	
CO2	3	3		3								2	3	
CO3	3	3		3								2	3	
CO4	3	3		3								2	3	
CO5	3	3		3								2	3	

UNIT – I   ORDINARY DIFFERENTIAL EQUATIONS   12

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

UNIT – II   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 – III   FOURIER SERIES   12

General Fourier series – Dirichlet's conditions – Change of intervals – Odd and even functions – Half range sine and cosine series – Root mean square – Parseval's identity – Harmonic analysis.

UNIT – IV   FOURIER TRANSFORMS   12

Fourier transform pair – Properties – Fourier sine and cosine transforms pair – Properties – Transforms of simple functions – Parseval's identity.

UNIT – V   PARTIAL DIFFERENTIAL EQUATIONS   12

Formation of partial differential equations – Lagrange's partial differential equation – Clairaut's form of partial differential equations – Higher order linear partial differential equation with constant coefficients.

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

TEXT BOOKS:

1. T. Veerarajan, "Transforms and Partial Differential Equations", McGraw Hill Publishers, 3rd Edition, 2016.
2. T. Veerarajan, "Engineering Mathematics for Semesters I & II", McGraw Hill Publishers, 1st Edition, 2019.

REFERENCE BOOKS:

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

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Head / Department of Mathematics
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10. 05. 2019

II SEMESTER (BME)

COURSE CODE	U19CHE204D	LTPC	
COURSE NAME	BIOCHEMISTRY	2 0 0 2	

Course outcome:

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

CO1 Outline the fundamentals of biochemistry.
CO2 Analyze the classification of carbohydrates and their properties and applications.
CO3 Discuss the classification of lipids and their biological importance.
CO4 Demonstrate the structure and properties of nucleic acid and protein.
CO5 Describe the classification and the biological clinical applications of enzymes.

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

UNIT I   INTRODUCTION TO BIOCHEMISTRY   6

Introduction to Biochemistry - water as a biological solvent - weak acid and bases, pH, buffers, Handerson Hasselbalch equation, physiological buffers in living systems, Energy in living organism - Properties of water and their applications in biological systems - Introduction to Biomolecules, Biological membrane, Clinical application of Electrolytes and radioisotopes.

UNIT II   CARBOHYDRATES   6

Classification of carbohydrates - mono, di, oligo and polysaccharides - Structure, physical and chemical properties of carbohydrates - Isomerism, racemisation and mutarotation - Digestion and absorption of carbohydrates - Metabolic pathways and bioenergetics – Glycolysis, glycogenesis, glycogenolysis and its hormonal regulation - TCA cycle and electron transport chain - Oxidative phosphorylation - Biochemical aspect of Diabetes mellitus and Glycogen storage Disease.

UNIT III   LIPIDS   6

Classification of lipids- simple, compound and derived lipids - Nomenclature of fatty acid, physical and chemical properties of fat - Metabolic pathways: synthesis and degradation of fatty acid (beta oxidation), hormonal regulation of fatty acid metabolism, ketogenesis, Biosynthesis of Cholesterol - Disorders of lipid metabolism.

UNIT IV   NUCLEIC ACID and PROTEIN   6

Structure of purines and pyrimidines, nucleoside, nucleotide, DNA act as a genetic material, chargoffs rule - Watson and crick model of DNA - Structure of RNA and its type - Metabolism and Disorder of purines and pyrimidines nucleotide - Classification, structure and properties of proteins, structural organization of proteins - classification and properties of amino acids - Separation of protein, Inborn Metabolic error of amino acid metabolism.

UNIT V   ENZYME AND ITS CLINICAL APPLICATION   6

Classification of enzymes, apoenzyme, coenzyme, holoenzyme and cofactors - Kinetics of enzymes - Michaelis-Menten equation - Factors affecting enzymatic activity: temperature, pH, substrate concentration and enzyme concentration - Inhibitors of enzyme action: Competitive, non - competitive, irreversible - Enzyme: Mode of action, allosteric and covalent regulation - Clinical enzymology - Measurement of enzyme activity and interpretation of units.

TOTAL: 30 HOURS

TEXT BOOKS:

1. Rafi MD —Text book of biochemistry for Medical Students, Second Edition, University Press, 2014.

2. David W. Martin, Peter A. Mayes , Victor W. Rodwell, - Harper's Review of Biochemistry, LANGE Medical Publications, 1981.

REFERENCES:

1. Keith Wilson and John Walker, —Practical Biochemistry - Principles & Techniques, Oxford University Press, 2009.

2. Pamela. C. Champe and Richard. A. Harvey, — Lippincott Biochemistry Lippincott's Illustrated Reviews, Raven publishers,1994.

30.6.2022

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30.06.2022   B.E. / B.Tech. Regulations 2019

U19EGR206A – ENGINEERING GRAPHICS

	L	T	P	C
	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   Understand 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

UNIT I – PLANE CURVES (Manual drafting)   06

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)   12

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)   12

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)   12

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)
12

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: 60 Hours

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.

REFERENCES

1. Dhananjay A. Jolhe, 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), SubhasPublications, 1998.
4. Bertoline & Wiebe fundamentals of graphics communication III edition McGrawhill 2002

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U19BME201	BIOLOGY FOR ENGINEERS	L	T	P	C
		3	0	0	3

COURSE OUTCOMES

On successful completion of this course, the student will be able to

•	Analyze the cell growth and structure.
•	Classify various nomenclatures of Enzymes.
•	Compare different cycles of Metabolism.
•	Analyze the human activity with the Genetic nature.
•	Design the various industrial applications.

CO/PO, PSO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

CO's	Programme Outcomes (PO's) and Programme Specific Outcomes (PSO's)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	1	-	-	-	-	-	-	-	-	2	1	1	-
CO2	3	3	1	-	-	-	-	-	-	-	-	2	1	1	-
CO3	3	3	1	-	-	-	-	-	-	-	-	2	1	1	-
CO4	3	3	1	-	-	-	-	-	-	-	-	2	1	1	-
CO5	3	3	1	-	-	-	-	-	-	-	-	2	1	1	-

UNIT I	CELL: THE BASIC UNIT OF LIFE	9

Cell- Basic Properties of Cells- Prokaryotic Cells- Eukaryotic Cells- Cell Cycle and Cell Division-
M Phase- Meiosis- Cell Differentiation.

UNIT II	MOLECULAR ANALYSIS AND ENZYMES	9

Carbohydrates- Amino acids and Proteins- Nucleic Acids- Lipids- Nature of Bonding and
Qualitative Tests- Classification and Nomenclature of Enzymes- Co-Factors- Importance of
Enzymes.

UNIT III	METABOLISM	9

Metabolism and Its Concepts- Metabolic Basis for Living - Anabolic and Catabolic Pathways -
Concept of Non- Equilibrium and Steady State- Photosynthesis- Photorespiration (C2 Cycle) - C4
Pathways CAM Cycle (In Succulent Plant) - Factors Affecting Photosynthesis-Respiration-
Glycolysis Fermentation- Aerobic Respiration

UNIT IV	GENETICS	9

Mendel's Laws of Inheritance- Gene Interaction- Multiple Alleles- Chromosomal Theory of
Inheritance Linkage- Recombination (Crossing Over) - Chromosome Mapping- Genetic Disorders.

UNIT V	MICROBIOLOGY AND ITS INDUSTRIAL APPLICATIONS	9

Microorganisms- Growth Kinetics- Culture Media- Sterilization- Microscopy- applications of
Microbiology- Immunology and Immunity- Cancer Biology- Stem Cell.

		TOTAL: 45 Hours

TEXTBOOKS:

	1.	Wiley,"Biology for Engineers", John Wiley & Sons,I Edition,2018.
	2.	S. ThyagaRajan, N. Selvamurugan, M. P. Rajesh, R. A. Nazeer, Richard W. Thilagaraj, S. Barathi, and M. K. Jaganathan, "Biology for Engineers," Tata McGraw-Hill, New Delhi, 2012

REFERENCES:

	1.	Robert Weaver, "Molecular Biology," MCGraw-Hill, 5th Edition, 2012.
	2.	Kenneth Murphy, "Janeway's Immunobiology," Garland Science; 8th edition, 2011.

04/04/23

Dr.S.PRABAKAR, M.E.,Ph.D.,
Professor and Head
Department of Biomedical Engineering
Sona College of Technology, Salem-5

3 0 0 3

COURSE OUTCOMES

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

6. Apply basic laws to calculate the voltage, current and power for electric circuits.
7. Identify the network topologies of circuits.
8. Analyze various dc circuits using network theorems.
9. Analyze the resonant circuits and coupled circuits.
10. Analyze the two port networks for various parameters.

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		2			2	3	2	3	3
CO2	3	3	3	3	3		2			2	3	2	3	3
CO3	3	3	3	3	3		2			2	3	2	3	3
CO4	3	3	3	3	3		2			2	3	2	3	3
CO5	3	3	3	3	3		2			2	3	2	3	3

UNIT I   **BASICS OF CIRCUIT ANALYSIS**

Mesh and Nodal analysis – Star Delta Transformation Techniques –Concept of Duality – Dual Network – Graphs of a Network – Trees, Twig, Link and Branches – Incidence Matrix – Tie-Set Matrix Formation and Cut-Set Matrix Formation of a Graph.   **12**

UNIT II   **- CIRCUIT THEOREMS**   **12**

DC analysis : Superposition Theorem – Thevenin's Theorem – Norton's Theorem – Reciprocity Theorem – Maximum Power Transfer Theorem – Tellegen's Theorem.

UNIT III   **SERIES RESONANT CIRCUITS AND COUPLED CIRCUITS**   **12**

Resonances-Series Resonance – Impedance and Phase Angle of a Series Resonance Circuit – Voltages and Currents in a Series Circuit – Quality Factor. Coupled Circuits: Self-Inductance – Mutual Inductance – Dot Conversion – Coupling Coefficient.

UNIT IV   **TRANSIENTS**   **12**

DC Response of an R-L Circuit – DC Response of an R-C Circuit – DC Response of an R-L-C Circuit – Sinusoidal Response of R-L Circuit – Sinusoidal Response of R-C Circuit – Sinusoidal Response of R-L-C Circuit.

31|3|2023

Dr.R.S. SABEENIAN, M.E., M.B.A., Ph.D
Professor and Head of Department,
Electronics and Communication Engg.
SONA COLLEGE OF TECHNOLOGY
SALEM-636 005. Tamil Nadu. India

UNIT V   TWO PORT NETWORKS

Two port Network – Open Circuit Impedance (Z) Parameters – Short Circuit Admittance (Y) Parameters –Transmission (ABCD) Parameters – Hybrid (h) Parameters –Inter Relationship of Different Parameters .

Total:45

TEXTBOOKS

1. A Sudhakar, Shyammohan S Palli, "Circuits and Networks Analysis and Synthesis", Mc-Graw Hill, 2019.

REFERENCE BOOKS

4. Ravish R Singh," Networks Analysis and Synthesis", Mc-Graw Hill Education, 2019

5. M.L. Soni and J.C. Gupta, A Course in "Electrical Circuits Analysis", Dhanpat Rai & Co,   2015

6. Abhijit Chakrabarti, "Circuit Theory Analysis and Synthesis", Dhanpat Rai & CO. (Pvt).Ltd, Educational and technical publishers.

31/3/2023

Dr.R.S. SABEENIAN, M.E., M.B.A., Ph.D
Professor and Head of Department,
Electronics and Communication Engg.
SONA COLLEGE OF TECHNOLOGY
SALEM-636 005. Tamil Nadu. Indi

U19WPL212 - WORKSHOP PRACTICE

<div align="right">

L T P C

0 0 2 1

</div>

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.

<div align="right">

TOTAL: 30 hours

</div>

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

U19PCL208B	PHYSICS AND CHEMISTRY LABORATORY [For BME]	L	T	P	C
		0	0	4	2

Course Outcomes	
After successful completion of this course, the students should be able to	
CO1:	Apply the principles of Optics, 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 thickness and 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, Spectrometer, able to handle burette and pipette

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	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
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 survey
Quiz on 1st half (5)	Internal test II (10)	
Internal test I (10)	RTPS (10)	
Mean of 2nd half of Experiment (10)	End semester Examination (40)	

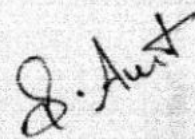**List of Experiments (Physics part)**

1	Determination of the thickness of a thin wire by forming interference fringes using air wedge apparatus.	
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 band gap of the given semiconductor diode.	
6	Determination of velocity of ultrasonic waves and compressibility of the given liquid using ultrasonic interferometer.	
7	Determination of wavelength of the prominent colors in the mercury spectrum using a spectrometer.	
8	Determination of the Young's modulus of the given material by non-uniform bending method.	
9	Determination of coefficient of viscosity of the given liquid by Poiseuille's method.	
10	Determination of rigidity modulus of the material using torsion pendulum.	
List of Experiments (Chemistry part)		
11	Estimation of hardness of water sample by EDTA method.	
12	Estimation of alkalinity of water sample by indicator method.	
13	Estimation of copper in brass by EDTA method.	
14	Estimation of HCl by pH metry.	
15	Determination of iron content in water by spectrophotometric method.	
16	Estimation of HCl by conductometry. (HCl vs NaOH)	
17	Estimation of mixture of acids by conductometry. ($HCl + CH_3COOH$ vs NaOH)	
18	Estimation of ferrous ion by potentiometric titration.	
19	Determination of Molecular weight of a polymer by viscosity measurements.	
20	Estimation of chromium in waste water.	
		Total Hours: 60 Hrs

Dr. C. Shanthi
HOD / Sciences

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

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

Dr.S.Anita

Head/Training

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

French Language A1 Level 2/A2
First year II semester

Course code: U19OLE1201   **0 0 2 1**

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

1. Accept and refuse of an invitation, give some instruction of do's and don'ts, converse in commercial centres, write an invitation

2. Describe a city, locate a place in a city, ask further details, describe one's hometown

3. Talk about things around us, recite a past event, identify sign boards, express agree and disagree, express obligation and prohibition, sell an object in online

4. Talk about one's goals, express one's feelings, write a list of things to do, express an opinion, talk about weather, draft a mail response

5. Express one's interest and wish, describe a pet animal, express one's aversions, encourage others, write to ask for a help, narrate a past event, write a biography

Unit-I Gouter à la campagne   **6 hours**
Hr 2: City shopping and services, conjugation: payer, manger and acheter, negative sentence
Hr 4: Imperative sentence, food and beverages, utensils, cutleries, corckeries
Hr 6: Quantitative articles, quantities, pronoun 'en', express appreciation, write an invitation

Unit-II Voyager dans sa ville   **6 hours**
Hr 8: City and localities, Conjugation: prendre, adjectives of place, pronoun 'y'
Hr 10: Transport, leisure activities, preposition of place, degrees of comparison
Hr 12: Asking information about a new place, describe a city

Unit-III Faire du neuf avec du vieux   **6 hours**
Hr 14: Things in a store, conjugation : faire, imparfait 2, passé composé
Hr 16: Things in a repairing shop, computer, relative pronouns: que and qui
Hr 18: Imperative negative, express obligation and interdiction, online sale and response

Unit-IV Changer d'air   **6 hours**
Hr 20: Professions, conjugation: croire, voir, recent past tense
Hr 22: Traveling formalities, expressing about health condition, future tense
Hr 24: Pronoun COD, talk about weather condition, write about one's plans and projections

Unit-V Devenir éco-citoyen   **6 hours**
Hr 26: Citizenship and solidarity, conjugation: connaitre and savoir, depuis vs pendant
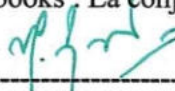Hr 28: Imparfait vs passé composé, nature and environment, indirect pronouns COI
Hr 30: Animals, conditional, talk on supporting others, write a biography

                                                                  Total : 30 hours

Text Books

1. The course faculty will provide relevant audios, videos, handouts and notes.

2. Books : Saison (Méthode de français, cachier d'activités)

3. Reference books : La conjugaison, Dondon, Echo

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

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

German Language Course

First year II semester

Course Code: U19OLE1202

LTPC
0 0 2 1

Course Outcomes: At the end of the course, students should be able to,
1. Use grammatical expressions appropriately in day-to-day conversation.
2. Make them frame simple sentences /questions.
3. Accentuate to start and sustain basic conversation
4. Helps them articulate thoughts in German
5. Identify the different forms of the verb.

UNIT – I   6
- Nominative/accusative case, adjectives

UNIT – II   6
- Modes of transportation, orientation, giving/understanding simple directions

UNIT – III   6
- Food and beverages, Modal verbs, Separable verbs
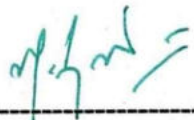
UNIT – IV   6
- Simple sentences using modal / separable verbs

UNIT – V   6
- Articles of clothing

Total : 30 hours

Text Book
Netzwerk A1

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

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

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

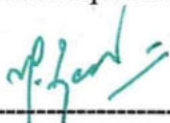Hr 27-28: Preparing for JLPT N5

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.

Dr. M. Renuga   Dr. M.RENUGA,
BoS – Chairperson,   Professor & Head,
Science & Humanities   Department of Humanities & Languages,
     HOD / H&L   ....na College of Technology,
                        SALEM - 636 005.

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

S. No	Course Code	Course Title	Lecture	Tutorial	Practical	Credit	Total Contact Hours
		Theory					
1	U19MAT301B	Probability and Statistics	3	1	0	4	60
2	U19BM301	Electronic Devices and Circuits	3	0	0	3	45
3	U19EC301	Signals and Systems	3	1	0	4	60
4	U19BM302	Anatomy and Human Physiology	3	0	0	3	45
5	U19CS307	Programming in C	3	0	0	3	45
6	U19TAM301	தமிழரும் தொழில்நுட்பமும் / Tamils and Technology	1	0	0	1	15
7	U19GE303	**Mandatory Course:** Essence of Indian Traditional Knowledge	2	0	0	0	30
		Practical					
8	U19BM303	Electronic Devices and Circuits Laboratory	0	0	2	1	30
9	U19BM304	Anatomy and Human Physiology Laboratory	0	0	2	1	30
10	U19CS308	C Programming Laboratory	0	0	2	1	30
11	U19GE301	Soft Skills and Aptitude – I	0	0	2	1	30
					Total Credits	22	

Approved By

Chairman, Biomedical Engineering BoS
Dr.S.Prabakar

Member Secretary, Academic Council
Dr.R.Shivakumar

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

Copy to:-
  HOD/ Biomedical Engineering, Third Semester BE BME Students and Staff, COE

B. E / BIOMEDICAL ENGINEERING

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

COURSE OUTCOMES

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

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

CO / PO, PSO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

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

UNIT – I   BASIC STATISTICS   12

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

UNIT – II   RANDOM VARIABLES   12

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

UNIT – III   THEORETICAL DISTRIBUTIONS   12

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

UNIT – IV   TWO DIMENSIONAL RANDOM VARIABLES   12

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

20. 05. 2020   B. E. / B. Tech. Regulations 2019

UNIT – V   TESTING OF SIGNIFICANCE   12

Sampling distributions - Testing of hypothesis for mean, standard deviation, variance, proportion and differences using normal and t distributions - χ^2- tests for independence of attributes and goodness of fit and F distribution.
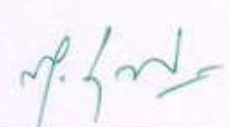
Theory: 45 Hours   Tutorial: **15 Hours**   Total: **60 Hours**

TEXT BOOKS:

1. S. C. Gupta and V. K. Kapoor, "Fundamentals of Mathematical Statistics", Sultan Chand and Sons Publishers, 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.
5. S. P. Gupta, "Statistical Methods", Sultan Chand and Sons Publishers, 15th Edition, 2012.

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

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

20. 05. 2020

B. E. / B. Tech. Regulations 2019

U19MAT301B   **PROBABILITY AND STATISTICS**   **L T P C**
                                                      3 1 0 4

COURSE OUTCOMES
At the end of the course, the students will be able to
- Apply the concepts of measures of central tendency, dispersion, correlation to the given data and analyze the results.
- Apply the concepts of random variables and their properties to generate the moments.
- Fit the suitable distribution and its properties to the real-world problems and interpret the results.
- Apply the concepts of joint probability distribution and its properties to find the covariance.
- Test the hypothesis of the population using sample information.

UNIT I   BASIC STATISTICS   12
Measures of central tendency (simple arithmetic mean, median, mode) – Quartiles – Measures of dispersion (range, inter-quartile range, quartile deviation, mean deviation, standard deviation, coefficient of variation) – Simple correlation – Curve fitting (straight line and parabola).

UNIT II   RANDOM VARIABLES   12
Discrete and continuous random variables – Probability mass function, probability density function, moments, moment generating function and their properties.

UNIT III   THEORETICAL DISTRIBUTIONS   12
Binomial, Poisson, geometric, uniform, exponential and normal distributions and their properties - Applications.

UNIT IV   TWO DIMENSIONAL RANDOM VARIABLES   12
Joint distributions, marginal and conditional distributions – Covariance – Correlation – Central limit theorem.

UNIT V   TESTING OF SIGNIFICANCE   12
Sampling distributions - Testing of hypothesis for mean, standard deviation, variance, proportion and differences using normal and t distributions - 32- tests for independence of attributes and goodness of fit and F distribution.

TOTAL: 60 Hours

TEXTBOOKS:
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.
5. S. P. Gupta, "Statistical Methods", Sultan Chand and Sons Publishers, 15th Edition, 2012.

Academic co-ordinator.
k. Manikandan
AP/BmE

BoS - Chairman

Dr.S.PRABAKAR, M.E.,Ph.D.,
Professor and Head
Department of Biomedical Engineering
Sona College of Technology, Salem-5

U19BM301 **ELECTRONIC DEVICES AND CIRCUITS** **L T P C**
                                                             3 0 0 3

COURSE OUTCOMES
At the end of the course, the students will be able to
- Bias the transistors for amplification purpose
- Analysis the mid-frequency operation of BJT amplifier circuits
- Calculate cut-off frequencies and bandwidth of BJT amplifier circuit
- Analysis the Working principle of FETs
- Design different types of power supplies.

UNIT I   TRANSISTOR BIAS STABILITY   9
BJT – Need for biasing – Stability factor - Fixed bias circuit, Load line and quiescent point. Variation of quiescent point due to h FE variation within manufacturers tolerance - Stability factors - Different types of biasing circuits - Method of stabilizing the Q point - Advantage of Self bias (voltage divider bias) over other types of biasing- self bias as a constant current circuit

UNIT II   MID-BAND ANALYSIS OF SMALL SIGNAL AMPLIFIERS   9
CE, CB and CC amplifiers - Method of drawing small-signal equivalent circuit - Miller's theorem - Comparison of CB, CE and CC amplifiers and their uses - Methods of increasing input impedance using Darlington connection and bootstrapping – Differential amplifier, Basic BJT differential pair – CMRR.

UNIT III   FREQUENCY RESPONSE OF AMPLIFIERS   9
General shape of frequency response of amplifiers - Definition of cut-off frequencies and bandwidth - Low frequency analysis of amplifiers to obtain lower cut-off frequency Hybrid equivalent circuit of BJTs - High frequency analysis of BJT amplifiers to obtain upper cut-off frequency – Gain Bandwidth Product.

UNIT IV   FIELD EFFECT TRANSISTORS   9
JFETs – Drain and Transfer characteristics - Current equations - Pinch off voltage and its significance- MOSFET- Characteristics- Threshold voltage -Channel length modulation, Characteristics – Comparison of MOSFET with JFET.

UNIT V   RECTIFIERS AND POWER SUPPLIES   9
Classification of power supplies, Rectifiers - Half-wave, full-wave and bridge rectifiers with resistive load. Analysis for V dc and ripple voltage with C, L, LC and CLC filters.
                                                            TOTAL : 45Hours
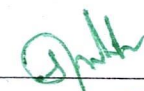
TEXTBOOKS:
1. Millman and Halkias, "Integrated Electronics", 2nd Edition, Tata Mc Graw Hill, 2010.
2. Anil K. Maini and Varsha Agrawal, "Electronics Devices and Circuits", First Edition, Wiley Publications, 2009.

REFERENCE BOOKS:
1. Y.N. Bapat, "Electronic devices and circuits, Discrete and Integrated", 3rd Edition, Tata Mc Graw Hill, 2011

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U19EC301	SIGNALS AND SYSTEMS (Common for ECE& BME)	L T P C 3 1 0 4

COURSE OUTCOMES
At the end of the course, the students will be able to
- Classify the signals as continuous time and discrete time signals and classify systems based on their properties
- Determine the response of LTI system using convolution sum for DT system and Convolution Integral for CT system
- Apply Fourier series and Fourier Transform for periodic Signals
- Analyze system using Laplace transform and realize the structure for CT system
- Analyze system using Z transform and realize the structure for DT system

UNIT I   CLASSIFICATION OF SIGNALS AND SYSTEMS   12
Continuous-Time and Discrete-Time signals–The Unit Impulse Unit Step, Unit Ramp Signals and other Basic Signals – Operation of Signals -Time Shifting – Time Reversal – Amplitude Scaling – Time Scaling – Signal Addition – Multiplications –Classification of signals-Continuous-Time and Discrete- Time Systems– Basic System Properties - Systems With and Without Memory – Causality – Stability –Time Invariance – Linearity.

UNIT II   LINEAR TIME- INVARIANT SYSTEMS   12
Continuous-Time LTI Systems: The Convolution Integral - graphical and analytical approach – Properties of Linear Time-Invariant Systems – Solution of Differential Equations.
Discrete-Time LTI system: The Convolution sum-tabulation method-matrix multiplication method- graphical and analytical approach – Solution of Difference Equations.

UNIT III   ANALYSIS OF CT SIGNALS USING FOURIER SERIES & FOURIER TRANSFORM   12
Fourier Series Representation (Trigonometric and Exponential) of Continuous-Time Periodic Signals – Properties of Continuous-Time Fourier Series – Representation of Aperiodic Signals: The Continuous- Time Fourier Transform – The Fourier Transform for Periodic Signals – Properties of the Continuous-
Time Fourier Transform.

UNIT IV   ANALYSIS OF SIGNALS AND SYSTEMS USING LAPLACE TRANSFORM   12
The Laplace Transform – The Region of Convergence for Laplace Transform– The Inverse Laplace Transform using Partial fraction– Properties of the Laplace Transform–System Function and Block Diagram Representations-Direct Form I and Direct Form II.

UNIT V   ANALYSIS OF SIGNALS AND SYSTEMS USING Z-TRANSFORM   12
The Z-Transform – The Region of Convergence for the Z-Transform –The Inverse Z-Transform using Partial fraction and long division method– Properties of the Z-Transform – System Function and Block Diagram Representations-Direct Form I and Direct Form II.

TOTAL : 60 Hours

TEXT BOOKS:

1. Alan V. Oppenheim, Alan S. Willsky, S. Hamid Nawab, "Signals and Systems", 2nd E, Prentice Hall India, 2010
2. A.Anand Kumar, "Signals and Systems", 3rd Edition, Prentice Hall India,2013

REFERENCE BOOKS:

1. M .J. Roberts, "Signals & Systems Analysis using Transform Methods & MATLAB", Tata McGraw Hill, 2007
2. Haykin, Simon, and Barry Van Veen. "Signals and systems", John Wiley & Sons, 2007.
3. A. NagoorKani, "Signals & Systems", Tata McGraw Hill, 2010
4. John G. Proakis, Dimitris G. Manolakis, "Digital Signal Processing, Principles, Algorithms, and Applications", 4th E, PHI, 2007
5. Robert A. Gable, Richard A. Roberts, "Signals & Linear Systems", 3rd E, John Wiley, 1995
6. Edward W Kamen& Bonnie's Heck, "Fundamentals of Signals and Systems", Pearson Education, 2007

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COURSE OUTCOMES
At the end of the course, the students will be able to
- Describe the basic concepts of anatomy and physiology.
- Recognize the ways the body undergoes change throughout the life span related to cell and organ development.
- Analyze how the development and progression of structural systems contributes to the body's overall function.
- Identify basic characteristics of each body system and how they work together as a whole.
- Differentiate between organ systems of the body and their various functions.

UNIT I   ORGANIZATION OF HUMAN BODY   9
Structure of Cell – levels of structural organization - Polarization and Depolarization of Cell, Tissue: Types – Homeostasis -Specialized tissues – functions – Positive and Negative Feedback Mechanism - Muscle Physiology: Muscle physiology and aspects of Skin Resistance.

UNIT II   RESPIRATORY SYSTEM AND URINARY SYSTEM   9
Respiratory System: Physiological aspects of respiratory system – Trachea and Lungs - Exchange of gases - Respiratory Mechanism. Types of respiration - Oxygen and carbon dioxide transport and acid base regulation.Urinary system: Structure of Kidney and Nephron - Mechanism of Urine formation – Urinary reflex – urethra - internal/external sphincters - Homeostasis and blood pressure regulation by urinary system – Storage and elimination.

UNIT III   BLOOD AND CARDIOVASCULAR SYSTEM   9
Blood composition - functions of blood – functions of RBC.WBC types and their functions Blood groups – importance of blood groups – identification of blood groups. Blood vessels – Electrical simulation – blood clotting - Wound healing - Anatomy of heart – Properties of Cardiac muscle – Conducting system of heart – Cardiac cycle – Heart sound- Volume and pressure changes and regulation of heart rate –Coronary Circulation. Factors regulating Blood flow – ECG – Einthoven's Triangle.

UNIT IV   SKELETAL AND SPECIAL SENSORY SYSTEM   9
Skeletal system: Bone types and functions – Axial Skeleton and Appendicular Skeleton. Joint - Types of Joint – Cartilage structure, types and functions. Special Sensory system- Optics of vision – receptor and neural function of the retina – photochemistry of vision – central neurophysiology of vison – EOG – Physiology of hearing mechanism – hearing loss – audiograms – hearing tests – taste and smell sensors.

UNIT V   NERVOUS SYSTEM   9
Structure of a Neuron – Neuroglial Cells - Synapses - Reflex actions of sympathetic and parasympathetic nervous system – Nerve conduction and action potentials - Brain – Electroencephalograph (EEG) - Divisions of brain lobes - Cross Sectional Anatomy of Brain - Cortical localizations and functions. Spinal cord – Tracts of spinal cord – Spinal Nerve - Reflex mechanism – Types of reflex. Autonomic nervous system and its functions. **Total : 45 Hours**

TEXT BOOKS:

1. Elaine.N. Marieb, "Essential of Human Anatomy and Physiology", Pearson Education New Delhi, 8th Edition, 2016.
2. Gillian Pocock, Christopher D. Richards, "The Human Body An introduction for Biomedical and Health Sciences", Oxford University Press, USA, 2013.

REFERENCE BOOKS:

1 William F. Ganong,"Review of Medical Physiology", Mc Graw Hill, New Delhi, 25th Edition, 2015.
2 Eldra Pearl Solomon. "Introduction to Human Anatomy and Physiology", W.B.Saunders Company, 2003.
3 Arthur C. Guyton, "Text book of Medical Physiology", Elsevier Saunders, 11th Edition, 2006.

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U19CS307	PROGRAMMING IN C	L T P C
		3 0 0 3

COURSE OUTCOMES

At the end of the course, the students will be able to
- Write simple C programs using console input and output functions
- Write C programs using arrays, decision making and looping statements
- Design and develop simple application using functions and pointers.
- Design and develop real-time applications using structures and unions
- Design and develop real-time applications using file operation

UNIT I   BASICS OF C PROGRAMMING   9

Introduction to programming paradigms - Structure of C program - C programming: Data Types – Storage classes - Constants – Enumeration Constants - Keywords – Operators: Precedence and Associativity - Expressions - Input/Output statements, Assignment statements – Decision making statements - Switch statement - Looping statements – Pre-processor directives - Compilation process

UNIT II   ARRAYS AND STRINGS   9

Introduction to Arrays: Declaration, Initialization – One dimensional array – Two dimensional arrays – multi-dimensional array- String – string built-in functions – Sorting- Searching

UNIT III   FUNCTIONS AND POINTERS   9

Introduction to functions: Function prototype, function definition, function call-Call by Value-Call by reference – Recursion – user defined functions versus built-in functions- Pointers – Pointer operators – Pointer arithmetic – Arrays and pointers – pointers to an array – function pointer-indirect pointer.

UNIT IV   STRUCTURES   9

Structure – Structure definition-Nested structures – Pointer and Structures – Array of structures – Self- referential structures – bit fields- Union-Dynamic memory allocation - Singly linked list – typedef.

UNIT V   FILE PROCESSING   9

Files – Types of file- File Primitives- File access mode- Sequential file access - Random file access - Command line arguments-introduction to TSR programs

TOTAL: 45 Hours

TEXT BOOK:
1. Ben Clemens "21st Century C ", Second Edition ,Oreilly Media Inc,2014
2. Deitel and Deitel, "C How to Program", Pearson Education, New Delhi, 2011.

REFERENCE BOOKS:
1. Kernighan,B.W and Ritchie,D.M, "The C Programming language", Second Edition, Pearson Education, 2006.
2. Yashavant P. Kanetkar. "Let Us C", BPB Publications, 14th edition, 2016.
3. Byron S Gottfried, "Programming with C", Schaum's Outlines, Second Edition, Tata McGraw-Hill, 2006.

4. Anita Goel and Ajay Mittal, "Computer Fundamentals and Programming in C", Dorling Kindersley (India) Pvt. Ltd., Pearson Education in South Asia, 2011.

5. E. Balagurusamy, "Programming in ANSI C", seventh edition, Tata McGraw Hill, 2016.

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U19GE303   **ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE   L T P C**
                                                                   2 0 0 0

COURSE OUTCOMES
At the end of the course, the students will be able to,
- Understand, connect and explain basics of Indian traditional knowledge in modern scientific perspective.
- Show an ability to comment critically on curriculum proposals that aim to promote science citizenship/scientific literacy
- Communicate using common medical and psychological terminology, including the skill to discuss commonly used medications, supplements, and surgical procedures
- Use effective oral and written language skills to communicate scientific data and ideas

UNIT I   INTRODUCTION TO VEDAS   **6**
- Traditional methodology of Veda – Sat Angas
- Types of Vedas and their application
- Sub Veda – Ayurveda - their modern-day application

UNIT II   BASICS OF APPLIED VEDIC SCIENCE   **6**
- Modern day application of Vedas and procedure
- Ancient Indian Scientific thoughts
- Introduction to the Vedic language "Sanskrit"

UNIT III   MODERN SCIENCE   **6**
- Introduction – modern science
- Objectives – modern science
- Architecture in ancient India

UNIT IV   TECHNOLOGY   **6**
- India's contribution to science and technology (from ancient to modern)
- Nobel laureates of Indian origin and their contribution
- India in space
- Latest achievement from Jan – 2017

UNIT V   YOGA AND HOLISTIC HEALTH CARE   **6**
- Fundamentals of yoga and holistic health
- Human biology
- Diet and nutrition
- Life management
- Contemporary yogic models – case study

                                                          TOTAL: 30 Hours

REFERENCE BOOKS
1. V. Sivaramakrishna (Ed.), Cultural Heritage of India-Course Material, Bharatiya Vidya Bhavan, Mumbai, 5th Edition, 2014
2. Swami Jitatmanand, Modern Physics and Vedant, Bharatiya Vidya Bhavan
3. RN Jha, Science of Consciousness Psychotherapy and Yoga Practices, Vidyanidhi
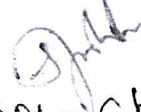

Prakasham, Delhi, 2016.

4. Roshan Dalal The Vedas: An Introduction to Hinduism's Sacred Texts, Penguin Books 2014. ISBN 13: 9780143066385

5. Raja Ram Mohan Roy, Vedic Physics, Mount Meru Publication ISBN : 9781988207049

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U19BM303   ELECTRONIC DEVICES AND CIRCUITS LABORATORY   L T P C
0 0 2 1

At the end of each experiment, the students will be able to -

1. Operate electronic test equipment and hardware tools to use and the same for conducting experiments
2. Plot the characteristics of given bipolar BJT, Diodes and special diodes to understand their behavior
3. Design, construct and test amplifier circuits and interpret the results

LIST OF EXPERIMENTS

1. V-I Characteristics of given Si and Ge Diodes
2. V-I Characteristics of Zener Diode and Prove that the output voltage gets regulated after the breakdown voltage for variable input voltage in the range of 0.5 V to 8 V of a given Zener Diode
3. Design Power Supply circuit using half wave and Full wave rectifier with simple capacitor filter.
4. Analyse Characteristics of the following Special Diodes
   i. Photo diode
   ii. Light emitting diode
5. Analyse the Input and Output Characteristics of BJT (NPN)
6. Analyse Frequency Response of BJT (CE) using Fixed Bias Amplifier Circuit
7. Analyse Frequency Response of BJT (CE) using Voltage Divider Bias (self-bias) with and without bypassed Emitter Resistor (CE)
8. Analyse the frequency response of the Common Collector BJT Amplifier.
9. Design a Differential amplifier using BJT and Measurement of CMRR.
10. Analyse the Input and Output Characteristics V-I Characteristics of FET.

TOTAL: 30 Hours

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Diploma

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U19BM304   ANATOMY AND HUMAN PHYSIOLOGY LABORATORY   L T P C

                                                                        0 0 2 1

COURSE OUTCOMES

At the end of each experiment, the students will be able to -
- Estimation and quantification of biomolecules.
- Separation of macromolecules.
- Interpreting the metabolic changes in pathological conditions.

LIST OF EXPERIMENTS

1. Preparation of serum and plasma from blood using Neubaur's Chamber.
2. Measure the amount of blood using blood glucose estimation.
3. Measure the level of creatinine in the blood to check kidney function.
4. Determination of urea in blood and urine by Urease method.
5. Estimation of cholesterol in serum.
6. Separation of proteins by SDS electrophoresis.
7. Separation of amino acids by thin layer chromatography.
8. Separation of DNA by agarose gel electrophoresis.
9. ESR, PCV, MCH, MCV, MCHC, total count of RBCs and hemoglobin estimation.
10. Differential count of different WBCs and blood group identification.
11. Measurement of pH of solutions using pH meter.
12. Ishihara chart for color blindness and Snellen"s chart for myopia and hyperopia - by letters reading and ophthalmoscope to view retina.
13. Determination of percentage Transmittance, Absorbance and concentration of given solution using spectrophotometer.

                                                           TOTAL : 30 Hours

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U19CS308   **C PROGRAMMING LABORATORY**   **L T P C**
                                                         0 0 2 1

COURSE OUTCOMES:
After successful completion of the course, the students would be able to
1. Design and develop simple programs using branching, looping statements
2. Develop programs using functions, arrays, structures and string handling
3. Write programs using pointers and dynamic memory allocation and file handling

LIST OF EXPERIMENTS:

1. Programs using Input, Output and assignment statements.
2. Programs using Branching statements
3. Programs using Looping statements
4. Programs using Functions
5. Programs using Arrays
6. Programs using Structures
7. Programs using Strings
8. Programs using Pointers (both data pointers and function pointers)
9. Programs using dynamic memory allocation
10. Programs using Recursion
11. Programs using Files

TOTAL : 30 Hours

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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

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

U19TAM301   TAMILS AND TECHNOLOGY   LT 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

Dr. M.RENUGA,
Professor & Head,
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nna College of Technology,
SALEM - 63

U19GE303   ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE   2 0 0 0

Course Outcomes

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

CO / PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
COs	Programme Outcomes (POs) and Programme Specific Outcome (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	P09	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	2	-	-	2	-	-	-	-	-	-	-	2
CO2	2	2	2	-	-	2	-	-	-	-	-	-	-	2
CO3	3	2	2	-	-	2	-	-	-	-	-	-	-	2
CO4	3	2	2	-	-	2	-	-	-	-	-	-	-	2
CO5	2	2	2	-	-	2	-	-	-	-	-	-	-	2

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

6

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

6

UNIT – III- Modern Science
- Introduction – modern science
- Objectives – modern science
- Architecture in ancient India

6

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

6

UNIT – V- Yoga and Holistic Health Care   6

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

Reference Books

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

Total: 30 hours

M. Raja
Course Coordinator / Sciences

Dr. C. Shanthi
HOD / Sciences

Dr. M. Renuga
Chairperson BOS,
Science and Humanities

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

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

Dr.S.Anita

Head/Training

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

S. No	Course Code	Course Title	Lecture	Tutorial	Practical	Credit	Total Contact Hours
Theory							
1	U19BM401	Analog and Digital Integrated Circuits	3	0	0	3	45
2	U19BM402	Biomedical Instrumentation	3	0	0	3	45
3	U19BM403	Control System for Biomedical Engineering	3	0	0	3	45
4	U19BM404	Biomaterials	3	0	0	3	45
5	U19CS406	Data Structures	3	0	0	3	45
6	U19GE402	Mandatory Course: Environment and Climate Science	2	0	0	0	30
Practical							
7	U19BM405	Analog and Digital Integrated Circuits Laboratory	0	0	2	1	30
8	U19BM406	Biomedical Instrumentation Laboratory	0	0	2	1	30
9	U19CS407	Data Structures Laboratory	0	0	2	1	30
10	U19GE401	Soft Skills and Aptitude-II	0	0	2	1	30
					Total Credits	19	375

Approved By

Chairperson, Biomedical Engineering BoS
Dr.S.Prabakar

Member Secretary, Academic Council
Dr.R.Shivakumar 5-1-24

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

Copy to:-

HOD/ Biomedical Engineering, Fourth Semester BE BME Students and Staff, COE

22.12.2023

Regulations-2019

U19BM401	ANALOG AND DIGITAL INTEGRATED CIRCUITS	L	T	P	C
		3	0	0	3

COURSE OUTCOMES

On successful completion of this course, the student will be able to

CO1	•	Outline the basics of linear and non-linear applications of operational amplifiers.
CO2	•	Design an active filter, ADC and DAC using Op-amp
CO3	•	Analyze the oscillator circuits, waveform generators, IC555 timers, and IC565 Phase-Locked Loops (PLL).
CO4	•	Design and implement the Combinational circuits.
CO5	•	Design the synchronous and asynchronous sequential circuits.

CO/PO, PSO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

CO's	Programme Outcomes (PO's) and Programme Specific Outcomes (PSO's)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	2	1	-	-	-	-	1	-	1	3	2	1
CO2	3	3	3	2	1	-	-	-	-	1	-	1	3	2	1
CO3	3	3	3	2	1	-	-	-	-	1	-	1	3	2	1
CO4	3	3	3	2	1	-	-	-	-	1	-	1	3	2	1
CO5	3	3	3	2	1	-	-	-	-	1	-	1	3	2	1

UNIT I	OPERATIONAL AMPLIFIER	9

Ideal and Practical Op-Amp, Op-Amp Characteristics, DC and AC Characteristics, Features of 741 Op-Amp, Pin details -Linear applications - Inverting, Non-Inverting, summing, subtracting, averaging, Differential, Instrumentation Amplifier, Differentiators and Integrators, Non-linear applications -Comparators, Schmitt Trigger.

UNIT II	ACTIVE FILTERS AND DATA CONVERTERS	9

Introduction to Active Filters, LPF, HPF, Band pass, Band reject, Basic DAC, Different types of DACs-Weighted resistor DAC, R-2R ladder DAC, Different Types of ADCs - Parallel Comparator Type ADC, Counter Type ADC, Successive Approximation ADC, Single and Dual Slope ADC.

UNIT III	OP-AMP, IC-555 & IC 565 APPLICATIONS	9

Oscillators - RC Phase shift and Wein-bridge. Waveform generators - Square, triangular and saw tooth, IC555 Timer - Functional Diagram, Monostable and Astable Operations, IC565 PLL - Block Schematic, Description of Individual Blocks and IC pins, Applications.

UNIT IV	DIGITAL INTEGRATED CIRCUITS	9
	Number Systems – Decimal, Binary, Octal, Hexadecimal, 1's and 2's complements, Codes – Binary, BCD, Gray, Alphanumeric codes, Boolean theorems, Various Logic Families, Logic gates, Universal gates, Sum of products and product of sums, Karnaugh map Minimization, Design of Half and Full Adders, Half and Full Subtractors, Binary Parallel Adder –Multiplexer, Demultiplexer, Decoder, Encoder, Priority Encoder.	

UNIT V	SEQUENTIAL LOGIC IC'S AND MEMORIES	9
	Flip flops – SR, JK, T, D, Master/Slave FF – operation and excitation tables, ICs details, Triggering of FF,– state minimization, state assignment, circuit implementation – Design of Counters- Ripple Counters, Ring Counters, Shift registers, Universal Shift Register.	

TOTAL : 45 Hours

TEXTBOOKS:

1.	M. Morris Mano and Michael D.Ciletti, "Digital Design", Pearson, 5th Edition, 2014.
2.	Ramakant A. Gayakwad, "OP - AMP and Linear IC's", Prentice Hall, 2012

REFERENCES:

1.	Taub and Schilling, "Digital Integrated Electronics", Mc Graw Hill, 2017.
2.	John.F.Wakerly, " Digital design principles and practices", Pearson Education, 5th Edition, 2018.
3.	Sergio Franco, "Design with operational amplifiers and analog integrated circuits", Mc Graw Hill Education, 3rd Edition, 2017.
4.	S Salivahanan and V S Kanchana Bhaaskaran, Linear Integrated Circuits, McGraw Hill Education, 3rd Edition, 2018.

COORDINATOR

K.MANIKANDAN

Asst. Prof /BME

CHAIRMAN

BoS-BME

Dr.S.PRABAKAR, M.E.,Ph.D.,
Professor and Head
Department of Biomedical Engineering
Sona College of Technology, Salem-5

U19BM402	BIOMEDICAL INSTRUMENTATION	L	T	P	C
		3	0	0	3

COURSE OUTCOMES

On successful completion of this course, the student will be able to

CO1	•	Understand the various aspects of bio potential recording systems for human anatomy.
CO2	•	Infer the various measurement methods and translate flow of blood as metrics.
CO3	•	Outline the objectives and working principles of various radiological and ultrasound equipment.
CO4	•	Design the bio amplifiers for physiological recordings.
CO5	•	Explain the fundamentals of signal generators and analyzers.

CO/PO, PSO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

CO's	Programme Outcomes (PO's) and Programme Specific Outcomes (PSO's)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	2	1	2	-	-	-	1	-	2	3	3	2
CO2	3	3	2	2	-	2	-	-	-	1	-	2	3	3	2
CO3	3	3	2	2	-	2	-	-	-	1	-	2	3	3	2
CO4	3	3	2	2	1	2	-	-	-	1	-	2	3	3	2
CO5	3	3	2	2	1	2	-	-	-	1	-	2	3	3	2

UNIT I	BASICS OF BIOPOTENTIALS	9

Origin of Bio-potentials- Electro-Physiology, Bio-potential Electrodes-Bio-Potential Recording, Biological Amplifiers –ECG-EEG-EMG-PCG-EOG-Lead systems and recording methods-Typical waveforms and signal characteristics.

UNIT II	HAEMOTOLOGICAL INSTRUMENTS AND ANALYSIS TECHNIQUE	9

Step Measurement of blood flow-radiographic indicator dye dilution-Thermal convection-Magnetic blood flow rate-Ultrasonic blood flow meter-Sphygmomanometer-Blood gas analyzer-Oximeter-Auto analyzer-Electrophoresis-Colorimeter-Spectrophotometer-Flame photometer.

UNIT III	MEDICAL IMAGING TECHNIQUES	9

Introduction to medical imaging - X-Ray, Computer Tomography (CT),Magnetic Resonance imaging (MRI),Positron Emission Tomography (PET),SPECT, Mammography-Physics of ultrasound imaging- Modes of Scan-Advantages and Disadvantages of ultrasound Scanning-Thermography.

UNIT IV	SIGNAL CONDITIONING CIRCUITS	9
Need for bio-amplifier - single ended bio-amplifier, differential bio-amplifier, Impedance matching circuit, Isolation amplifiers – Transformer and optical isolation - Isolated DC amplifier and AC carrier amplifier., Power line interference, Right leg driven ECG amplifier, Band pass filter circuits.		

UNIT V	SIGNAL GENERATORS AND ANALYZERS	9
Sine wave generator-Frequency synthesized sine wave generator-sweep frequency generator-Pulse and Square wave generator-Functional Generator-Wave Analyzer-Applications-Harmonic distortion analyzer-Spectrum analyzer-Applications.		

TOTAL : 45 Hours

TEXTBOOKS:

	1.	Leslie Cromwell, "Biomedical Instrumentation and Measurements", Pearson India, 2015.
	2.	Albert D. Helfrick and William David Cooper, "Modern Electronic Instrumentation and Measurement Techniques", Pearson Education India; 1st edition, January 2015.

REFERENCES:

	1.	R S Khandpur, "Handbook of Biomedical Instrumentation", McGraw Hill Education; Third edition, 2015.
	2.	Ananda Natarajan R, "Biomedical Instrumentation and Measurements", Prentice Hall of India, New Delhi, 2015.
	3.	Oliver B.M and Cage J.M, "Electronic Measurements and Instrumentation", McGraw Hill, revised edition 2017.
	4.	Joseph J Carr, "Elements of Electronic Instrumentation and Measurement", Pearson Education India, 3rd edition, 2015.
	5.	R S Khandpur, "Handbook of Biomedical Instrumentation", McGraw Hill Education; Third edition, 2015.

COORDINATOR

K.MANIKANDAN

Asst. Prof /BME

CHAIRMAN

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U19BM403	CONTROL SYSTEMS FOR BIOMEDICAL ENGINEERING	L	T	P	C
		3	0	0	3

COURSE OUTCOMES

On successful completion of this course, the student will be able to

CO1	•	Interpret the need for mathematical modeling of various systems, representation of systems in block diagrams and signal flow graphs and are introduced to biological control systems
CO2	•	Determine the time response of various systems and discuss the concept of system stability
CO3	•	Examine the frequency response characteristics of various systems using different charts
CO4	•	Understand the concept of modeling basic physiological systems
CO5	•	Design the time and frequency response analysis of physiological control systems.

CO/PO, PSO Mapping

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

CO's	Programme Outcomes (PO's) and Programme Specific Outcomes (PSO's)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	1	-	-	-	-	-	-	-	2	2	2	-
CO2	3	3	2	2	-	-	-	-	-	-	-	1	2	2	-
CO3	3	3	2	2	-	-	-	-	-	-	-	1	2	2	-
CO4	3	3	2	2	2	-	-	-	-	-	-	2	2	2	-
CO5	3	3	3	2	2	-	-	-	-	-	-	2	2	2	-

UNIT I	INTRODUCTION	9

Open and Closed loop Systems, Modeling and Block Diagrams, Block diagram and signal flow graph representation of systems, reduction of block diagram and signal flow graph, Introduction to Physiological control systems- Illustration, Linear models of physiological systems, Difference between engineering and physiological control system.

UNIT II	TIME RESPONSE ANALYSIS	9

Step and impulse responses of first order and second order systems, time domain specifications of first and second order systems, steady state error constants, Definition of stability, Routh- Hurwitz criteria of stability, root locus technique, construction of root locus and study of stability.

UNIT III	FREQUENCY RESPONSE ANALYSIS	9

Frequency domain specifications - Polar plots, Bode plots, Nyquist stability criterion, Constant M and N circles.

UNIT IV	BIOLOGICAL SYSTEM MODELS	9
Distributed parameter versus lumped parameter models, Model development of Cardiovascular system- Heart model-circulatory model, Pulmonary mechanics- Lung tissue viscoelastance-chest wall- airways, Interaction of Pulmonary and Cardiovascular models, Static analysis of physiological systems – Regulation of cardiac output, Regulation of ventilation.		

UNIT V	BIOLOGICAL CONTROL SYSTEM ANALYSIS	9
Simple models of muscle stretch reflex action, Study of steady state analysis of muscle stretch reflex action, Study of transient response analysis of neuromuscular reflex model action, Study of frequency response of circulatory control model, Stability analysis of Pupillary light reflex.		

TOTAL : 45 Hours

TEXTBOOKS:

1.	I.J. Nagarath and M. Gopal, Control Systems Engineering, 5th Edition, Anshan Publishers, 2009.	
2.	Michael C K Khoo, Physiological Control Systems,WILEY- IEEE Press, Prentice Hall of India, 2018.	

REFERENCES:

1.	Benjamin C. Kuo, Automatic Control Systems, Prentice Hall of India, 2014.
2.	John Enderle Susan Blanchard and Joseph Bronzino, Introduction to Biomedical Engineering, 2nd Edition, Academic Press, 2005.
3.	Ogata, Katsuhiko and Yanjuan Yang, Modern control engineering, Vol 4, Prentice-Hall, 2010.
4.	Bhattacharya and Sriman Kumar, Control systems engineering, Pearson Education India, 2nd Edition, 2012.
5.	Richard C. Dorf and Robert H. Bishop, Modern control systems, Pearson, 2004.

COORDINATOR

K.MANIKANDAN

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Sona College of Technology, Salem-5

22.12.2023

Regulation - 2019

U19BM404	BIOMATERIALS	L	T	P	C
		3	0	0	3

COURSE OUTCOMES

On successful completion of this course, the student will be able to

CO1	•	Describe the basic properties of Biomaterials.
CO2	•	Explain the interaction between Metallic Implant materials and host tissues
CO3	•	Analyze the polymeric implant materials and Composite implant materials.
CO4	•	Summarize the basic characteristics of Ceramic Implant Materials.
CO5	•	Apply ethical principles in the selection and development of biomaterials

CO/PO, PSO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

CO's	Programme Outcomes (PO's) and Programme Specific Outcomes (PSO's)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1	-	-	2	-	-	-	1	-	2	2	2	1
CO2	3	2	1	-	-	2	-	-	-	1	-	2	2	2	1
CO3	3	2	1	-	-	2	-	-	-	1	-	2	2	2	1
CO4	3	2	1	-	-	2	-	-	-	1	-	2	2	2	1
CO5	3	2	1	-	-	2	-	2	-	1	-	2	2	2	1

UNIT I	PROPERTIES OF BIOMATERIALS	9

Definition of biomaterials- requirements & classification of biomaterials- Comparison of properties of some common biomaterials. Effects of physiological fluid on the properties of biomaterials. Biological responses (extra and intra-vascular system). Surface properties of materials- physical properties of materials- mechanical properties.

UNIT II	METALLIC IMPLANT MATERIALS	9

Stainless steel- Cobalt based alloys- Ti and Ti-based alloys. Importance of stress-corrosion cracking. Host tissue reaction with bio metal- corrosion behaviour and the importance of passive films for tissue adhesion. Hard tissue replacement implant: Orthopedic implants- Dental implants. Soft tissue replacement implants: Percutaneous and skin implants- Vascular implants- Heart valve implants- Tailor made composite in medium.

UNIT III	POLYMERIC IMPLANT MATERIALS	9

Polyolefin's- polyamides- acrylic polymers- fluorocarbon polymers- silicon rubbers- acetyls. (Classification according to thermo sets- thermoplastics and elastomers).Viscoelastic behavior: creep-recovery- stress-relaxation- strain rate sensitivity. Importance of molecular structure- hydrophilic and hydrophobic surface properties- migration of additives (processing aids)- aging and environmental stress cracking. Physiochemical characteristics of biopolymers. Biodegradable polymers for medical purposes- Biopolymers in controlled release systems. Synthetic polymeric membranes and their biological applications.

UNIT IV	CERAMIC IMPLANT MATERIAL	9

Definition of bio ceramics. Common types of bio ceramics Aluminum oxides- Glass ceramics- Carbons. Bio resorbable and bioactive ceramics. Importance of wear resistance and low fracture toughness. Host tissue reactions: importance of interfacial tissue reaction (ceramic/bone tissue reaction). Composite implant materials - Mechanics of improvement of properties by incorporating different elements. Composite theory of fiber reinforcement (short and long fibers- fibers pull out). Polymers filled with osteogenic fillers (hydroxyapatite). Host tissue reactions.

UNIT V	BIOCOMPATIBILITY AND TOXICOLOGICAL SCREENING OF BIOMATERIALS	9

Definition of biocompatibility, blood compatibility and tissue compatibility. Toxicity tests: acute and chronic toxicity studies (in situ implantation, tissue culture, haemolysis, thrombogenic potential test, systemic toxicity, intra cutaneous irritation test), sensitization, carcinogenicity, mutagenicity and special tests.

TOTAL : 45 Hours

TEXTBOOKS:

1.	Biomaterials- Basic Theory with Engineering Applications C.Mauli Agarwal, Joo L.Ong, Mark R. Appleford, Gopinath Mani. Cambrige University Press, New York-2016.

REFERENCES:

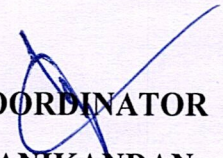| 1.	Biomaterials Science: An Introduction to Materials in Medicine- By Buddy D. Ratner, et. al. Academic Press, San Diego, 2015.
2.	Sujata V. Bhat, Biomaterials, Narosa Publishing House, 2014.

COORDINATOR

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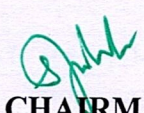
Asst. Prof /BME

CHAIRMAN

BoS-BME

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U19CS406	DATA STRUCTURES	L	T	P	C
		3	0	0	3

COURSE OUTCOMES

On successful completion of this course, the student will be able to

CO1	•	Implement abstract data types for linear data structures
CO2	•	Solve real world problems using stack and queue linear data structures
CO3	•	Apply various non-linear tree data structures in real time applications
CO4	•	Design algorithms to solve common graph problems
CO5	•	Analyze various searching, sorting and hashing techniques

CO/PO, PSO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

CO's	Programme Outcomes (PO's) and Programme Specific Outcomes (PSO's)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	3	2	1	1	2	1	1	1	3	3	3
CO2	3	3	3	3	3	2	1	1	2	1	1	1	3	3	3
CO3	3	3	3	3	3	2	1	1	2	1	1	1	3	3	3
CO4	3	3	3	3	3	2	1	1	2	1	1	1	3	3	3
CO5	3	3	3	3	3	2	1	1	2	1	1	1	3	3	3

UNIT I	LINEAR DATA STRUCTURES – LIST	9

Abstract Data Types (ADTs) – List ADT – Array-based implementation – Linked list implementation - Singly linked lists - Circularly linked lists - Doubly-linked lists – Applications of lists

UNIT II	LINEAR DATA STRUCTURES – STACKS, QUEUES	9

Stack ADT – Operations– Evaluating arithmetic expressions - Conversion of Infix to postfix expression – Queue ADT – Operations – Circular Queue – Double ended queue – Applications of Stacks and queues.

UNIT III	NON LINEAR DATA STRUCTURES – TREES	9

Trees – Traversals – Binary Trees – Expression trees – Applications of trees – Binary search trees - AVL Trees – B-Tree – Heap – Applications of heap -Tries.

UNIT IV	NON LINEAR DATA STRUCTURES – GRAPHS	9
Graphs - Representation of graph – Graph traversals – Breadth-first traversal – Depth-first traversal – Minimum Spanning Trees: Prim's algorithm, Kruskal's algorithm – Shortest path algorithms: Dijkstra's algorithm- Applications of Graphs: Topological Sort.	

UNIT V	SEARCHING, SORTING AND HASHING TECHNIQUES	9
Searching - Linear Search – Binary Search, Sorting – Bubble sort– Insertion sort – Merge sort, Hashing - Hash Functions – Separate Chaining – Open Addressing – Rehashing – Extendible Hashing.	

TOTAL : 45 Hours

TEXTBOOKS:

1.	Mark Allen Weiss, "Data structures and Algorithm Analysis in C", Pearson Education, New Delhi, Second Edition, 2012.

REFERENCES:

1.	Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest , Clifford Stein, "Introduction to Algorithms" ,3rd Edition, MIT Press, 2010.
2.	Jean Paul Tremblay and Sorenson, "An Introduction to Data Structures with Applications", McGraw Hill Publishing Company, New Delhi, Second Edition, 2007.
3.	Yedidyah Langsam, Moshe J Augenstein and Aaron M Tanenbaum, "Data Structures using C and C++", Prentice Hall of India/ Pearson Education, New Delhi, 2006.
4.	Ellis Horowitz, SartajSahni, Susan Anderson-Freed, "Fundamentals of Data Structures in C", Silicon Press, New Jersey, Second Edition, 2005

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Sona College of Technology, Salem-5

U19BM405	ANALOG AND DIGITAL INTEGRATED CIRCUITS LABORATORY	L	T	P	C
		0	0	2	1

COURSE OUTCOMES

On successful completion of this course, the student will be able to

CO1	•	Perform mathematical operations and generate different types of waveforms using Op-amp.
CO2	•	Design the various linear applications utilizing operational amplifiers.
CO3	•	Design and implement combinational and sequential circuits using logic gates.

CO/PO, PSO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

CO's	Programme Outcomes (PO's) and Programme Specific Outcomes (PSO's)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	2	-	-	-	3	1	-	1	3	3	1
CO2	3	3	3	3	2	-	-	-	3	1	-	1	3	3	1
CO3	3	3	3	3	2	-	-	-	3	1	-	1	3	3	1

List of Experiments:

1. Design of Inverting and Non-Inverting amplifier using Opamp (IC 741)
2. Design of Integrator and Differentiator using Opamp (IC 741)
3. Design of Differential amplifier to find CMRR using Opamp (IC 741).
4. Design of Astable and Monostable multivibrator using Opamp (IC 741)
5. Design of Schmitt trigger using Opamp (IC 741)
6. Design and implementation of
   (a) Half Adder and Full Adder, Half Subtractor and Full Subtractor
   (b) 4-bit Parallel Adder cum Subtractor
   (c) Magnitude Comparator
7. Design and implementation of
   (a) Code Converters – Binary to Gray and Gray to Binary
   (b) BCD to Excess 3 and Excess 3 to BCD
8. Design and implementation of
   (a) Multiplexer and Demultiplexer (b) Decoder (c) Encoder (d) Parity Generator and Checker
9. Design and implementation of
   (a) Asynchronous Counter (b) Synchronous Counter
10. Design and implementation of
    (a) Shift Registers – SISO, SIPO and PIPO

TOTAL : 30 Hours

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22.12.2023

Regulation - 2019

U19BM406	BIOMEDICAL INSTRUMENTATION LABORATORY	L	T	P	C
		0	0	2	1

COURSE OUTCOMES

On successful completion of this course, the student will be able to

CO1	•	Measure and analyze the various Bio signals.
CO2	•	Measure various non-electrical parameters using suitable sensors/transducers
CO3	•	Design instrumentation amplifier and filters using simulation tools.

CO/PO, PSO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

CO's	Programme Outcomes (PO's) and Programme Specific Outcomes (PSO's)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	2	2	2	-	-	-	1	2	2	3	3	3
CO2	3	3	3	2	2	2	-	-	-	1	2	2	3	3	3
CO3	3	3	3	2	2	2	-	-	-	1	2	2	3	3	3

List of Experiments:

1. Measure the electrical activity of heart using ECG.
2. Measure the electrical activity of muscles using EMG.
3. Measure the electrical pattern of brains Using EEG.
4. Measure the velocity of blood flow using Blood flow measurement system using ultra sound transducer.
5. Measure the respiration rate using accessories.
6. Measure the rate/rhythm in heart beat using pacemakers.
7. Measure of hearing loss by air conduction and bone conduction using Audiometer.
8. Measure of blood pressure using sphygmomanometer and stethoscope.
9. Conduct Weber and Rinne test for auditory conduction.
10. Design instrumentation amplifier circuit and filter circuits using TINA simulation software.

TOTAL : 30 Hours

COORDINATOR   CHAIRMAN

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                                               Sona College of Technology, Salem-5

22.12.2023   Regulation - 2019

U19CS407	DATA STRUCTURES LABORATORY	L	T	P	C
		0	0	2	1

COURSE OUTCOMES

On successful completion of this course, the student will be able to

CO1	•	Design and develop simple programs using data structures
CO2	•	Apply non-linear data structures for various real time applications
CO3	•	Design shortest path algorithm for various real life applications

CO/PO, PSO Mapping

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

CO's	Programme Outcomes (PO's) and Programme Specific Outcomes (PSO's)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	3	3	2	2	1	2	1	2	3	3	2
CO2	3	3	3	3	3	3	2	2	1	2	1	2	3	3	2
CO3	3	3	3	3	3	3	2	2	2	2	2	2	3	3	2

List of Experiments:

1. Implementation of Lists, Stacks and Queues
2. Implementation of Binary Tree and Traversal Techniques
3. Implementation of Binary Search Trees
4. Implementation of AVL Trees
5. Implementation of B-trees
6. Implementation of graphs using BFS and DFS.
7. Implementation of Prim's algorithm.
8. Implementation of Kruskal's algorithm
9. Implementation of Dijkstra's algorithm
10. Implementation of Hashing and Collision Resolution Technique.
11. Implementation of Heap
12. Implement of Sorting and searching Techniques

TOTAL : 30 Hours

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22.12.2023

Regulation - 2019

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.

22/12/2023

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22/12/23

Dr. M.RENUGA,
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Sona College of Technology,
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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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Professor and Head
Department of Training