SONA COLLEGE OF TECHNOLOGY, SALEM-5

(An Autonomous Institution)

B.E- Civil 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: Civil Engineering

S.No	Course Code	Course Title	L	T	P	C	Category	Total Contact Hours
Theory								
1	U19ENG101A	English for Engineers - I	2	0	2	3	HS	60
2	U19MAT102A	Linear Algebra and Calculus	3	1	0	4	BS	60
3	U19PHY103A	Physics for Civil Engineering	3	1	0	4	BS	60
4	U19CHE104A	Chemistry for Civil Engineering	3	1	0	4	BS	60
5	U19EGR106	Engineering Graphics	2	0	2	3	ES	60 (30L+30P)
Practical								
7	U19PCL108A	Physics and Chemistry Laboratory-I	0	0	3	1.5	BS	45
8	U19WPL112	Workshop Practice	0	0	2	1	ES	30
9	U19GE101	Basic Aptitude-I	0	0	2	0	EEC	30
					Total Credits	**20.5**		
Optional Language Elective*								
11	U19OLE1101	French	0	0	2	1	HS	30
12	U19OLE1102	German						30
13	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, Civil Engineering BoS**	**Member Secretary, Academic Council**	**Chairperson, Academic Council & Principal**
Dr. M. Renuga	**Dr. R. Malathy**	**Dr. R. Shivakumar**	**Dr. S. R. R. Senthil Kumar**

Copy to:-HOD/Civil, First Semester BE Civil 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: Civil Engineering

S.N	Course Code	Course Title	L	T	P	C	Category	Total Contact Hours
	Theory							
1	U19TAM201	தமிழர் மரபு / Heritage of Tamils	1	0	0	1	HSMC	15
2	U19ENG201A	English for Engineers-II	2	0	2	3	HSMC	60 (30L+30P)
3	U19MAT202A	Differential Equations and Vector Calculus	3	1	0	4	BSC	60
4	U19PPR205	Problem Solving Using Python Programming	3	0	0	3	ESC	45
5	U19BEE206	Basics of Electrical and Electronics Engineering	3	0	0	3	ESC	45
6	U19CE201	Basics of Engineering Mechanics	3	1	0	4	ESC	60
	Practical							
7	U19BEE207	Basics of Electrical Engineering Laboratory	0	0	2	1	ESC	30
8	U19PCL208A	Physics and Chemistry Laboratory-II	0	0	3	1.5	BSC	45
9	U19PPL211	Python Programming Laboratory	0	0	2	1	ESC	30
10	U19GE201	Basic Aptitude-II	0	0	2	0	EEC	30
					Total Credits	**21.5**		
	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)

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BE-Civil
III

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

S. No	Course Code	Course Title	Lecture	Tutorial	Practical	Credit	Total Contact Hours
Theory							
1	U19MAT301A	Fourier Analysis and Statistics	3	1	0	4	60
2	U19CE301	Mechanics of Fluids	2	1	0	3	45
3	U19CE302	Strength of Materials -I	2	1	0	3	45
4	U19CE303	Construction Materials and Practices	3	0	0	3	45
5	U19CE304	Surveying	3	0	0	3	45
6	U19TAM301	தமிழரும் தொழில்நுட்பமும் / Tamils and Technology	1	0	0	1	15
7	U19GE302	**Mandatory Courses :** Environment and Climate Science	2	0	0	0	30
Practical							
8	U19CE305	Materials Testing Laboratory	0	0	2	1	30
9	U19CE306	Survey Laboratory	0	0	2	1	30
10	U19ENG301	Communication Skills Laboratory	0	0	2	1	30
11	U19GE301	Soft Skills and Aptitude-I	0	0	2	1	30
					Total Credits	**20**	**405**

ApprovedBy

Chairperson, Civil Engineering BoS
Dr.R.Malathy

Member Secretary, Academic Council
Dr.R.Shivakumar

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

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HOD/Civil Engineering,Third Semester BE Civil Students and Staff, COE

Civil
IV

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

S. No	Course Code	Course Title	Lecture	Tutorial	Practical	Credit	Total Contact Hours
Theory							
1	U19CE401	Environmental Engineering	3	0	0	3	45
2	U19CE402	Strength of Materials-II	2	1	0	3	45
3	U19CE403	Transportation Engineering	3	0	0	3	45
4	U19CE404	Concrete Technology	3	0	0	3	45
5	U19CE903	**Professional Elective -** Elements of Building Planning	3	0	0	3	45
	U19CE904	**Professional Elective -** Energy Efficiency and Green Building					
6	U19GE403	Mandatory Courses - Essence of Indian Traditional Knowledge	2	0	0	0	30
Practical							
7	U19CE405	Fluid Mechanics Laboratory	0	0	2	1	30
8	U19CE406	Concrete and Highway Laboratory	0	0	2	1	30
9	U19CE407	Environmental Engineering Laboratory	0	0	2	1	30
10	U19GE401	Soft Skills and Aptitude-II	0	0	2	1	30
					Total Credits	**19**	**375**

ApprovedBy

Chairperson, Civil Engineering BoS
Dr.R.Malathy

Member Secretary, Academic Council
Dr.R.Shivakumar
9.1.24

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

Copy to:-
HOD / Civil Engineering, Fourth Semester BE Civil Students and Staff, CO

SONA COLLEGE OF TECHNOLOGY (Autonomous), SALEM-636 005.
DEPARTMENT OF CIVIL ENGINEERING
CURRICULUM - R2019
LIST OF ELECTIVE COURSE

PROFESSIONAL ELECTIVE-I (Semester – 4)						
S.No	**COURSE CODE**	**COURSE TITLE**	**L**	**T**	**P**	**C**
1.	U19CE901	Application of IoT for Civil Engineering	3	0	0	3
2.	U19CE902	Advanced Surveying	3	0	0	3
3.	U19CE903	Elements of Building Planning	3	0	0	3
4.	U19CE904	Energy Efficiency and Green Building	3	0	0	3

PROFESSIONAL ELECTIVE-II & III (Semester – 5)						
S.No	**COURSE CODE**	**COURSE TITLE**	**L**	**T**	**P**	**C**
1.	U19CE905	Remote Sensing and GIS	3	0	0	3
2.	U19CE906	Housing Planning and Management	3	0	0	3
3.	U19CE907	Architecture and Town Planning	3	0	0	3
4.	U19CE908	Building Services and Safety Regulations	3	0	0	3
5.	U19CE909	Construction Practices and Equipments	3	0	0	3
6.	U19CE910	Municipal Solid Waste Management	3	0	0	3
7.	U19CE911	Railway, Airport and Harbour Engineering	3	0	0	3
8.	U19CE912	Air Pollution Management	3	0	0	3

PROFESSIONAL ELECTIVE-IV & V (Semester – 6)						
S.No	**COURSE CODE**	**COURSE TITLE**	**L**	**T**	**P**	**C**
1.	U19CE913	Smart Structures and Smart Materials	3	0	0	3
2.	U19CE914	Design of RC Structures	3	0	0	3
3.	U19CE915	Industrial Waste Water Engineering	3	0	0	3
4.	U19CE916	Repair and Rehabilitation of Structures	3	0	0	3
5.	U19CE917	Prefabricated Structures	3	0	0	3
6.	U19CE918	Ground Improvement Techniques	3	0	0	3
7.	U19CE919	Pavement Engineering	3	0	0	3
8.	U19CE920	Traffic Engineering and Management	3	0	0	3

PROFESSIONAL ELECTIVE-VI & VII (Semester – 7)						
S.No	**COURSE CODE**	**COURSE TITLE**	**L**	**T**	**P**	**C**
1.	U19CE921	Advanced Design of Steel Structures	3	0	0	3
2.	U19CE922	Bridge Engineering	3	0	0	3
3.	U19CE923	Groundwater Hydrology	3	0	0	3
4.	U19CE924	Prestressed Concrete Structures	3	0	0	3
5.	U19CE925	Disaster Management	3	0	0	3
6.	U19CE926	Contracts Laws and regulations	3	0	0	3
7.	U19CE927	Environmental Impact Assessment	3	0	0	3
8.	U19CE928	Structural health Monitoring	3	0	0	3
9.	U19CE929	Project Management for Engineers	3	0	0	3
10.	U19CE930	Formwork Engineering	3	0	0	3
11.	U19CE931	Building Information & Modeling	3	0	0	3

SONA COLLEGE OF TECHNOLOGY, SALEM-5

DEPARTMENT OF CIVIL ENGINEERING

LIST OF PROFESSIONAL ELECTIVES FOR HONORS DEGREE **Date: 11.05.2023**

S.No	Vertical 1: ADVANCED SURVEYING	Vertical 2: CONSTRUCTION ENGINEERING AND MANAGEMENT	Vertical 3: ENVIRONMENTAL ENGINEERING	Vertical 4: ENERGY EFFICIENCY AND GREEN BUILDING	Vertical 5: STRUCTURAL ENGINEERING
1.	BASICS OF REMOTE SENSING, GIS, GNSS AND ITS APPLICATIONS *	SCHEDULING METHODS IN CONSTRUCTION	INTEGRATED WATER RESOURCES MANAGEMENT	ENERGY EFFICIENCY ACOUSTICS AND DAYLIGHT IN BUILDING*	BRIDGE ENGINEERING *
2.	DIGITAL LAND SURVEYING AND MAPPING *	MATERIALS MANAGEMENT	APPLIED ENVIRONMENTAL MICROBIOLOGY*	ENERGY RESOURCES, ECONOMICS AND ENVIRONMENT*	STRUCTURAL HEALTH MONITORING
3.	GEOINFORMATICS SYSTEM	RESOURCE MANAGEMENT IN CONSTRUCTION	PLASTIC AND ELECTRONIC DEBRIS MANAGMENT	GREEN BUILDING RATING SYSTEMS	FORMWORK ENGINEERING
4.	DRONE SURVEYING	CONSTRUCTION PROJECT MANAGEMENT	ENVIRONMENTAL MODELLING	ENVIRONMENTAL IMPACT ASSESSMENT	BRICK MASONRY STRUCTURES
5.	ELECTRONIC DISTANCE MEASUREMENT FOR SURVEYING	CONSTRUCTION PERSONNEL MANAGEMENT	NANOTECHNOLOGY FOR ENVIRONMENTAL ENGINEERING	GREEN MATERIALS AND GREEN PRODUCTS	TALL BUILDING STRUCTURES
6.	INTRODUCTION TO QUADCOPTERS	INDUSTRIAL SAFETY ENGINEERING *	GEOENVIRONMENTAL ENGINEERING	ENERGY AND WATER EFFICIENCY IN BUILDINGS	STRUCTURAL DYNAMICS *
7.	ADVANCED REMOTE SENSING	FORMWORK ENGINEERING	ENVIRONMENTAL RESTORATION OF POLLUTED SITES*	GREEN BUILDING AND SUSTAINABLE MATERIALS	EXPERIMENTAL STRESS ANALYSIS
8.	TACHOMETRIC AND MODERN SURVEYING	PROJECT MANAGEMENT FOR MANAGERS *	ENVIRONMENTAL LEGISLATION	GREEN TECHNOLOGIES	MECHANICS OF COMPOSITE MATERIALS
9.	_	VALUATION FOR ENGINEERS	_	_	_

*In each vertical, maximum of two NPTEL courses were identified

SONA COLLEGE OF TECHNOLOGY, SALEM-5

Department of Civil Engineering

Honours Verticals & Courses

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

Vertical 1: ADVANCED SURVEYING

S.No	Course Code	Course Name	L	T	P	C
1	NPTEL	BASICS OF REMOTE SENSING, GIS, GNSS AND ITS APPLICATIONS *				
2	NPTEL	DIGITAL LAND SURVEYING AND MAPPING *				
3	U19CE2001	GEOINFORMATICS SYSTEM	3	0	0	3
4	U19CE2002	DRONE SURVEYING	3	0	0	3
5	U19CE2003	ELECTRONIC DISTANCE MEASUREMENT FOR SURVEYING	3	0	0	3
6	U19CE2004	INTRODUCTION TO QUADCOPTERS	3	0	0	3
7	U19CE2005	ADVANCED REMOTE SENSING	3	0	0	3
8	U19CE2006	TACHOMETRIC AND MODERN SURVEYING	3	0	0	3

Vertical 2: CONSTRUCTION ENGINEERING AND MANAGEMENT

S.No	Course Code	Course Name	L	T	P	C
1	U19CE2007	SCHEDULING METHODS IN CONSTRUCTION	3	0	0	3
2	U19CE2008	MATERIALS MANAGEMENT	3	0	0	3
3	U19CE2009	RESOURCE MANAGEMENT IN CONSTRUCTION	3	0	0	3
4	U19CE2010	CONSTRUCTION PROJECT MANAGEMENT	3	0	0	3
5	U19CE2011	CONSTRUCTION PERSONNEL MANAGEMENT	3	0	0	3
6	NPTEL	INDUSTRIAL SAFETY ENGINEERING *				
7	U19CE930	FORMWORK ENGINEERING	3	0	0	3
8	NPTEL	PROJECT MANAGEMENT FOR MANAGERS *				
9	U19CE2012	VALUATION FOR ENGINEERS	3	0	0	3

Vertical 3: ENVIRONMENTAL ENGINEERING

S.No	Course Code	Course Name	L	T	P	C
1	U19CE2013	INTEGRATED WATER RESOURCES MANAGEMENT	3	0	0	3
2	NPTEL	APPLIED ENVIRONMENTAL MICROBIOLOGY*				
3	U19CE2014	PLASTIC AND ELECTRONIC DEBRIS MANAGMENT	3	0	0	3
4	U19CE2015	ENVIRONMENTAL MODELLING	3	0	0	3
5	U19CE2016	NANOTECHNOLOGY FOR ENVIRONMENTAL ENGINEERING	3	0	0	3
6	U19CE2017	GEOENVIRONMENTAL ENGINEERING	3	0	0	3

7	NPTEL	ENVIRONMENTAL RESTORATION OF POLLUTED SITES*				
8	U19CE2018	ENVIRONMENTAL LEGISLATION	3	0	0	3

Vertical 4: ENERGY EFFICIENCY AND GREEN BUILDING

S.No	Course Code	Course Name	L	T	P	C
1	NPTEL	ENERGY EFFICIENCY ACOUSTICS AND DAYLIGHT IN BUILDING*				
2	NPTEL	ENERGY RESOURCES, ECONOMICS AND ENVIRONMENT*				
3	U19CE2019	GREEN BUILDING RATING SYSTEMS	3	0	0	3
4	U19CE927	ENVIRONMENTAL IMPACT ASSESSMENT	3	0	0	3
5	U19CE2020	GREEN MATERIALS AND GREEN PRODUCTS	3	0	0	3
6	U19CE2021	ENERGY AND WATER EFFICIENCY IN BUILDINGS	3	0	0	3
7	U19CE2022	GREEN BUILDING AND SUSTAINABLE MATERIALS	3	0	0	3
8	U19CE2023	GREEN TECHNOLOGIES	3	0	0	3

Vertical 5: STRUCTURAL ENGINEERING

S.No	Course Code	Course Name	L	T	P	C
1	NPTEL	BRIDGE ENGINEERING *				
2	U19CE928	STRUCTURAL HEALTH MONITORING	3	0	0	3
3	U19CE930	FORMWORK ENGINEERING	3	0	0	3
4	U19CE2024	BRICK MASONRY STRUCTURES	3	0	0	3
5	U19CE2025	TALL BUILDING STRUCTURES	3	0	0	3
6	NPTEL	STRUCTURAL DYNAMICS *				
7	U19CE2026	EXPERIMENTAL STRESS ANALYSIS	3	0	0	3
8	U19CE2027	MECHANICS OF COMPOSITE MATERIALS	3	0	0	3

*** These Courses are available in NPTEL**

SONA COLLEGE OF TECHNOLOGY, SALEM-5

Department of Civil Engineering

Minor Degree - Verticals & Courses

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

MINOR VERTICAL: ENERGY EFFICIENCY AND GREEN BUILDING

S.No	Course Code	Course Name	L	T	P	C
1	NPTEL	ENERGY EFFICIENCY ACOUSTICS AND DAYLIGHT IN BUILDING*				
2	NPTEL	ENERGY RESOURCES, ECONOMICS AND ENVIRONMENT*				
3	U19CE2019	GREEN BUILDING RATING SYSTEMS	3	0	0	3
4	U19CE927	ENVIRONMENTAL IMPACT ASSESSMENT	3	0	0	3
5	U19CE2020	GREEN MATERIALS AND GREEN PRODUCTS	3	0	0	3
6	U19CE2021	ENERGY AND WATER EFFICIENCY IN BUILDINGS	3	0	0	3
7	U19CE2022	GREEN BUILDING AND SUSTAINABLE MATERIALS	3	0	0	3
8	U19CE2023	GREEN TECHNOLOGIES	3	0	0	3

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Sona College of Technology, Salem

(An Autonomous Institution)

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Branch: Civil Engineering

S.No	Course Code	Course Title	L	T	P	C	Category	Total Contact Hours
Theory								
1	U19ENG101A	English for Engineers - I	2	0	2	3	HS	60
2	U19MAT102A	Linear Algebra and Calculus	3	1	0	4	BS	60
3	U19PHY103A	Physics for Civil Engineering	3	1	0	4	BS	60
4	U19CHE104A	Chemistry for Civil Engineering	3	1	0	4	BS	60
5	U19EGR106	Engineering Graphics	2	0	2	3	ES	60 (30L+30P)
Practical								
7	U19PCL108A	Physics and Chemistry Laboratory-I	0	0	3	1.5	BS	45
8	U19WPL112	Workshop Practice	0	0	2	1	ES	30
9	U19GE101	Basic Aptitude-I	0	0	2	0	EEC	30
					Total Credits	**20.5**		
Optional Language Elective*								
11	U19OLE1101	French	0	0	2	1	HS	30
12	U19OLE1102	German						30
13	U19OLE1103	Japanese						30

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

Approved By

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L T P C
2 0 2 3

U19ENG101A English for Engineers – I

First year I semester

Common to CIVIL Branch

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

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

	COURSE OUTCOMES	PROGRAMME OUTCOMES													
		1	2	3	4	5	6	7	8	9	10	11	12	Ps o1	Ps o2
1	Use grammatical components effectively in both written and spoken communication	2	1	1	1	1	2	3	2	2	3	3	3	3	3
2	Develop speaking skills for self-introduction, delivering speeches and technical presentation.	3	2	2	3	3	3	3	2	2	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, detailed project report

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, drafting circulars

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
- Preparing abstracts for technical articles

TOTAL: 60 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

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

B. E. / CIVIL ENGINEERING

SEMESTER – I	LINEAR ALGEBRA AND CALCULUS	L	T	P	C
U19MAT102A		3	1	0	4

COURSE OUTCOMES

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

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

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

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

UNIT – I LINEAR SYSTEM OF EQUATIONS 12

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

UNIT – II VECTOR SPACES 12

Vector Space – Linear independence and dependence of vectors – Basis – Dimension – Linear transformations (maps) – Matrix associated with a linear map – Range and kernel of a linear map – Rank-nullity theorem (without proof).

UNIT – III EIGEN VALUES AND EIGEN VECTORS 12

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

UNIT – IV MULTIVARIABLE CALCULUS 12

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

UNIT – V MULTIPLE INTEGRALS 12

Double integrals – Change of order of integration – Change of variables from Cartesian to polar coordinates – Area as double integrals in Cartesian coordinates – Triple integrals – Volume as triple integrals in Cartesian coordinates.

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

TEXT BOOKS:

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

REFERENCE BOOKS:

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

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

Course Code: U19PHY103A **L T P C**
Course Name: PHYSICS FOR CIVIL ENGINEERING **3 1 0 4 100**

(For I Semester B.E. Civil Engineering)

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

CO1 Discuss the dual nature of matter and radiation.

CO2 Describe the basic components of lasers.

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

CO4 Evaluate the factors affecting architectural acoustics of buildings.

CO5 Elucidate the different modes of heat transfer.

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

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

Unit 1 Quantum Physics 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 - Scanning electron microscope – Transmission 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, Diamond Structure.

Unit 4 Architectural Acoustics 12

Classification of sound waves: Audible sound waves, Infrasonic waves, Ultrasonic waves-Noise and musical sound-Weber – Fechner law-Loudness level and intensity.

Basic requirements for the acoustically good halls- Reverberation -Sabine's law and its importance (no derivation)-absorption co-efficient-Factors affecting the acoustics and their remedies.

Sound insulation: Noise classification-Transmission loss-Sound insulation between individual rooms.

Unit 5 Thermal Physics 12

Heat and temperature - Modes of heat transfer (Conduction, convection and radiation) - Specific heat capacity - thermal capacity and coefficient of linear thermal expansion. **Thermal conductivity** - Measurement of thermal conductivity of good conductor - Forbe's method - Measurement of thermal conductivity of bad conductor - Lee's disc method - Radial flow of heat - Cylindrical flow of heat - Practical applications of conduction of heat – Thermal insulation in buildings.

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

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

Text Book:

1. B. K. Pandey and S. Chaturvedi, "Engineering Physics", Cengage Learning India Pvt. Ltd., Delhi, 2012.
2. Dr. B.C. Punmia et al, "Building construction", Laxmi publications Pvt. Ltd., New Delhi 2008.

References:

1. Engineering Physics, Sonaversity, Sona College of Technology, Salem (Revised Edition 2018).
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)

Dr. C. Shanthi
HOD / Science

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I SEMESTER (CIVIL)

COURSE CODE	**U19CHE104A**	L T P C
COURSE NAME	**CHEMISTRY FOR CIVIL ENGINEERING**	3 1 0 4

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 domestic and industrial uses.

CO2 Outline the principles, applications of electrochemistry, types of corrosion and its control methods.

CO3 Compare the types of polymerization reactions, techniques and fabrication methods of polymers.

CO4 Analyze the composition, properties and industrial applications of engineering materials.

CO5 Describe the ingredients, manufacture, properties and applications of construction materials.

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

COs, POs PSOs Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO – 1	3	3												3
CO – 2	3	3												2
CO – 3	3	3												3
CO – 4	3	3												3
CO - 5	3	3												3

UNIT I WATER TECHNOLOGY **12**

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 - Domestic water treatment – screening, sedimentation, coagulation, aeration, sand filtration and disinfection methods - Chlorination, ozonation and UV treatment.

UNIT II ELECTROCHEMISTRY AND CORROSION **12**

Electrode potential – Nernst Equation – derivation and problems based on single electrode potential calculation – reference electrodes – standard hydrogen electrode – calomel electrode – Ion selective electrode – glass electrode – measurement of pH – electrochemical series – significance – electrolytic and electrochemical cells – reversible and irreversible cells – EMF – measurement of emf – potentiometric titrations (redox – Fe^{2+} vs dichromate) – conductometric titrations (acid-base – HCl vs NaOH) – Corrosion – types – dry and wet corrosion – examples – Corrosion control methods – Sacrificial anode and impressed cathode current method.

UNIT III POLYMER CHEMISTRY **12**

Nomenclature of Polymers - classification of Polymers – functionality – types of polymerization-addition-condensation and copolymerization – Free Radical mechanism of addition Polymerization – Properties of Polymers – glass transition temperature, Tg - Methods of Polymerization-bulk-solution-emulsion and suspension – Plastics – Moulding constituents of plastic – Moulding of plastics into articles-Injection-Compression and Blow moulding – Thermoplastic and Thermosetting resins – Engineering Plastics-Nylon 6,6-Polycarbonate and Polyurethane-preparation-properties and applications – Rubbers-types-applications-vulcanization of rubber.

UNIT IV CHEMISTRY OF ENGINEERING MATERIALS **12**

Refractories – classification – acidic, basic and neutral refractories – properties (refractoriness, refractoriness under load, dimensional stability, porosity, thermal spalling). **Abrasives** – natural and synthetic abrasives – quartz, corundum, emery, garnet, diamond, silicon carbide and boron carbide. **Lubricants** – mechanism of lubrication, liquid lubricants, - properties – (viscosity index, flash and fire points, cloud and pour points, oiliness) – solid lubricants – graphite and molybdenum sulphide. **Composites –** definition, constituents of composites – composition, properties and applications of various fibre reinforced polymer (FRP) composites.

UNIT V CHEMISTRY OF BUILDING MATERIALS **12**

Lime – classification – manufacture and properties of lime – Cement – classification – Portland cement – chemical composition – manufacture of Portland cement by wet method – setting and hardening – analysis of cement – concretes – hot and cold weathering of concrete, cement and its prevention methods – special cements - gypsum – plaster of Paris – Glass - manufacture, types, properties and uses – Recent trends in construction materials – special paints and their applications in construction sector.

TOTAL: 60 HOURS

Text Books:

1. P.C.Jain and Monica Jain, "Engineering Chemistry" Dhanpat Rai Pub, Co., New Delhi , 17th Edition, 2018.
2. S. Kalaiarasan et al, "Chemistry For Civil Engineering" Sonaversity, Sona College of Technology, Salem, 2019.

Reference Books:

1. O G Palana, Engineering Chemistry", Tata McGraw Hill Education (India) Private Limited, Chennai, Second Edition, 2017.
2. B. Sivasankar, "Engineering Chemistry", Tata McGraw-Hill Pub. Co. Ltd., New Delhi (2008).
3. B.K. Sharma, "Engineering Chemistry", Krishna Prakasan Media (P) Ltd., Meerut (2001).
4. N. Krishnamurthy, K. Jeyasubramanian and P. Vallinayagam, "Applied Chemistry", Tata McGraw-Hill Publishing Company Limited, New Delhi (1999).

Dr. C. Shanthi
HOD/Sciences

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

Course Outcomes

Upon completion of this course the students will be able to

CO1 Predict the construction of various curves in civil elevation, plan and machine components.

CO2 Analyze the principles of projection of various planes by different angle to project points, lines and planes.

CO3 Draw the principles of projection of simple solid by the axis is inclined to one reference plane by change of position method.

CO4 Analyze the interior details of complex components, machineries by sectioning the solid body. Study the development of surfaces for prisms and pyramids.

CO5 Draw the projection of three dimensional objects representation of machine structure and explain standards of orthographic views by different methods.

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

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

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

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

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

UNIT I PLANE CURVES (Manual drafting) L 4 P 2

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

UNIT II PROJECTION OF POINTS, LINES AND PLANE SURFACES (CAD Software) L 9 P 3

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

UNIT III PROJECTION OF SOLIDS (CAD Software) L 9 P 3

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

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

UNIT IV SECTION OF SOLIDS AND DEVELOPMENT OF SURFACES (CAD Software) L 9 P 3

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

UNIT V CONVERSION OF ISOMETRIC VIEWS TO ORTHOGRAPHIC VIEWS (Manual drafting) L 9 P 3

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

Total Number of hours: 60

Learning Resources

Text Books

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

Reference Books

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

Dr.D.SENTHIL KUMAR, M.E.,Ph.D
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U19PCL108A	PHYSICS AND CHEMISTRY LABORATORY-I (For Civil Engineering)	L	T	P	C
		0	0	3	1.5

Course Outcomes

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

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

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

CO/PO, PSO Mapping

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

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

Course Assessment methods

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

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

List of Experiments (Physics part) (Any five experiments from the below list)	
1	Determination of velocity of ultrasonic waves and compressibility of the given liquid using ultrasonic interferometer.
2	Determination of dispersive power of the prism for various pairs of colors in the mercury spectrum using a spectrometer.
3	Determination of laser wavelength, particle size of lycopodium powder, acceptance angle and numerical aperture of an optical fibre using diode laser.
4	Determination of the thickness of a thin wire by forming interference fringes using air wedge apparatus.
5	Determination of the thermal conductivity of a bad conductor using Lee's Disc apparatus.
6	Determination of the Young's modulus of the given material by non-uniform bending method.
List of Experiments (Chemistry part)	
7	Estimation of hardness of water sample by EDTA method.
8	Estimation of alkalinity of water sample by indicator method.
9	Estimation of HCl by pH metry.
10	Estimation of HCl by conductometry. (HCl vs NaOH)
11	Estimation of ferrous ion by potentiometric titration.
12	Evaluate the iron content of the water by spectrophotometry.
	1.5 Credits **Total Hours: 30 Hrs** 45

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COURSE CODE **U19WPL112** L T P C

COURSE NAME **WORKSHOP PRACTICE** 0 0 2 1

Course Outcomes

Upon completion of this course the students will be able to

CO1 Familiarize with the basic of tools and equipment's used in fitting, carpentry, welding and sheet metal.

CO2 Fabricate the different simple products in above trades.

CO3 Produce different joining of metals.

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

LIST OF EXPERIMENTS

SECTION 1: **FITTING**

Tools and Equipment's- Practice in filling.

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

SECTION 2: **SHEET METAL**

Tools and Equipment's- Practice

Making of Dust Pan and Funnel.

SECTION 3: **WELDING**

Tools and Equipment's – Practice

Arc welding of Butt joint and Lap Joint.

SECTION 4: **CARPENTRY**

Tools and Equipment's- Planning Practice

Making of Half Lap joint and Dovetail Joint.

Total Number of hours: 30

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I-Sem
2022 Batch

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

Course Outcomes U19GE101.

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

1. Solve fundamental problems in specific areas of quantitative aptitude	
2. Solve basic problems in stated areas of logical reasoning	
3. Demonstrate rudimentary verbal aptitude skills in English with regard to specific topics	
1.Quantitative Aptitude and Logical Reasoning	**Solving simple problems with reference to the following topics:** a. Numbers – HCF & LCM b. Decimal fractions c. Simplification d. Square roots & cube roots e. Surds & indices f. Ratio and proportion g. Averages h. Area and volume i. Coding and decoding & artificial language
2. Verbal Aptitude	**Demonstrating plain English language skills with reference to the following topics:** a. Synonyms b. Antonyms c. Verbal analogy d. Editing passages e. Sentence filler words

30 hours.

S. Anita

Dr.S.Anita

Head/Training

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

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

S.N	Course Code	Course Title	L	T	P	C	Category	Total Contact Hours
	Theory							
1	U19TAM201	தமிழர் மரபு / Heritage of Tamils	1	0	0	1	HSMC	15
2	U19ENG201A	English for Engineers-II	2	0	2	3	HSMC	60 (30L+30P)
3	U19MAT202A	Differential Equations and Vector Calculus	3	1	0	4	BSC	60
4	U19PPR205	Problem Solving Using Python Programming	3	0	0	3	ESC	45
5	U19BEE206	Basics of Electrical and Electronics Engineering	3	0	0	3	ESC	45
6	U19CE201	Basics of Engineering Mechanics	3	1	0	4	ESC	60
	Practical							
7	U19BEE207	Basics of Electrical Engineering Laboratory	0	0	2	1	ESC	30
8	U19PCL208A	Physics and Chemistry Laboratory-II	0	0	3	1.5	BSC	45
9	U19PPL211	Python Programming Laboratory	0	0	2	1	ESC	30
10	U19GE201	Basic Aptitude-II	0	0	2	0	EEC	30
					Total Credits	**21.5**		
	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, Civil Engineering BoS**	**Member Secretary, Academic Council**	**Chairperson, Academic Council & Principal**
Dr. M. Renuga	**Dr. R. Malathy**	**Dr. R. Shivakumar**	**Dr. S. R. R. Senthil Kumar**

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

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

UNIT I LANGUAGE AND LITERATURE **3**

Language Families in India - Dravidian Languages – Tamil as a Classical Language - Classical Literature in Tamil – Secular Nature of Sangam Literature – Distributive Justice in Sangam Literature - Management Principles in Thirukural - Tamil Epics and Impact of Buddhism & Jainism in Tamil Land - Bakthi Literature Azhwars and Nayanmars - Forms of minor Poetry - Development of Modern literature in Tamil - Contribution of Bharathiyar and Bharathidhasan.

UNIT II HERITAGE - ROCK ART PAINTINGS TO MODERN ART – SCULPTURE **3**

Hero stone to modern sculpture - Bronze icons - Tribes and their handicrafts - Art of temple car making - - Massive Terracotta sculptures, Village deities, Thiruvalluvar Statue at Kanyakumari, Making of musical instruments - Mridhangam, Parai, Veenai, Yazh and Nadhaswaram - Role of Temples in Social and Economic Life of Tamils.

UNIT III FOLK AND MARTIAL ARTS **3**

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

UNIT IV THINAI CONCEPT OF TAMILS **3**

Flora and Fauna of Tamils & Aham and Puram Concept from Tholkappiyam and Sangam Literature - Aram Concept of Tamils - Education and Literacy during Sangam Age - Ancient Cities and Ports of Sangam Age - Export and Import during Sangam Age - Overseas Conquest of Cholas.

UNIT V CONTRIBUTION OF TAMILS TO INDIAN NATIONAL MOVEMENT AND INDIAN CULTURE **3**

Contribution of Tamils to Indian Freedom Struggle - The Cultural Influence of Tamils over the other parts of India – Self-Respect Movement - Role of Siddha Medicine in Indigenous Systems of Medicine – Inscriptions & Manuscripts – Print History of Tamil Books.

TOTAL : 15 PERIODS

TEXT-CUM-REFERENCE BOOKS

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

HOD

Dr. M.RENUGA,
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U19TAM201	தமிழர் மரபு	LTPC 1001

அலகு I மொழி மற்றும் இலக்கியம்: 3

இந்திய மொழிக் குடும்பங்கள் – திராவிட மொழிகள் – தமிழ் ஒரு செம்மொழி – தமிழ் செவ்விலக்கியங்கள் – சங்க இலக்கியத்தின் சமயச் சார்பற்ற தன்மை – சங்க இலக்கியத்தில் பகிர்தல் அறம் – திருக்குறளில் மேலாண்மைக் கருத்துக்கள் – தமிழ்க் காப்பியங்கள், தமிழகத்தில் சமண பௌத்த சமயங்களின் தாக்கம் – பக்தி இலக்கியம், ஆழ்வார்கள் மற்றும் நாயன்மார்கள் – சிற்றிலக்கியங்கள் – தமிழில் நவீன இலக்கியத்தின் வளர்ச்சி – தமிழ் இலக்கிய வளர்ச்சியில் பாரதியார் மற்றும் பாரதிதாசன் ஆகியோரின் பங்களிப்பு.

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

நடுகல் முதல் நவீன சிற்பங்கள் வரை – ஐம்பொன் சிலைகள்– பழங்குடியினர் மற்றும் அவர்கள் தயாரிக்கும் கைவினைப் பொருட்கள், பொம்மைகள் – தேர் செய்யும் கலை – சுடுமண் சிற்பங்கள் – நாட்டுப்புறத் தெய்வங்கள் – குமரிமுனையில் திருவள்ளுவர் சிலை – இசைக் கருவிகள் – மிருதங்கம், பறை, வீணை, யாழ், நாதஸ்வரம் – தமிழர்களின் சமூக பொருளாதார வாழ்வில் கோவில்களின் பங்கு.

அலகு III நாட்டுப்புறக் கலைகள் மற்றும் வீர விளையாட்டுகள்: 3

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

அலகு IV தமிழர்களின் திணைக் கோட்பாடுகள்: 3

தமிழகத்தின் தாவரங்களும், விலங்குகளும் – தொல்காப்பியம் மற்றும் சங்க இலக்கியத்தில் அகம் மற்றும் புறக் கோட்பாடுகள் – தமிழர்கள் போற்றிய அறக்கோட்பாடு – சங்ககாலத்தில் தமிழகத்தில் எழுத்தறிவும், கல்வியும் – சங்ககால நகரங்களும் துறை முகங்களும் – சங்ககாலத்தில் ஏற்றுமதி மற்றும் இறக்குமதி – கடல்கடந்த நாடுகளில் சோழர்களின் வெற்றி.

அலகு V இந்திய தேசிய இயக்கம் மற்றும் இந்திய பண்பாட்டிற்குத் தமிழர்களின் பங்களிப்பு: 3

இந்திய விடுதலைப்போரில் தமிழர்களின் பங்கு – இந்தியாவின் பிறப்பகுதிகளில் தமிழ்ப் பண்பாட்டின் தாக்கம் – சுயமரியாதை இயக்கம் – இந்திய மருத்துவத்தில், சித்த மருத்துவத்தின் பங்கு – கல்வெட்டுகள், கையெழுத்துப்படிகள் – தமிழ்ப் புத்தகங்களின் அச்சு வரலாறு.

TOTAL : 15 PERIODS

TEXT-CUM-REFERENCE BOOKS

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

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U19ENG201A - English for Engineers – II

First year II semester

Civil

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

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

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

UNIT –I **12**

- 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 **12**

- 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 **12**

- 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 **12**

- 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 **12**

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

(Theory: 30 hours: Practical: 30 hours) TOTAL: 60 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. / CIVIL ENGINEERING

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

COURSE OUTCOMES

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

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

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

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

UNIT – I ORDINARY DIFFERENTIAL EQUATIONS **12**

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

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

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

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

UNIT – III LAPLACE TRANSFORMS **12**

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

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

UNIT – IV PARTIAL DIFFERENTIAL EQUATIONS **12**

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

UNIT – V VECTOR CALCULUS **12**

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

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

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

TEXT BOOKS:

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

REFERENCE BOOKS:

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

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U19PPR205 PROBLEM SOLVING USING PYTHON PROGRAMMING 3 0 0 3

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.

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

Lists-creating lists, list operations, list methods, mutability list functions, searching and sorting, Sets-creating sets, set operations. Tuples-Tuple assignment, Operations on Tuples, lists and tuples, Tuple as return value- Dictionaries-operations and methods, Nested Dictionaries.

TOTAL: 45 HOURS

J. Akilandeswari

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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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U19BEE206 BASICS OF ELECTRICAL AND ELECTRONICS ENGINEERING

L	T	P	C
3	0	0	3

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

1. analyze the various DC & AC circuits and find the circuit parameters.
2. discuss the construction and working principle of DC machines.
3. discuss the construction and working principle of Transformer & AC machines.
4. describe the various types of measuring techniques.
5. discuss the electrical systems in buildings and electrical standards for various devices.

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

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

UNIT I - DC & AC CIRCUITS 9

DC circuits: Definition of voltage, Current, Electromotive force, Resistance, Power & Energy, Ohms law and Kirchhoff's Law & its applications - Series and Parallel circuits- Star-delta transformation.

***AC Circuits*:** Generation of alternating emf - RMS value, Average value, Peak factor and Form factor for sinusoidal AC waveform - Series RLC circuits - Introduction to three-phase system.

UNIT II - DC MACHINES 9

DC Generator: Construction of DC generator – Working principle of DC generator – EMF equation – Types of DC generator- Applications.

DC Motor: Working principle of DC motor – Back EMF- Types of DC motor Applications.

UNIT III - TRANSFORMER & AC MACHINES 9

Transformer: Construction and working principle of transformer – EMF equation – Types of transformers- Transformation ratio.

AC machines: Construction and working principle of single phase & three phase induction motor- Applications.

UNIT IV - MEASURING TECHNIQUES 9

Strain measuring techniques using electrical strain gauges- Measurement of Resistance, Inductance and Capacitance using Wheatstone, Anderson and Schering bridgesMeasurement of energy using single phase induction type energy meter –Load cells.

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UNIT V - ELECTRICAL SYSTEMS IN BUILDINGS 9

Protective devices in electrical installations- Earthing for safety- Types of earthing- ISI specifications- Types of wires, wiring systems and selection criteria - Planning electrical wiring for building- Main and distribution boards- Layout of a substation.

TOTAL: 45 Hours

TEXT BOOKS

1. B.L. Theraja, "Fundamentals of Electrical Engineering & Electronics", S. Chand & Co Ltd, 2015.
2. S. Padma, "Basic Electrical and Electronics Engineering", Sonaversity, Revised edition 2016.

REFERENCES

1. S.K. Bhattacharya, "Electrical Machines", Tata MC Graw Hill Publishing company ltd., 3rd Edition, 2009.
2. Muthusubramanian R, Salivahanan S, "Basic Electrical and Electronics Engineering", 3rd Edition 2007, Tata McGraw-Hill publishing company limited.
3. A.K.Sawheny, "A course in Electrical and Electronics Measurement & Instrumentation ", DhanpatRai and Co, 9th Edition, 2012

S. Padma 31.3.23

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U19CE201 - BASICS OF ENGINEERING MECHANICS

L	T	P	C
3	1	0	4

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

1. Apply the various methods to determine the resultant forces and its equilibrium acting on a particle in 2d and 3d.
2. Apply the concept of reaction forces (non-concurrent coplanar and noncoplanar forces) and moment of various support systems with rigid bodies in 2d equilibrium. reducing the force, moment, and couple to an equivalent force - couple system acting on rigid bodies in 2d.
3. Apply the concepts of locating centroids / center of gravity of various sections/ volumes and to find out area moments of inertia for the sections and mass moment of inertia of solids.
4. Apply the concepts of frictional forces at the contact surfaces of various engineering systems.
5. Apply the various methods of evaluating kinetic and kinematic parameters of the rigid bodies subjected to concurrent coplanar forces.

UNIT I - STATICS OF PARTICLES

9+3

Fundamental Concepts and Principles, Systems of Units, Method of Problem Solutions, Statics of Particles -Forces in a Plane, Resultant of Forces, Resolution of a Force into Components, Rectangular Components of a Force, Unit Vectors. Equilibrium of a Particle- Newton's First Law of Motion, Space and Free-Body Diagrams, Forces in Space, Equilibrium of a Particle in Space.

UNIT II - EQUILIBRIUM OF RIGID BODIES

9+3

Principle of Transmissibility, Equivalent Forces, Vector Product of Two Vectors, Moment of a Force about a Point, Varignon's Theorem, Rectangular Components of the Moment of a Force, Scalar Product of Two Vectors, Mixed Triple Product of Three Vectors, Moment of a Force about an Axis, Couple - Moment of a Couple-Further Reduction of a System of Forces, Equilibrium in Two - Reactions at Supports and Connections.

UNIT III - PROPERTIES OF SURFACES AND SOLIDS

9+3

Determination of Areas and Volumes – First moment of area and the Centroid of sections – Rectangle, circle, triangle from integration – T section, I section, Hollow section by using standard formula Second and product moments of plane area – Rectangle, triangle, circle from integration – T section, I section by using standard formula – Parallel axis theorem and perpendicular axis theorem – Polar moment of inertia – Principal moments of inertia of plane areas – Principal axes of inertia.

UNIT IV - FRICTION

9+3

Frictional force – Laws of Coulomb friction – Angle of friction – cone of friction – Equilibrium of bodies on inclined plane – Ladder friction.

UNIT V - DYNAMICS OF PARTICLES

9+3

Kinematics - Rectilinear Motion and Curvilinear Motion of Particles. Kinetics- Newton's Second Law of Motion - Equations of Motions, Dynamic Equilibrium, Energy and Momentum Methods - Work of a Force , Kinetic Energy of a Particle, Principle of Work and Energy, Principle of Impulse and Momentum, Impact.

TOTAL: 60 Hours

TEXT BOOKS

1. Beer Ferdinand P, Russel Johnston Jr., David F Mazurek, Philip J Cornwell, SanjeevSanghi, Vector Mechanics for Engineers: Statics and Dynamics, McGraw Higher Education., 11th Edition, 2017.
2. Hibbeler, R.C., "Engineering Mechanics", Vol. 1 Statics, Vol. 2 Dynamics, Pearson Education Asia Pvt. Ltd., (2017).
3. Vela Murali, "Engineering Mechanics-Statics and Dynamics", Oxford University Press, 2018.

REFERENCES

1. K.L. Kumar, "Engineering Mechanics" Tata McGraw-hill, 2017, 4th Edition
2. S.S. Bhavikatti, " Engineering Mechanics", New Age International Publishers, 2006
3. R. S. Khurmi, " Engineering Mechanics", S. Chand Publishers, 2018.
4. Dr. N. Kotteswaran, "Engineering Mechanics – Statics & Dynamics", Sri Balaji Publications 2004.

U19BEE207 BASIC OF ELECTRICAL ENGINEERING LABORATORY

L	T	P	C
0	0	2	1

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

1. apply basic circuit laws for calculating electric parameters of DC & AC circuits.
2. determine and draw the mechanical, electrical and performance characteristics of electrical machines.
3. determine the value of Resistance, Inductance and Capacitance using various bridges.

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	1	2	1	1	1	2	-	-	1	1	1	1
CO2	2	2	1	1	1	1	1	-	-	-	1	1	1	1
CO3	2	2	1	1	1	1	1	-	-	-	1	1	1	1

List of Experiments

1. Verification of Ohm's law.
2. Verification of Kirchhoff's laws.
3. Measurement of power and power factor for series RLC circuit.
4. Load characteristics of DC shunt motor.
5. Speed control of DC shunt motor.
6. Load test on single phase transformer.
7. Speed control of three phase induction motor.
8. Measurement of DC resistance by Wheatstone bridge.
9. Measurement of inductance using Anderson bridge.
10. Measurement of capacitance using Schering bridge.
11. Measurement of earth pit resistance using megger

TOTAL: 30 Hours

S. Padma 31.3.23

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

U19PCL208A	PHYSICS AND CHEMISTRY LABORATORY- II [For CIVIL]	L	T	P	C
		0	0	3	1.5

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 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

	Programme Outcomes (POs) and Programme Specific Outcome (PSOs)													
COs	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 rigidity modulus of the material of wire using torsion pendulum.
2	Determination of specific resistance of a given wire using Carey Foster's bridge.
3	Determination of coefficient of viscosity of liquid by Poiseuille's method.
4	Determination of wavelength of prominent colors in mercury spectrum using a spectrometer.
5	Determination of the Young's modulus of the given material by uniform bending method.
6	Determination of bandgap of a semiconductor diode.
List of Experiments (Chemistry part)	
7	Estimation of copper in brass by EDTA method.
8	Estimation of calcium oxide in cement by EDTA method.
9	Determination of dissolved oxygen of water by Winkler's method
10	Estimation of chromium in waste water.
11	Determination of molecular weight of a polymer by viscosity measurements
12	Estimation of chloride ion present in the sample water by argentometric method.
	Total Hours: 45 Hrs

30-6-2022

Dr. C. Shanthi
HOD / Sciences

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

U19PPL211 PYTHON PROGRAMMING LABORATORY 0 0 2 1

COURSE OUTCOMES

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

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

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

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

LIST OF EXPERIMENTS

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

TOTAL: 30 HOURS

J. Akilandeswari

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

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

Course Outcomes

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

1. Solve more elaborate problems than those in BA-I* in specific areas of quantitative aptitude
2. Solve problems of greater intricacy than those in BA-I in stated areas of logical reasoning
3. Demonstrate higher than BA-I level verbal aptitude skills in English with regard to specific topics

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

S. Anita

Dr.S.Anita

Head/Training

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 ...

German Language Course

First year II semester

Course Code: U19OLE1202

L T P C
0 0 2 1

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

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

UNIT – I **6**

- Nominative/accusative case, adjectives

UNIT – II **6**

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

UNIT – III **6**

- Food and beverages, Modal verbs, Separable verbs

UNIT – IV **6**

- Simple sentences using modal / separable verbs

UNIT – V **6**

- Articles of clothing

Total : 30 hours

Text Book
Netzwerk A1

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

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

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

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

BE-Civil
III

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

S. No	Course Code	Course Title	Lecture	Tutorial	Practical	Credit	Total Contact Hours
Theory							
1	U19MAT301A	Fourier Analysis and Statistics	3	1	0	4	60
2	U19CE301	Mechanics of Fluids	2	1	0	3	45
3	U19CE302	Strength of Materials -I	2	1	0	3	45
4	U19CE303	Construction Materials and Practices	3	0	0	3	45
5	U19CE304	Surveying	3	0	0	3	45
6	U19TAM301	தமிழரும் தொழில்நுட்பமும் / Tamils and Technology	1	0	0	1	15
7	U19GE302	**Mandatory Courses :** Environment and Climate Science	2	0	0	0	30
Practical							
8	U19CE305	Materials Testing Laboratory	0	0	2	1	30
9	U19CE306	Survey Laboratory	0	0	2	1	30
10	U19ENG301	Communication Skills Laboratory	0	0	2	1	30
11	U19GE301	Soft Skills and Aptitude-I	0	0	2	1	30
					Total Credits	**20**	**405**

ApprovedBy

Chairperson, Civil Engineering BoS
Dr.R.Malathy

Member Secretary, Academic Council
Dr.R.Shivakumar

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

Copy to:-

HOD/Civil Engineering,Third Semester BE Civil Students and Staff, COE

B. E. CIVIL ENGINEERING

SEMESTER – III	FOURIER ANALYSIS AND STATISTICS	L	T	P	C
U19MAT301A		3	1	0	4

COURSE OUTCOMES

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

1. express a periodic signal as an infinite sum of sine and cosine wave components using Fourier series.
2. apply the Fourier transform techniques to convert the signal in terms of the frequencies of the waves.
3. represent the data in the form of diagram and graph and analyze them.
4. apply the concepts of measures of central tendency and dispersion to the given data and analyze the results.
5. apply the concepts of correlation and regression to the given data and analyze the result.

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

UNIT – I 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 – II FOURIER TRANSFORMS 12

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

UNIT – III COLLECTION AND REPRESENTATION OF DATA 12

Collection of data – Primary and secondary data – Diagrammatic representation – Simple, subdivided and multiple bar diagrams – Pie diagram – Pictograph – Graphs of frequency distribution – Histogram – Frequency polygon – Frequency curve – Cumulative frequency curve.

UNIT – IV MEASURES OF CENTRAL TENDENCY AND DISPERSION 12

Measures of central tendency (Simple arithmetic mean, median and mode) – Quartiles – Measures of dispersion (range, inter-quartile range, quartile deviation, mean deviation, standard deviation and coefficient of variation).

UNIT – V CORRELATION AND REGRESSION 12

Simple and rank correlations – Multiple and partial correlations – Linear regression – Curve fitting (straight line and parabola).

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

REFERENCE BOOKS:

1. E. Kreyszig, "Advanced Engineering Mathematics", Wiley Publishers, 10th Edition, Reprint, 2017.
2. B. V. Ramana, "Higher Engineering Mathematics", McGraw Hill Publishers, 29th Reprint, 2017.
3. S. C. Gupta and V. K. Kapoor, "Fundamentals of Mathematical Statistics", Sultan Chand and Sons Publishers, 11th Edition, Reprint, 2019.
4. R. A. Johnson and C. B. Gupta, "Miller and Freund's, Probability and Statistics for Engineers", Pearson Publishers, 9th Edition, 2018.

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

Sona College of Technology Autonomous
APPROVED
Board of Studies
Civil Engineering
Chairperson

20. 05. 2020

COURSE CODE	COURSE NAME	L	T	P	C
U19CE301	MECHANICS OF FLUIDS	2	1	0	3

Course Objective (s): The Purpose of learning this course is to:

1.	Measure the basic properties of fluid.
2.	Understand the concepts of statics and dynamics of fluid flow.
3.	Compute the major and minor losses occurring in pipe flow.
4.	Understand the concepts of boundary layer problem.
5.	Physical laws in addressing problems in hydraulics.

Course Outcome (s) (COs): At the end of this course, the students will be able to:

CO1	Describe the fundamental and physical properties of a fluid (K2)
CO2	Imbibe basic laws and equations used for analysis of static and dynamic fluids (K2)
CO3	Evaluate the fluid velocity considering major and minor losses; and also understand the application of Equations of motion & Conservation of momentum to different fluids (K3)
CO4	Apply the Boundary layer concept for different fluid flow types (K3)
CO5	Apply the similitude concept and set up the relation between a model and a prototype (K4)

Knowledge Level: K1 – Remember: K2 – Understand: K3 – Apply: K4 – Analyze: K5 – Evaluate:

CO – PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	POS
CO1	3	1	3	1	1	1	3	1	1	-	-	2	1	2
CO2	3	2	3	1	2	1	3	-	1	-	-	2	1	2
CO3	3	2	3	1	2	1	3	-	1	-	-	2	1	2
CO4	1	2	3	2	2	2	3	3	2	-	-	2	2	2
CO5	1	3	3	2	2	2	3	1	2	-	-	2	2	2
CO (Avg)	2.2	2	3	1.4	1.8	1.4	3	1	1.4	-	-	2	1.4	2

Correlation Level: 1:Slight (Low) 2:Moderate (Medium) 3:Substantial (High)

UNIT-I	FLUID PROPERTIES AND FLUID STATICS	9 Hours

Definitions-Fluid and fluid mechanics-Dimensions and units-Fluid properties: Density, specific weight, specific volume, specific gravity, temperature, viscosity, compressibility, vapour pressure, capillarity and surface tension-Continuum concept of system and control volume. Fluid statics: concept of fluid static pressure, absolute, gauge, atmosphere and vacuum pressures - Measurements of pressure. Hydrostatic forces on surfaces -forces on planes – centre of pressure.

UNIT-II	FLUID KINEMATICS AND DYNAMICS	9 Hours

Fluid Kinematics: Classification and types of flow - continuity equation (one dimensional differential forms)- velocity field and acceleration- Velocity potential function and stream function-Equipotential line- Flow net. Fluid Dynamics : Equations of motion -Euler's equation of motion-Bernoulli's equation: Applications:- Venturi meter- Orifice meter and Velocity measurement (Pitot tube, Current meter, Hot wire and hot film anemometer, Float technique, Laser Doppler velocimetry)- linear momentum equation and its application to pipe bend.

UNIT - III	FLOW THROUGH PIPES AND CHANNEL	9 Hours

Flow through Orifices and Mouth pieces. Reynold's experiment -Laminar flow through circular pipe (Hagen poiseulle's). Flow through pipes -Losses of energy in pipes- Major Energy losses (Darcy - Weisbach's and Chezy's Formula)- Minor Energy losses-Hydraulic gradient and total energy line-Flow through compound: Pipes in series and in parallel-Power transmission through pipes-. Measurement of flow through notches and weir

UNIT-IV	BOUNDARY LAYER	9 Hours

Boundary layer - Definition- boundary layer on a flat plate - Laminar and turbulent boundary layer- Displacement, energy and momentum thickness - Momentum integral equation-Boundary layer separation and control - Drag on flat plate.

UNIT-V	DIMENSIONAL ANALYSIS AND MODEL STUDIES	9 Hours

Fundamental dimensions - Dimensional homogeneity- Method of dimensional analysis: Rayleigh's method and Buckingham π- theorem-Model analysis-Similitude- Types of similarities-Types of forces acting in moving fluid-

Dimensionless numbers-Model Laws-Classification of models: Undistorted and distorted models.	
	TOTAL (L:30+T:15): 45 PERIODS
TEXT BOOKS:	
1.	Bansal R.K., "Fluid Mechanics and Hydraulic Machines", Laxmi Publications, New Delhi, 2017.
2.	Rajput R.K., "Fluid Mechanics and Hydraulic Machines", S. Chand Publishing Ltd, New Delhi, 2013.
REFERENCES:	
1.	Kumar K.L, "Engineering Fluid Mechanics", Eurasia Publishing House Pvt. Ltd, New Delhi, 1995.
2.	Modi P.N and Seth, "Hydraulics and Fluid Mechanics including Hydraulic Machines", Standard Book House New Delhi. 2004.
3.	Subramanya K, "Fluid Mechanics and Hydraulic Machines-Problems and Solutions", Tata McGraw Hill Education, New Delhi, 2010.

Sona College of Technology
APPROVED
Board of Studies
Civil Engineering
Chairperson
Autonomous

COURSE CODE	COURSE NAME	L	T	P	C
U19CE302	Strength of Materials -I	2	1	0	3

Course Objective (s): The Purpose of learning this course is to:

1.	Inculcate the basic knowledge on the stress-strain and its application in civil engineering structures.
2.	Develop the ability of students to carry out analysis of complex state of stress.
3.	Analyse and understand different internal forces and stresses induced dueto representative loads on structural elements.
4.	Aware the student about different types of stresses induced in beams and shafts dueto bending and twisting moments respectively
5.	Evaluate the behaviour of torsional member and application in springs.

Course Outcome (s) (COs): At the end of this course, the students will be able to:

CO1	Comprehend the state of stresses and strains in various structural components under all types of forces.(K2)
CO2	Determine principal stresses and planes for an element in two and three dimensional state of stress.(K4)
CO3	Draw the Shearing force and bending moment diagrams for beams subjected to all the types of loading.(K3)
CO4	Calculate bending and shearing stresses of beam under flexure and shear.(K4)
CO5	Ideas of torsional stresses and how to evaluate it in circular sections and its applications in spring analysis.(K4)

Knowledge Level: K1 – Remember: K2 – Understand: K3 – Apply: K4 – Analyze: K5 – Evaluate:

CO – PO Mapping

COs	Pos												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	1	3	1	1	1	3	1	1	-	-	2	1	2
CO2	3	2	3	1	2	1	3	-	1	-	-	2	1	2
CO3	3	2	3	1	2	1	3	-	1	-	-	2	1	2
CO4	1	2	3	2	2	2	3	3	2	-	-	2	2	2
CO5	1	3	3	2	2	2	3	1	2	-	-	2	2	2
CO (Avg)	2.2	2	3	1.4	1.8	1.4	3	1	1.4	-	-	2	1.4	2

Correlation Level: 1:Slight (Low) 2:Moderate (Medium) 3:Substantial (High)

UNIT-I	SIMPLE STRESSES	9 Hours

Simple Stresses and strains -Elastic constants -Volumetric strain- Relationship between elastic constants-Stress Strain diagram for ductile and brittle materials-Analysis of axially loaded members-Composite Bars-Thermal Stresses.

UNIT-II	COMPLEX STRESSES	9 Hours

State of Stress in two dimensions-Stresses on inclined planes-Principal Stresses and Principal Planes-Maximum shear stress - Mohr's circle method. State of stress in three dimensions-Stress invariants - Determination of principal stresses and principal planes.

UNIT-III	SHEARING FORCE AND BENDING MOMENT	9 Hours

Types of loads, supports, beams-Concept of shearing force and bending moment - Relationship between intensity of load, Shearing Force and Bending moment - Shearing Force and Bending Moment Diagrams for Cantilever, simply supported and overhanging beams with concentrated load, uniformly distributed load, uniformly varying load and concentrated moment.

UNIT-IV	STRESSES IN BEAMS	9 Hours

Theory of simple bending-Assumptions and derivation of simple bending equation-Flexural rigidity- Bending and shearing stress distribution diagrams- Composite beams.

UNIT-V	TORSION	9 Hours

Theory of Torsion- Assumptions and derivation of torsional equation-Power transmitted-Stresses and Deformations in Solid and Hollow Circular Shafts- Compound shaft- Combined bending and torsion of shafts- Shaft in series and parallel. Open and Closed coiled helical springs- laminated springs - Springs in series and parallel. Design of buffer springs.

TOTAL: 45 Hours

TEXT BOOKS:

1.	Rajput R.K, "Strength of Materials", S.Chand and Co, New Delhi, 2014.
2.	Bansal R.K, "Strength of Materials", Laxmi Publications, New Delhi, 2017.
REFERENCES:	
1.	Chandramouli P.N, "Fundamentals of Strength of Materials", PHI Learning Private Limited, New Delhi, 2013.
2.	Subramanian R, "Strength of Materials", Oxford University Press, New Delhi, 2010.
3.	Bhavikatti. S., "Solid Mechanics", Vikas publishing house Pvt. Ltd, New Delhi, 2010.
4.	Timoshenko.S.B. and Gere.J.M, "Mechanics of Materials", Van NosReinbhold, New Delhi1995.
5.	S.S. Rattan " Strength of Materials" McGraw Hill Education (India) Pvt. Ltd., 2nd Edition (Sixth reprint 2013)

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COURSE CODE	COURSE NAME	L	T	P	C
U19CE303	CONSTRUCTION MATERIALS AND PRACTICES	3	0	0	3

Course Objective (s): The Purpose of learning this course is to:

1.	Impart the basic knowledge about building construction and types of buildings with requirements
2.	Acquaint the various building materials
3.	Expound the concrete making materials with its desirable properties
4.	Elucidate the various construction practices
5.	Explicate the function and classification of various building components and form works

Course Outcome (s) (COs): At the end of this course, the students will be able to:

CO1	Familiarize the Building components and its function.(K2)
CO2	Choose effective brick, timber, roofing materials in the field.(K2)
CO3	Select suitable type of concrete making materials.(K2)
CO4	Practice various construction techniques in the field.(K3)
CO5	Understand the Function and location of doors, windows and stair case.(K2)

Knowledge Level: K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate;

CO – PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	POS
CO1	3	1	3	1	1	1	3	1	1	-	-	2	1	2
CO2	3	2	3	1	2	1	3	-	1	-	-	2	1	2
CO3	3	2	3	1	2	1	3	-	1	-	-	2	1	2
CO4	1	2	3	2	2	2	3	3	2	-	-	2	2	2
CO5	1	3	3	2	2	2	3	1	2	-	-	2	2	2
CO (Avg)	2.2	2	3	1.4	1.8	1.4	3	1	1.4	-	-	2	1.4	2

Correlation Level: 1:Slight (Low) 2:Moderate (Medium) 3:Substantial (High)

UNIT-I	INTRODUCTION TO BUILDING CONSTRUCTION	9 Hours

General: Definition of Civil Engineering-Function of Civil Engineer-Division of Civil Engineering- Types of structure : Load Bearing Structure - Framed Structure. Components of building and its function. Site planning: Precaution in selection of sites- Situations and surrounding of site for various types of building-Procedure for site analysis. Sub structure: Functional requirement of a foundation- Bearing capacity of soil- Types of foundation and their construction-Suitability.

UNIT-II	BUILDING MATERIALS	9 Hours

Bricks- Manufacturing process-Classification-Testing- Bricks for special use-Refractory bricks. Stone as building material-Criteria for selection-Tests on stones-Application. Timber- Market forms and Industrial forms-Properties-Seasoning and Preservative treatment - Structural steel-Shapes-Applications. Flooring and roofing: Materials-Suitability-Types. Pipes: Types-Sizes-Application. Paints - Varnishes - Distempers - Bitumens. Concrete blocks – Lightweight concrete blocks.

UNIT-III	CONCRETE MAKING MATERIALS	9 Hours

Lime – Preparation of lime mortar. Cement - Ingredients - Manufacturing process - Types and Grades - Properties of cement and Cement mortar - Hydration - Compressive strength - Tensile strength - Fineness- Soundness and consistency - Setting time- Storage of cement. Aggregate: Classification-Fine aggregates – River sand –Artificial sand - Properties -Bulking of sand-Fineness modulus. Coarse Aggregates - Crushing strength - Impact strength - Flakiness Index - Elongation Index - Abrasion Resistance- Grading.

UNIT-IV	CONSTRUCTION PRACTICES	9 Hours

Introduction about NBC-Specifications, details and sequence of activities and construction co-ordination - Site Clearance - Marking - Earthwork - Masonry: Bonds - Brick masonry-Stone masonry - concrete hollow block masonry - Flooring - Damp proof courses - Construction joints - Movement and expansion joints - Pre cast pavements - Fabrication and erection of steel trusses - Frames - Braced domes - Laying brick -Weather and water proof - Rroof finishes - Acoustic and fire protection.

UNIT-V	BUILDING COMPONENTS AND FORMWORKS	9 Hours

Lintel: Functions of lintel and sunshade-Types of lintel; Arches: Construction-Elements-Classification. Doors and Windows: Technical terms-Types and their suitability. Stair and stair cases:Terminology-Location and classification of stairs-Requirement of good stair. Form works: Centering and shuttering - Scaffoldings, shoring and underpinning - Slip forms.	
	TOTAL: 45 Hours
TEXT BOOKS:	
1.	Rajput R K., "Engineering Materials", S Chand and Company Ltd, 2014.
2.	Arora S.P and Bindra S.P, "Building Construction", DhanpatRai Publications (P) Ltd, 2015.
REFERENCES:	
1.	Shetty M.S, "Concrete Technology Theory and Practice", S. Chand and Company Ltd, New Delhi, 2014.
2.	Punmia B.C, "Building Construction", Laxmi Publication, New Delhi, 2016.
3.	Sahu G.C., Joygopal Jena., "Building Materials and Construction", McGraw Hill Education (India) Private Limited, New Delhi, 2015.
4.	William H.Severns and Julian R.Fellows, "Air-conditioning and Refrigeration", John Wiley and Sons, London, 1988.
5.	A.F.C. Sherratt, "Air-conditioning and Energy Conservation", The Architectural Press, London, 2007.

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COURSE CODE	COURSE NAME	L	T	P	C
U19CE304	SURVEYING	3	0	0	3

Course Objective (s): The Purpose of learning this course is to:

1.	Study the basics of linear/angular measurement methods like Chain surveying,Compass surveying
2.	Know the basics of levelling and theodolite survey in elevation and angular measurements
3.	understand tacheometric surveying in distance and height measurements
4.	Know the setting out of simple curves by linear and instrument method
5.	study the total station surveying

Course Outcome (s) (COs): At the end of this course, the students will be able to:

CO1	Conduct linear and angular measurement survey with the help of chain, tape and compass.**(K1)**
CO2	Determine the horizontal and vertical distance by traversing using theodolite and measure difference in elevation and produce reduced level of the given points.**(K3)**
CO3	Describe the methods of Tacheometric surveying and contouring. **(K1)**
CO4	Describe the methods of setting out curves in the field and to determine the area and volume of structures.**(K1)**
CO5	Handle total station instrument for making the horizontal and vertical measurements.Conduct the global positioning system for determining geographical location of the site.**(K2)**

Knowledge Level: K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate;

CO – PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	POS
CO1	3	2	3	1	1	3	3	2	1	-	-	2	3	2
CO2	3	3	2	2	2	3	2	1	1	-	-	3	1	2
CO3	3	2	2	2	2	2	3	-	1	-	-	2	1	2
CO4	2	2	3	2	2	2	3	3	2	-	-	2	2	2
CO5	2	3	3	2	2	2	3	1	2	-	-	2	2	2
CO (Avg)	3.2	2.4	2.6	1.8	1.8	2.4	2.8	1.4	1.4			2.2	1.8	2

Correlation Level: 1:Slight (Low) 2:Moderate (Medium) 3:Substantial (High)

UNIT-I	FUNDAMENTALS OF CONVENTIONAL SURVEYING AND LEVELLING	9 Hours

Classifications and basic principles of surveying - Equipment and accessories for ranging and chaining - Methods of ranging - Compass - Types of Compass - Bearing - Types - True Bearing - Magnetic Bearing - Levelling- Principles and theory of Levelling - Datum- Bench Marks - Temporary and Permanent Adjustments- Methods of Levelling- Booking - Reduction - Sources of errors in Levelling - Curvature and refraction.

UNIT-II	THEODOLITE AND TRIGNOMETRIC LEVELLING	9 Hours

Introduction- Classification of theodolite- Temporary and permanent adjustments –Measurements of horizontal and vertical angles- Theodolite traversing-Traversing computation-Balancing of traversing-Introduction to omitted measurements. Trignometrical levelling: Heights and distances - Base of the object accessible and inaccessible.

UNIT-III	TACHEOMETRIC SURVEYING AND CONTOURS	9 Hours

Introduction-Instruments-Different systems of tachometric measurements- Tacheometer -Stadia Constants - Analytic Lens - Tangential and Stadia Tacheometry surveying-Substense method: Vertical and horizontal measurements. Contour - Contouring - Characteristics of contours - Methods of contouring- Direct method-Indirect method- Contour gradient -Uses of contour plan and map- Measurements of area and volume.

UNIT-IV	CURVESAND TRIANGULATION	9 Hours

Curves-Classifications-Elements of curves-Designation of curves-Setting out of simple curves: Linear and instrument method. Triangulation- Classification-Basic systems-Operation-Signals and towers-Satellite station.

UNIT-V	ADVANCED SURVEYING	9 Hours

Total station: Features-Recording-Advantages-Fields procedure. Photogrammetry: Aerial photogrammetry-Application. Remote sensing: Classification-principles- Resolution-Sensors-Methods of remote sensing-Image interpretation-

Application- Remote sensing in India. Geographic Information Systems: Scope- Purposes- Hardware of GIS-Applications. Global Positioning Systems: GPS elements- Application and uses- Advantages. Introduction about Drone surveying	
	TOTAL: 45 Hours
TEXT BOOKS:	
1.	Punmia B.C, "Surveying, Vol. I and II", Laxmi Publications, 2016.
2.	Basak N.N, "Surveying and Levelling", Tata Mc Graw Hill Publishing Company Ltd., New Delhi, 2014.
3.	Kumar S., " Basics of Remote Sensing and GIS", Laxmi Publication (P) Ltd,2015
REFERENCES:	
1.	Arora K. R, "Surveying Vol. I and II", Standard Book House, 2015.
2.	Duggal S.K, "Surveying Vol. I and II", Tata McGraw Hill, New Delhi, 2013.
3.	Kanetkar T.P, "Surveying and Levelling Vols. I and II", United Book Corporation, Pune, 2014.

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COURSE CODE **U19GE302** L T P C

COURSE NAME **MANDATORY COURSE:**
ENVIRONMENT AND CLIMATE SCIENCE 2 0 0 0

Course Outcomes

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 Mapping	PO -1	PO -2	PO -3	PO -4	PO -5	PO -6	PO -7	PO -8	PO -9	PO -10	PO -11	PO -12
CO – 1	√	√				√	√					
CO – 2	√											
CO – 3	√	√				√	√					
CO – 4	√	√				√	√					
CO – 5	√	√				√	√					

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 measuresMontreal Protocol to protect ozone layer depletion -Rain Water Harvesting - .Effect of climate change due to air pollutionCase 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

Text Book:

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

Reference Books:

1. S. Radjarejesri et al., "Environmental Science" Sonaversity, Sona College of Technology, Salem, 2018.
2. Masters, G.M., "Introduction to Environmental Engineering and Science", Pearson Education Pvt., Ltd., 2nd Edition, 2004.
3. Erach, B., "The Biodiversity of India", Mapin Publishing P.Ltd.,Ahmedabad, India.
4. ErachBharucha, "Textbook of Environmental Studies for Undergraduate Courses", 2005, University Grands Commission, Universities Press India Private Limited, Hyderguda, Hyderabad – 500029.

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COURSE CODE	COURSE NAME	L	T	P	C
U19CE305	MATERIAL TESTING LABORATORY	0	0	2	1

Course Objective (s): The Purpose of learning this course is to:

1.	Provide basic knowledge on properties of various construction materials.
2.	Acquaint with the experimental methods to determine the mechanical properties of materials.
3.	Provide knowledge in design of concrete structures, soil subgrade and pavements.

Course Outcome (s) (COs): At the end of this course, the students will be able to:

CO1	Determine the physical properties of given cement, fine aggregates coarse aggregates and wooden sample. **(K4)**
CO2	Evaluate Modulus of elasticity, torsional strength, hardness and tensile strength of given specimens. **(K5)**
CO3	Apply the technical concepts and ways to solve engineering problems through conducting experiments. **(K3)**

Knowledge Level: K1 – Remember: K2 – Understand: K3 – Apply: K4 – Analyze: K5 – Evaluate:

CO – PO Mapping

COs	Pos												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	POS
CO1	3	1	1	1	1	1	1	2	1	-	-	2	1	2
CO2	3	2	3	1	2	1	1	2	1	-	-	2	1	2
CO3	3	3	3	3	2	2	2	3	2	1	1	3	1	2
CO (Avg)	3	2	2.3	1.7	1.7	1.3	1.3	2.3	1.3	0.3	0.3	2.3	1	2

Correlation Level: 1:Slight (Low) 2:Moderate (Medium) 3:Substantial (High)

COURSE CONTENT

Brick/Building blocks: Shape and Size-Efflorescence-Compressive strength-Water absorption- Field test.
Wood: Compressive strength.
Cement: Specific gravity test- Fineness -Consistency test- Setting time- Soundness -Compressive strength of cement mortar cubes- Field test.
Fine aggregate: Specific gravity test- Bulking of sand-Sieve Analysis-Fineness modulus.
Coarse aggregate: Specific gravity test-Crushing strength-Impact strength-Shape test-Water absorption- Sieve Analysis-Fineness modulus.
Steel: Stress-strain characteristics - Modulus of elasticity -Hardness -Impact strength-Shear strength.
Evaluation of Stiffness on helical spring.
Stiffness and modulus of rigidity of the specimen using torsion testing machine.
Deflection test on cantilever and simply supported beam.

TOTAL: 30 Hours

REFERENCES:

1.	M. S. Shetty, "Concrete Technology - Theory and Practice", S. Chand Publications, 2006
2.	IS 4031 (Part 1) – 1996 – Indian Standard Method for determination of fineness by dry sieving.
3.	IS 2386 (Part 1 to Part 6) – 1963 – Indian Standard methods for test for aggregate for concrete
4.	IS 383– 1970 Indian Standard specification for coarse and fine aggregates from natural sources for concrete.
5.	IS 456-2000 Code of Practice is an Indian Standard code for Plain and Reinforced Concrete

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COURSE CODE	COURSE NAME	L	T	P	C
U19CE306	SURVEY LABORATORY	0	0	2	1

Course Objective (s): The Purpose of learning this course is to:

1.	To train the students in taking field observations pertaining to some of the real world problems such as triangulation, contouring, Total Station, Drones etc.,
2.	To train the students in all the related calculations and in the preparation of the required maps.
3.	To impart intensive training in the use of surveying instruments
4.	To train the students to appreciate practical difficulties in surveying on the field.
5.	Providing an opportunity to the students to develop team spirit.

Course Outcome (s) (COs): At the end of this course, the students will be able to:

CO1	Use conventional surveying tools such as chain/tape, compass, dumpy level, theodolite in the field of civil engineering applications such as structural plotting and highway profiling.
CO2	Use modern surveying instruments like total station and GPS.
CO3	Apply the technical concepts and ways to solve engineering problems by conducting experiments.

Knowledge Level: K1 – Remember: K2 – Understand: K3 – Apply: K4 – Analyze: K5 – Evaluate:

CO – PO Mapping

Cos	Pos												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	POS
CO1	3	3		2		2		2	3	3	2	2	2	2
CO2	3	3		2		2		2	3	3	2	2	2	2
CO3	3	3		2		2		2	3	3	2	2	2	2
CO (Avg)	3	3		2		2		2	3	3	2	2	2	2

Correlation Level: 1:Slight (Low) 2:Moderate (Medium) 3:Substantial (High)

COURSE CONTENT S

Chain Survey

1. Study of chains and its accessories, Aligning, Ranging, Chaining and Marking Perpendicular offset

Compass Survey

2. Compass Traversing – Measuring Bearings & arriving included angles

Levelling - Study of levels and levelling staff

3. Reduction of levels (Check and Fly leveling) - Height of collimation and Rise and Fall method.

Theodolite - Study of Theodolite

4. Measurements of horizontal angles by reiteration and repetition and vertical angles
5. Determination of elevation of an object using single plane method when base is accessible/inaccessible

Tacheometry – Tangential system – Stadia system

6. Measurement of height and distance using stadia and tangential system of tachometry.

Curve Setting

7. Setting out of a simple curve using linear method.

Total Station - Study of Total Station, Measuring Horizontal and vertical angles

8. Measurement of angles and height
9. Traverse using Total station and Area of Traverse
10. Determination of distance and difference in elevation between two inaccessible points using Total station

Global Positioning Systems

11. Calculation of latitude and longitude using GPS.

Drones

12. Advance surveying using Drones

Setting out works

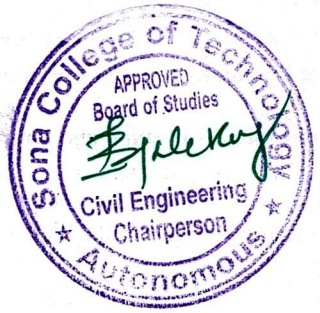
Centre line marking for single Room and Double Room

TOTAL: 30

REFERENCES:

1. Arora K. R, "Surveying Vol. I and II", Standard Book House, 2015.

2.	Duggal S.K, "Surveying Vol. I and II", Tata McGraw Hill, New Delhi, 2013.
3.	Kanetkar T.P, "Surveying and Levelling Vols. I and II", United Book Corporation, Pune, 2014.



U19ENG301- Communication Skills Laboratory (Lab/Practical Course) 0 0 2 1

(Common to all branches of Third / Fourth Semester B.E / B.Techprogrammes)

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

- Communicate confidently and effectively
- Demonstrate active listening skills
- Practice soft skills and interpersonal skills to excel in their jobs.
- Use language efficiently to face interviews, participate in group discussions and present speeches.

1. **Listening Comprehension**: Listening and typing – listening and sequencing of sentences – Filling in the blanks – Listening and answering questions.

2. **Reading Comprehension**: Filling in the blanks – Cloze exercises – Vocabulary building – Reading and answering questions.

3. **Speaking: Phonetics**: Intonation – Ear training – Correct Pronunciation – Sound recognition exercises – Common errors in English.

Conversations: Face to Face Conversation – Telephone conversation – Role play activities (Students take on roles and engage in conversation)

4. Making presentations: introducing oneself – introducing a topic – answering questions – individual presentation practice

5. Creating effective PPTs – presenting the visuals effectively

6. Using appropriate body language in professional contexts – gestures, facialexpressions, etc.

7. Preparing job applications - writing covering letter and résumé

8. Applying for jobs online - email etiquette

9. Participating in group discussions – understanding group dynamics - brainstorming the topic – mock GD

10. Training in soft skills - persuasive skills – people skills - questioning and clarifying skills

11. Writing Project proposals: collecting, analyzing and interpreting data / drafting the final report

12. Attending job interviews – answering questions confidently

13. Interview etiquette – dress code – body language – mock interview

TOTAL: 30 PERIODS

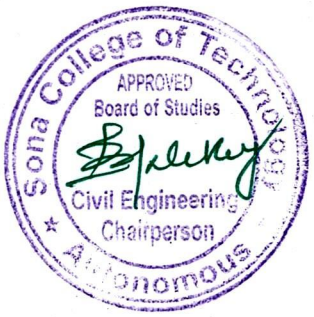
REFERENCE BOOKS:

1. English and Soft Skills. Dhanavel. S.P. Hyderabad: Orient BlackSwan Ltd. 2010.
2. How to Prepare for Group Discussion and Interview, Corneilssen, Joep. New Delhi: Tata-McGraw-Hill, 2009.
3. Group Discussion and Team Building D'Abreo, Desmond A. Mumbai: Better yourself books, 2004.
4. The ACE of Soft Skills, Ramesh, Gopalswamy, and MahadevanRamesh.New Delhi: Pearson, 2010.
5. Corporate Soft Skills, Gulati, Sarvesh. New Delhi: Rupa and Co. 2006.
6. Presentation Skills for Students, Van Emden, Joan, and Lucinda Becker. New York: Palgrave Macmillan, 2004.
7. Dictionary of Common Errors, Turton, N.D and Heaton, J.B. Addision Wesley Longman Ltd., Indian reprint 1998.

EXTENSIVE READING

1. The 7 Habits of Highly Effective People,Covey, Stephen R. New York: Free Press, 1989.

2. The Professional, Bagchi, Subroto.New Delhi: Penguin Books India, 2009.



Semester-III	U19 GE301- 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 higher levels of verbal aptitude skills in English with regard to specific topics

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, highest power. c. **Averages:** Basics of averages and weighted average. d. **Percentages**: Basics of percentage and Successive percentages. e. **Ratio and proportion:** Basics of R &P, Alligations, Mixture and Partnership. f. **Profit ,Loss and Discount**: Basic & Advanced PLD g. **Data Interpretation**: Tables, Bar diagram, Venn diagram, Line graphs, Pie charts, Caselets, Mixed varieties, Network diagram and other forms of data interpretation. h. **Syllogism:** Six set syllogism using Venn diagram and tick and cross method
3. Verbal Aptitude	**Demonstrating English language skills with reference to the following topics:** a. Verbal analogy b. Tenses c. Prepositions d. Reading comprehension e. Choosing correct / incorrect sentences f. Describing pictures g. Error spotting

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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 1/9/23.

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

UNIT I WEAVING AND CERAMIC TECHNOLOGY **3**

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

UNIT II DESIGN AND CONSTRUCTION TECHNOLOGY **3**

Designing and Structural construction House & Designs in household materials during Sangam Age -Building materials and Hero stones of Sangam age – Details of Stage Constructions in Silappathikaram - Sculptures and Temples of Mamallapuram - Great Temples of Cholas and other worship places - Temples of Nayaka Period - Type study (Madurai Meenakshi Temple)- Thirumalai Nayakar Mahal - Chetti Nadu Houses, Indo - Saracenic architecture at Madras during British Period.

UNIT III MANUFACTURING TECHNOLOGY **3**

Art of Ship Building - Metallurgical studies - Iron industry - Iron smelting, steel -Copper and gold- Coins as source of history - Minting of Coins – Beads making-industries Stone beads -Glass beads - Terracotta beads - Shell beads/ bone beats - Archeological evidences - Gem stone types described inSilappathikaram.

UNIT IV AGRICULTURE AND IRRIGATION TECHNOLOGY **3**

Dam, Tank, ponds, Sluice, Significance of Kumizhi Thoompu of Chola Period, Animal Husbandry - Wells designed for cattle use - Agriculture and Agro Processing - Knowledge of Sea - Fisheries – Pearl - Conche diving - Ancient Knowledge of Ocean - Knowledge Specific Society.

UNIT V SCIENTIFIC TAMIL & TAMIL COMPUTING **3**

Development of Scientific Tamil - Tamil computing – Digitalization of Tamil Books – Development of Tamil Software – Tamil Virtual Academy – Tamil Digital Library – Online Tamil Dictionaries –Sorkuvai Project.

TOTAL : 15 PERIODS

TEXT-CUM-REFERENCE BOOKS

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

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COURSE CODE U19GE302 L T P C

COURSE NAME **MANDATORY COURSE:**

ENVIRONMENT AND CLIMATE SCIENCE 2 0 0 0

Course outcome:

Upon completion of this course the students will be able to

CO1 Describe the importance of the acute need for environmental awareness and discuss significant aspects of natural resources like forests, water and food resources.

CO2 Illustrate the concepts of an ecosystem and provide an overview of biodiversity and its conservation.

CO3 Analyze the causes, effects of various environmental pollution and their appropriate remedial measures.

CO4 Provide solutions to combat environmental issues like global warming, acid Rain, ozone layer depletion.

CO5 Analyze the effect of climate change in various sectors and their remedial measures.

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

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

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

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

Unit II **ECOSYSTEMS AND BIODIVERSITY** L 6

Structure and Function of an Ecosystem– Energy Flow in the Ecosystem -Food Chains, Food Webs and Ecological Pyramids. Introduction to Biodiversity –Value of Biodiversity: Consumptive Use, Productive Use, Social, Ethical, Aesthetic and Option Values –India as a Mega-Diversity Nation –– Threats to Biodiversity: Habitat Loss, Poaching of Wildlife, Man-Wildlife Conflicts – Endangered and Endemic Species of India – Conservation of Biodiversity: In-Situ and Ex-Situ conservation of Biodiversity.

Unit III **ENVIRONMENTAL POLLUTION** L 6

Definition – Causes, Effects and Control Measures of:-(A) Air Pollution(B) Water Pollution (C) Soil Pollution (D) Marine Pollution (E) Noise Pollution (F) Thermal Pollution, Solid Waste Management-Effects and Control Measures of Acid Rain,– Role of an Individual in Prevention of Pollution.

Unit IV FUNDAMENTALS OF CLIMATE CHANGE L 6

Sustainable Development- - Climate Change-Causes and effects of Global Warming - Effect of global warming in food supply, plants, sea, coral reef, forest, agriculture, economy- Kyoto Protocol in reduction of greenhouse gases - Ozone Layer Depletion-mechanism, effects and control measures Montreal Protocol to protect ozone layer depletion -Rain Water Harvesting - .Effect of climate change due to air pollution Case study - CNG vehicles in Delhi.

Unit V EFFECT OF CLIMATE CHANGE L 6

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

Total Number of hours: 30

Learning Resources

Text Book:

1. Miller, T.G. Jr., "Environmental Science", Wadsworth Pub. Co. 2018 2. Anubha Kaushik and Kaushik,
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.

29/8/22

Dr. M. Raja
Course Coordinator / Sciences

29/8/2022

Dr. C. Shanthi
HOD / Sciences

29/8

Dr. M. Renuga
Chairperson BOS,
Science and Humanities

U19ENG301- Communication Skills Laboratory (Lab/Practical Course) 0 0 2 1

(Common to all branches of Third / Fourth Semester B.E / B.Tech-programmes)

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

- Communicate confidently and effectively
- Demonstrate active listening skills
- Practice soft skills and interpersonal skills to excel in their jobs.
- Use language efficiently to face interviews, participate in group discussions and present speeches.

1. **Listening Comprehension**: Listening and typing – listening and sequencing of sentences – Filling in the blanks – Listening and answering questions.

2. **Reading Comprehension**: Filling in the blanks – Cloze exercises – Vocabulary building – Reading and answering questions.

3. **Speaking: Phonetics**: Intonation – Ear training – Correct Pronunciation – Sound recognition exercises – Common errors in English.

Conversations: Face to Face Conversation – Telephone conversation – Role play activities (Students take on roles and engage in conversation)

4. Making presentations: introducing oneself – introducing a topic – answering questions – individual presentation practice

5. Creating effective PPTs – presenting the visuals effectively

6. Using appropriate body language in professional contexts – gestures, facialexpressions, etc.

7. Preparing job applications - writing covering letter and résumé

8. Applying for jobs online - email etiquette

9. Participating in group discussions – understanding group dynamics - brainstorming the topic – mock GD

10. Training in soft skills - persuasive skills – people skills - questioning and clarifying skills

11. Writing Project proposals: collecting, analyzing and interpreting data / drafting the final report

12. Attending job interviews – answering questions confidently

13. Interview etiquette – dress code – body language – mock interview

TOTAL: 30 PERIODS

REFERENCE BOOKS:

1. English and Soft Skills, Dhanavel, S.P. Hyderabad: Orient BlackSwan Ltd. 2010.
2. How to Prepare for Group Discussion and Interview, Corneilssen, Joep. New Delhi: Tata-McGraw-Hill, 2009.
3. Group Discussion and Team Building D'Abreo, Desmond A. Mumbai: Better yourself books, 2004.
4. The ACE of Soft Skills, Ramesh, Gopalswamy, and MahadevanRamesh.New Delhi: Pearson, 2010.
5. Corporate Soft Skills, Gulati, Sarvesh. New Delhi: Rupa and Co. 2006.
6. Presentation Skills for Students, Van Emden, Joan, and Lucinda Becker. New York: Palgrave Macmillan, 2004.
7. Dictionary of Common Errors, Turton, N.D and Heaton, J.B. Addision Wesley Longman Ltd., Indian reprint 1998.

EXTENSIVE READING

1. The 7 Habits of Highly Effective People,Covey, Stephen R. New York: Free Press, 1989.
2. The Professional, Bagchi, Subroto.New Delhi: Penguin Books India, 2009.

HOD

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Sona College of Technology,
SALEM - 6

III-Sem

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

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

1. Demonstrate capabilities in specific soft-skill areas using hands-on and/or case-study approaches
2. Solve problems of greater intricacy in stated areas of quantitative aptitude and logical reasoning
3. Demonstrate good vocabulary skills, analyse comprehension and critical reasoning passages, spot errors and utilize language skills to describe pictures effectively.

1.Soft Skills	**Demonstrating soft-skill capabilities with reference to the following topics:** a. Attitude building b. Dealing with criticism c. Innovation and creativity d. Problem solving and decision making e. Public speaking f. Group discussions
2. Quantitative Aptitude and Logical Reasoning	**Solving problems with reference to the following topics:** a. Vedic Maths: Fast arithmetic, multiplications technique, Criss cross, Base technique, Square root, Cube root, Surds, Indices, Simplification. b. Numbers: Types, Power cycle, Divisibility, Prime factors & multiples, HCF & LCM, Remainder theorem, Unit digit,Tens digit, highest power. c. Averages: Basics of averages and weighted average. d. Percentages: Basics of percentage and Successive percentages. e. Ratio and proportion: Basics of R &P, Alligations, Mixture and Partnership. f. Profit ,Loss and Discount: Basic & Advanced PLD g. Data Interpretation: Tables, Bar diagram, Venn diagram, Line graphs, Pie charts, Case lets, Mixed varieties, Network diagram and other forms of data interpretation. h. Syllogism: Six set syllogism using Venn diagram and tick and cross method
3. Verbal Aptitude	**Demonstrating English language skills with reference to the following topics:** a. Verbal analogy b. Tenses c. Prepositions d. Reading comprehension e. Choosing correct / incorrect sentences f. Describing pictures g. Error spotting

S. Anita 31/4/2023.

Dr.S.Anita
Head/Training

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

Civil
IV

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

S. No	Course Code	Course Title	Lecture	Tutorial	Practical	Credit	Total Contact Hours
Theory							
1	U19CE401	Environmental Engineering	3	0	0	3	45
2	U19CE402	Strength of Materials-II	2	1	0	3	45
3	U19CE403	Transportation Engineering	3	0	0	3	45
4	U19CE404	Concrete Technology	3	0	0	3	45
5	U19CE903	**Professional Elective -** Elements of Building Planning	3	0	0	3	45
	U19CE904	**Professional Elective -** Energy Efficiency and Green Building					
6	U19GE403	Mandatory Courses - Essence of Indian Traditional Knowledge	2	0	0	0	30
Practical							
7	U19CE405	Fluid Mechanics Laboratory	0	0	2	1	30
8	U19CE406	Concrete and Highway Laboratory	0	0	2	1	30
9	U19CE407	Environmental Engineering Laboratory	0	0	2	1	30
10	U19GE401	Soft Skills and Aptitude-II	0	0	2	1	30
					Total Credits	**19**	**375**

ApprovedBy

Chairperson, Civil Engineering BoS
Dr.R.Malathy

Member Secretary, Academic Council
Dr.R.Shivakumar
9.1.24

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

Copy to:-
HOD / Civil Engineering, Fourth Semester BE Civil Students and Staff, CO

COURSE CODE	COURSE NAME	L	T	P	C
U19CE401	ENVIRONMENTAL ENGINEERING	3	0	0	3

Course Objective (s): The Purpose of learning this course is to:

1.	Understand the various characteristics of Water so that its effective usage for various purposes can be obtained.
2.	Apply the various design criteria for the development of diverse unit operators and processes to have an effective water treatment system.
3.	Recognize the concepts behind the various types of Wastewater handling and their effective disposal.
4.	Utilize the various design concepts for effective planning of Wastewater treatment units.
5.	Determine appropriate cutting-edge Wastewater treatment techniques as per disposal norms.

Course Outcome (s) (COs): At the end of this course, the students will be able to:

CO1	Identify the quantity and quality of water from various sources and the processes involved in the water conveyancesystems.**(K1)**
CO2	Infer the design principles of unit operations and processes for water treatment.**(K2)**
CO3	Illustrate the design concepts and implementation of sewage transmission systems.**(K2)**
CO4	Design various sewage treatment systems.**(K3)**
CO5	Justify the suitable advanced treatment techniques for water and wastewater treatment.**(K5)**

Knowledge Level:K1 – Remember: K2 – Understand: K3 – Apply: K4 – Analyze: K5 – Evaluate:

CO – PO Mapping

COs	Pos												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	1	1	1	2	1	-	-	-	-	2	1
CO2	3	3	2	2	1	2	2	2	-	-	-	-	1	1
CO3	3	3	2	2	1	2	2	2	-	-	-	-	2	1
CO4	3	3	2	1	1	1	2	2	-	-	-	-	1	1
CO5	3	3	2	2	1	2	1	2	-	-	-	-	2	2
CO (Avg)	**3**	**3**	**2**	**1.6**	**1**	**1.6**	**1.8**	**1.8**	**-**	**-**	**-**	**-**	**1.6**	**1.2**

Correlation Level: 1:Slight (Low) 2:Moderate (Medium) 3:Substantial (High)

UNIT-I	WATER SUPPLY SYSTEM - SOURCE AND CONVEYANCE	9 Hours

Objectives- Design period - Population forecasting-Water demand -Sources of water and their Characteristics – Selection of water source- Drinking Water quality standards-Intake structures. Conveyance- Laying, jointing & testing of pipes- selection of pump and pipe materials – pipe joints -Distribution System of water supply.

UNIT-II	DESIGN PRINCIPLES OF WATER TREATMENT	9 Hours

Objectives-Selection of unit operations and process-Principles of screening, flocculation, sedimentation, filtration, disinfection – water softening-miscellaneous water treatments (Aeration-Iron & Manganese removal- Defluoridation)-Operation and maintenance aspects.

UNIT-III	SEWERAGE SYSTEM:COLLECTION AND TRANSMISSION	9 Hours

Common terms used in sanitary engineering- wastewater characteristics -Quantity of sanitary sewage: Sources of wastewater. Quantity of storm sewage: factors affecting storm sewage - Quantity of storm-water. Design of sewers - laying, jointing, and testing of sewers-sewer appurtenances- sewer materials and joints.

UNIT-IV	SEWAGE TREATMENT AND DESIGN PRINCIPLES	9 Hours

Objectives-types of treatments and processes- layout of sewage treatment plants -Design principles of screen chamber, grit chamber, primary sedimentation tank, activated sludge process-Modified activated sludge process-miscellaneous water treatments (oxidation ditch- chlorination-oxidation ponds-aerated lagoons)

UNIT-V	SEWAGE DISPOSAL AND RURAL SANITATION	9 Hours

Wastewater disposal methods -Sewage farming - Oxygen sag curve-Streeter Phelps model-Role of IoT in Wastewater reclamation -Sanitary fittings: one pipe and two pipes system-general layout of house drainage connection.

TOTAL: 45 Hours

TEXTBOOKS:

1. Garg S.K, "Environmental Engineering Vol.I& II", Khanna Publishers, New Delhi, 2010 & 2015.

2.	Punmia, B.C.,Ashok Jain, and Arun Jain, "Water Supply Engineering", Laxmi Publications (P) Ltd., New Delhi, 2010.
3.	Birdie G.S, Birdie J.S, "Water Supply & Sanitary Engineering", Dhanpat Rai Publishing Company (P) Ltd. New Delhi, 2013.
4.	Duggal K.N., "Elements of Environmental Engineering" S.Chand and Co. Ltd., New Delhi, 2014.
REFERENCES:	
1.	Manual on Water Supply and Treatment, CPHEEO, Ministry of Urban Development, Government of India, New Delhi, 2013.
2.	Syed R. Qasim and Edward M. Motley Guang Zhu, Water Works Engineering Planning, Design and Operation, Prentice Hall of India Learning Private Limited, New Delhi, 2009.
3.	Metcalf and Eddy- Wastewater Engineering–Treatment and Reuse, Tata Mc.Graw-Hill Company, New Delhi, 2010.

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COURSE CODE	COURSE NAME	L	T	P	C
U19CE402	STRENGTH OF MATERIALS II	2	1	0	3

Course Objective (s): The Purpose of learning this course is to:

1.	Determine the deflection of the beam based on the various methods.
2.	Analysis of the truss components using the method of joints, section, and tension coefficient.
3.	Apply knowledge and design columns for axial and bending.
4.	Calculation of Principal stress and strain for thin and compound cylinder
5.	Determining the stresses in unsymmetrical and curved beams.

Course Outcome (s) (COs): At the end of this course, the students will be able to:

CO1	Establish the slope and deflection in beams by using various methods. **(K2)**
CO2	Determine the forces in plane truss members**(K3)**
CO3	Familiarize the behavior of columns under axial and eccentric loads.**(K3)**
CO4	Examine the problems related to thin and thick cylinders subjected to fluid pressure and study the various theories of failures.**(K4)**
CO5	Determine the stresses due to the Unsymmetrical bending of beams, locate the shear center, and find the stresses in curved beams.**(K5)**

Knowledge Level:K1 – Remember: K2 – Understand: K3 – Apply: K4 – Analyze: K5 – Evaluate:

CO – PO Mapping

COs	Pos												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	1	1	1	0	0	0	0	2	2	3	3
CO2	3	3	3	3	1	1	0	0	0	0	2	3	2	2
CO3	2	3	3	2	1	1	0	0	0	0	2	3	3	2
CO4	2	2	2	1	1	1	0	0	0	0	2	2	2	2
CO5	2	3	2	2	1	1	0	0	0	0	2	2	1	1
CO (Avg)	**2.4**	**2.8**	**2.4**	**1.8**	**1**	**1**	**0**	**0**	**0**	**0**	**2**	**2.4**	**2.2**	**2**

Correlation Level: 1:Slight (Low) 2:Moderate (Medium) 3:Substantial (High)

UNIT-I	DEFLECTION OF DETERMINATE BEAMS	6+3 = 9 Hours

Elastic curve – Governing differential equation - Double integration method - Macaulay's method - Area moment method - conjugate beam method for computation of slope and deflection of determinant beams.

UNIT-II	ANALYSIS OF TRUSSES	6+3 = 9 Hours

Determinate and indeterminate trusses - Analysis of pin-jointed plane determinate trusses by method of joints, method of sections, and tension coefficient method – Analysis of Space trusses by tension coefficient method.

UNIT-III	COLUMNS	6+3 = 9 Hours

Euler's column theory – critical load for prismatic columns with different end conditions – Effective length – limitations - Rankine-Gordon formula - Eccentrically loaded columns – middle third rule - Middle fourth rule. - Core of a section. Combined axial and bending stresses.

UNIT-IV	CYLINDERS AND THEORIES OF FAILURES	6+3 = 9 Hours

Thin cylindrical and spherical shells – stresses, change in dimensions and volume -Thick cylinders – lame's theory – Compound cylinders – shrinking on stresses. Maximum Principal stress theory – Maximum Principal strain theory – Maximum shear stress theory – Total Strain energy theory – Maximum distortion energy theory – Application problems.

UNIT-V	ADVANCED TOPICS	6+3 = 9 Hours

Unsymmetrical bending of beams of symmetrical and unsymmetrical sections – Shear Centre - curved beams – Winkler Bach formula – Stresses in hooks.

TOTAL: 30+15= 45

TEXTBOOKS:

1.	Rajput R.K. "Strength of Materials", S.Chand and Co, New Delhi, 2014.
2.	Bansal R.K, "Strength of Materials", Laxmi Publications, New Delhi, 2017.

3.	Ratan.S.S., "Strength of Materials", Tata McGraw Hill Education Pvt. Ltd., New Delhi, 2011.
REFERENCES:	
1.	Chandramouli P.N, "Fundamentals of Strength of Materials", PHI Learning Private Limited, New Delhi, 2013.
2.	Subramanian R, "Strength of Materials", Oxford University Press, New Delhi, 2010.

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COURSE CODE	COURSE NAME	L	T	P	C
U19CE403	TRANSPORTATION ENGINEERING	3	0	0	3

Course Objective (s): The Purpose of learning this course is to:

1.	Understand the concept of highway development and different cross-sectional elements in the highway.
2.	Capability to know about the highway materials and design of pavements as per IS code.
3.	Apply knowledge and be able to design the pavements using IRC standards.
4.	Associate the concepts of railway planning and be able to design the permanent way.
5.	Able to locate the plan and also design the airport components.

Course Outcome (s) (COs): At the end of this course, the students will be able to:

CO1	Explain the various highway development and design cross-section elements. **(K1)**
CO2	Determine the characteristics of pavement materials and design of pavement as per IRC.**(K2)**
CO3	Design of pavement as per IRC.**(K3)**
CO4	Apply the concepts of railway planning while designing the permanent way.**(K4)**
CO5	Plan the locations and design of the airport components.**(K5)**

Knowledge Level:K1 – Remember: K2 – Understand: K3 – Apply: K4 – Analyze: K5 – Evaluate:

CO – PO Mapping

COs	Pos												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	2	3	1	1	1	3	3	3	3	3	3
CO2	3	3	3	2	2	2	1	1	3	2	3	2	3	2
CO3	-	-	3	-	-	-	-	-	2	-	-	-	3	2
CO4	3	1	1	1	1	1	1	2	2	1	2	2	3	2
CO5	3	3	3	2	3	1	1	1	3	1	1	2	3	2
CO (Avg)	3	2.5	2.6	1.75	2.25	1.25	1	1.25	2.6	1.75	2.25	2.25	3	2.2

Correlation Level: 1:Slight (Low) 2:Moderate (Medium) 3:Substantial (High)

UNIT-I	INTRODUCTION TO HIGHWAY	9 Hours

Introduction to Highway, classification of roads, highway planning-Road cross section-Camber, gradient, superelevation-Sight distance: PIEV theory-Stopping sight distance-Over taking sight distance-Intermediate sight distance. Horizontal curves: Super elevation-Widening of pavements –Introduction to Vertical curves and Transition curves. Types of gradients - grade compensation on curves.

UNIT-II	HIGHWAY MATERIALS	9 Hours

Pavement Materials: Desirable properties and testing of highway materials-Soil: California bearing ratio test, Benkelman Beam test, field density test; Aggregate: Crushing, abrasion, impact, water absorption, flakiness, and elongation indices and stone polishing value test; Bitumen: Penetration, ductility, viscosity, and softening point test.

UNIT-III	PAVEMENT DESIGN	9 Hours

Pavement Design: Rigid and flexible pavements- Components and their functions- Factors affecting the design of pavements; Design practice for flexible pavements (IRC method and recommendations-problems)-Design practice for rigid pavements (IRC recommendations - concepts only). Types of road constructions: Water Bound Macadam, bituminous, Granular based Macadam, and cement concrete road.

UNIT-IV	RAILWAY ENGINEERING	9 Hours

Recent Trends in Indian railways for national development- Permanent way, its components, and function: Rails, sleepers, and ballast- types of rails, rail fastenings, Gauges, coning of wheels, creeps, and kinks. A geometric design of railway tracks-Gradients and grade compensation, super-elevation, widening of gauges in curves (Concepts only) - Points and crossings - Railway stations and yards - Signalling and interlocking, Railway Tunnels

UNIT-V	AIRPORT ENGINEERING	9 Hours

Introduction to air transport –Site selection- Airport obstructions and zoning. Components of the airport- Runway: Orientation-Wind rose diagrams (theory only)-Runway length-Runway configuration and drainage-Preventive measures in runway, Taxiway -Aircraft parking configuration and parking system - Visual aids.

TOTAL: 45 Hours

TEXT BOOKS:	
1.	Khanna K, and Justo C E G, "Highway Engineering", 10th Edition, Khanna Publishers, Roorkee, 2018.
2.	SaxenaSubhash C, and Satyapal Arora, "A Course in Railway Engineering", Dhanpat Rai and Sons, Delhi, 2020.
3.	Khanna S K, Arora M G, and Jain S S, "Airport Planning and Design", Revised 10th edition, Nemchand and Brothers, Roorkee, 2015.
REFERENCES:	
1.	Kadiyali L.R, "Principles and Practice of Highway Engineering", Khanna Technical Publications, New Delhi, 2013.
2.	Rangwala, "Railway Engineering", Charotar Publishing House, 2017.
3.	Rangwala, "Airport Engineering", Charotar Publishing House, 2017.

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COURSE CODE	COURSE NAME	L	T	P	C
U19CE404	CONCRETE TECHNOLOGY	3	0	0	3

Course Objective (s): The Purpose of learning this course is to:

1.	Acquire and apply fundamental knowledge in the fresh and hardened properties of concrete.
2.	Outline the importance of adding admixtures and their properties.
3.	Design a concrete mix thatfulfils the required properties for fresh and hardened concrete.
4.	Summarise the concepts of conventional concrete and its differences with special concretes.
5.	Demonstrate techniques of measuring the Non-Destructive Testing of the concrete structure.

Course Outcome (s) (COs): At the end of this course, the students will be able to:

CO1	Determine the properties of fresh and hardened concrete. **(K2)**
CO2	Apply a suitable admixture in the required field conditions.**(K4)**
CO3	Design the concrete mix using ACI and IS code methods.**(K3)**
CO4	Evaluate the properties and applications of special concretes.**(K1)**
CO5	Diagnose the strength and durability of concrete structures with different testing methods.**(K5)**

Knowledge Level:K1 – Remember: K2 – Understand: K3 – Apply: K4 – Analyze: K5 – Evaluate:

CO – PO Mapping

COs	Pos												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	2	2	2	3	1	2	1	-	2	-	2
CO2	3	2	2	2	2	2	3	1	2	1	-	2	-	2
CO3	3	2	3	2	2	2	3	1	2	1	-	2	-	2
CO4	3	2	2	2	2	2	3	1	2	1	-	2	-	2
CO5	3	2	2	2	2	2	3	1	2	1	-	2	-	2
CO (Avg)	**3**	**2**	**2**	**2**	**2**	**2**	**3**	**1**	**2**	**1**	**-**	**2**	**-**	**2**

Correlation Level: 1:Slight (Low) 2:Moderate (Medium) 3:Substantial (High)

UNIT-I	FRESH AND HARDENED CONCRETE	9 Hours

Fresh concrete: Mechanism of hydration-Water-Cement ratio-Factors affecting the strength of the concrete-Workability - Concepts and tests as per Indian codal specifications. Concrete manufacturing stages: Batching - Mixing -Transportation - Placing of concrete -Curing of concrete.Water: Quality of water for mixing and curing - Use of seawater for mixing Concrete. Hardened concrete: Properties and tests-Strength of concrete - Temperature effects - Creep of concrete -Thermal properties of concrete - Micro cracking of the concrete

UNIT-II	ADMIXTURES	9 Hours

Admixtures -Necessity-Types-Chemical admixtures with specific properties - Accelerators - Retarders -Plasticizers and super plasticizers - Air entraining admixtures-Water proofers -Colouring agent. Mineral admixtures-Fly ash-Slag-Metakaolin-Rice husk ash-Micro and nano silica-Mineral additives and fillers.

UNIT-III	MIX DESIGN	9 Hours

Mix Design-Factors influencing mix proportion-Variability in test results -Quality control -Sampling and acceptance criteria- Design Mix and Nominal Mix- Mix design by ACI method and IS method using IS 10262-2019.

UNIT-IV	SPECIAL CONCRETES AND CONCRETING METHODS	9 Hours

Special concretes: Lightweight concrete – Recycled aggregate concrete - Fibre-reinforced concrete - Polymer concrete - Ferrocement - Ready mix concrete- Self-compacting concrete - High strength concrete – Geopolymer concrete - High-performance concrete-Pervious concrete – Self-curing concrete-Bio and bacterial concrete - Smart concrete: Concrete methods: Extreme weather concreting - Vacuum concrete - Underwater concreting - Guniting and shotcreting

UNIT-V	NON-DESTRUCTIVE TEST AND DURABILITY OF CONCRETE	9 Hours

Non-destructive tests: Rebound hammer-Ultra sonic pulse velocity test. The durability of concrete-Mechanism of corrosion - Causes and effects-Permeability of concrete-Shrinkage-Plastic shrinkage -Drying shrinkage-Chemical attack-Sulfate attack of concrete structures - chloride attack- Remedial measures Application of IoT in smart curing system for concrete.

TOTAL: 45 Hours

TEXT BOOKS:

1.	Shetty, M.S., "Concrete Technology", Theory & Practice, S.Chand and Co, 2019.
2.	Bhavikatti S S, "Concrete Technology", I.K. International Publishing House Pvt. Limited, 2015.
3.	Gupta.B.L., Amit Gupta, Concrete Technology, Jain Book Agency, 2010.
REFERENCES:	
1.	Shetty, M.S., "Concrete Technology", Theory & Practice, S.Chand and Co, 2019.
2.	Bhavikatti S S, "Concrete Technology", I.K. International Publishing House Pvt. Limited, 2015.
3.	Gupta.B.L., Amit Gupta, Concrete Technology, Jain Book Agency, 2010.
4.	Shetty, M.S., "Concrete Technology", Theory & Practice, S.Chand and Co, 2019.
5.	Bhavikatti S S, "Concrete Technology", I.K. International Publishing House Pvt. Limited, 2015.

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COURSE CODE	COURSE NAME	L	T	P	C
U19CE405	Fluid Mechanics Laboratory	0	0	2	1

Course Objective (s): The Purpose of learning this course is to:

1.	To provide practical knowledge in the verification of principles of fluid flow.
2.	To gain knowledge in performance testing of Hydraulic Turbines and Hydraulic Pumps.
3.	To impart knowledge in measuring pressure, discharge, and velocity of fluid flow.

Course Outcome (s) (COs): At the end of this course, the students will be able to:

CO1	Measure the flow, discharge, and energy loss in pipes and open channels.**(K2)**
CO2	Demonstrate the characteristics curves of pumps and turbines.**(K3)**
CO3	Apply the technical concepts and ways to solve engineering problems by conducting experiments.**(K5)**

Knowledge Level: K1 – Remember: K2 – Understand: K3 – Apply: K4 – Analyze: K5 – Evaluate:

CO – PO Mapping

COs	POs												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	3	3	1	2	1	1	1	1	2	1	2	2
CO2	2	3	3	3	2	2	2	1	1	1	2	2	2	2
CO3	2	3	2	2	2	2	2	1	1	1	3	3	2	2
CO (Avg)	2	2.6	2.6	2.6	1.6	2	1.6	1	1	1	2.3	2	2	2

Correlation Level: 1:Slight (Low) 2:Moderate (Medium) 3:Substantial (High)

List of experiments

1. Flow-through venturi meter and orifice meter
2. Flow-through variable duct area - Bernoulli's experiment
3. Flow-through orifice, mouthpiece, and notches
4. Determination of friction coefficient in pipes
5. Determination of minor losses
6. Performance characteristics of centrifugal pumps (Constant speed / Variable speed)
7. Performance characteristics of reciprocating pump
8. Characteristics of Pelton wheel turbine
9. Characteristics of Francis turbine
10. Characteristics of Kaplan turbine
11. Study of the impact of jet on a flat plate (normal/inclined)

TOTAL: 30 Hours

REFERENCES:

1. Modi, P.N and Seth, S.M., Hydraulics and Fluid Mechanics, Standard Book House, Delhi, 2010
2. Dr. R. K. Bansal, A Text book of Fluid Mechanics and Hydraulic Machines, Laxmi Publications Pvt Ltd, Ninth Edition, 2015.

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COURSE CODE	COURSE NAME	L	T	P	C
U19CE406	CONCRETE AND HIGHWAY LABORATORY	0	0	2	1

Course Objective (s): The Purpose of learning this course is to:

1.	To impart knowledge in studying the behaviour of concrete in fresh and hardened conditions.
2.	To gain knowledge on the characteristics of aggregates.
3.	To understand the performance of bitumen by conducting various tests.

Course Outcome (s) (COs): At the end of this course, the students will be able to:

CO1	Analyze the various properties of concrete.**(K3)**
CO2	Characterize the aggregate and bitumen used for road construction.**(K2)**
CO3	Apply the technical concepts and ways to solve engineering problems by conducting experiments.**(K4)**

Knowledge Level:K1 – Remember: K2 – Understand: K3 – Apply: K4 – Analyze: K5 – Evaluate:

CO – PO Mapping

COs	Pos												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	3	3	1	2	1	1	1	1	2	1	2	2
CO2	2	3	3	3	2	2	2	1	1	1	2	2	2	2
CO3	2	3	2	2	2	2	2	1	1	1	3	3	2	2
CO (Avg)	2	2.6	2.6	2.6	1.6	2	1.6	1	1	1	2.3	2	2	2

Correlation Level: 1:Slight (Low) 2:Moderate (Medium) 3:Substantial (High)

TESTS ON FRESH CONCRETE

a) IS methods (10262-2019)
b) Slump cone test
c) Compaction factor test
d) Self-compacting concrete test

TESTS ON HARDENED CONCRETE

a) Compressive Strength test
b) Split tensile strength test
c) Flexural strength test
d) Modulus of Elasticity test
e) Rebound hammer (Demonstration)
f) UPV test (Demonstration)

TEST ON AGGREGATES

a) Los Angeles Abrasion Test

TEST ON BITUMEN

a) Specific Gravity of Bitumen
b) Penetration Test
c) Viscosity Test
d) Softening Point Test
e) Ductility Test

TOTAL: 30 Hours

REFERENCES:

1. Shetty, M.S., "Concrete Technology", Theory & Practice, S.Chand and Co, 2019.
2. S. K. Khanna, C. E. G. Justo., "Highway Engineering", Nem Chand & Bros, New Delhi, 2018,Revised 10th Edition
3. IS 10262 : 2019, Concrete Mix Proportioning — Guidelines(Second Revision), January 2019.
4. Concrete Mix Design ACI 211.1-91

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COURSE CODE	COURSE NAME	L	T	P	C
U19CE407	Environmental Engineering Laboratory	0	0	2	1

Course Objective (s): The Purpose of learning this course is to:

1.	Understand the characteristic difference between Water and Wastewater as per Indian Standards.
2.	Acclaim suitable level of treatment for the water and wastewater samples accustomed.
3.	Assign suitable concepts for predicting the solution through the conduction of experiments over water and wastewater samples given.

Course Outcome (s) (COs): At the end of this course, the students will be able to:

CO1	Test the water and wastewater and their different characteristics as per standard.**(K2)**
CO2	Recommend the degree of treatment required for the water and wastewater.**(K4)**
CO3	Apply the technical concepts and ways to solve engineering problems by conducting the experiment**(K5)**

Knowledge Level:K1 – Remember: K2 – Understand: K3 – Apply: K4 – Analyze: K5 – Evaluate:

CO – PO Mapping

COs	Pos												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	1	1	1	1	-	1	1	-	-	-	-	1	1
CO2	2	2	1	1	2	-	2	1	-	-	-	-	1	2
CO3	1	1	1	1	1	-	1	1	-	-	-	-	1	1
CO (Avg)	1.3	1.3	1	1	1.3	-	1.3	1	-	-	-	-	1	1.3

Correlation Level: 1:Slight (Low) 2:Moderate (Medium) 3:Substantial (High)

List of experiments

1. Sampling and preservation methods and significance of characterization of water and wastewater(Study experiment).
2. Determination of pH,TDS, and EC
3. Determination of Chlorides
4. Determination of Hardness
5. Determination of Total Solids, Suspended solids, Volatile and Fixed solids
6. Determination of Optimum Coagulant Dosage
7. Determination of Residual Chlorine & Determination of Available Chlorine in Bleaching powder
8. Determination of Dissolved Oxygen
9. Determination of B.O.D.
10. Determination of C.O.D.
11. Introduction to Bacteriological Analysis (Study experiment).

TOTAL: 30 Hours

REFERENCES:

1. Standard methods for the examination of water and wastewater, APHA, 23rd Edition, Washington, 2017.
2. Garg S.K., "Environmental Engineering Vol. I & II", Khanna Publishers, New Delhi, 37th Edition 2019.
3. Modi P.N., "Environmental Engineering Vol. I & II", Standard Book House, Delhi-6, 16th Edition 2018.

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COURSE CODE	COURSE NAME	L	T	P	C
U19CE903	ELEMENTS OF BUILDING PLANNING	3	0	0	3

Course Objective (s): The Purpose of learning this course is to:

1.	Understand the concept of Building drawing and approval procedures.
2.	Analyze the requirements of Building with their standards.
3.	Signify the various types of structures with desired purposes.
4.	Understand the concept of Green building with the evaluation procedure.
5.	Prepare the documents of the building to sanction authorities.

Course Outcome (s) (COs): At the end of this course, the students will be able to:

CO1	Plan the residential building as per function requirements.**(K1)**
CO2	Design various elements of the building**(K3)**
CO3	Comprehend the provisions and standards of housing elements.**(K4)**
CO4	Explain the different green building rating systems with real-time examples**(K5)**
CO5	Formulate and design the housing layouts by various standards of the building**(K3)**

Knowledge Level:K1 – Remember: K2 – Understand: K3 – Apply: K4 – Analyze: K5 – Evaluate:

CO – PO Mapping

COs	Pos												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	1	3	1	2	1	3	1	1	-	-	3	2	2
CO2	3	1	3	1	2	1	3	1	1	-	-	3	2	2
CO3	3	1	3	1	1	1	3	1	1	-	-	2	2	2
CO4	2	2	3	1	1	1	3	2	1	-	-	2	2	1
CO5	2	2	3	1	1	1	3	2	1	-	-	2	2	1
CO (Avg)	**2.6**	**1.4**	**3**	**1**	**1.4**	**1**	**3**	**1.4**	**1**	**-**	**-**	**2.4**	**2**	**1.6**

Correlation Level: 1:Slight (Low) 2:Moderate (Medium) 3:Substantial (High)

UNIT-I	BUILDING FUNCTIONAL ELEMENTS	9 Hours

Introduction-Nomenclature of building planning and construction classification of building-Site selection for residential building; Elements of climate-Directions and their characteristics-Orientation of buildings -Factors affecting orientation. Building Bye-Laws - Guidelines for planning and drawing of buildings.

UNIT-II	REQUIREMENTS OF BUILDING	9 Hours

Principles of planning of buildings:Aspect-Prospect-Privacy- Sizes of the Rooms-Roominess-Grouping-Circulation-Sanitation-Elegance- Economy,Principles on minimum plot sizes and building frontage.Minimumstandard dimensions of building elements-Provisions for lighting, ventilation, fire, means of access, and parking.

UNIT-III	PLANNING OF RESIDENTIAL BUILDING	9 Hours

Introduction-House-Home-Rooms meant for the various activities: Purposes and requirements; Economical measures in building construction- Types of Structural frames - Load bearing structures-Framed structures-Prefabricated structures. Introduction to the intelligent building. Fixing the position of various building components and justification.

UNIT-IV	GREEN BUILDING	9 Hours

Principles- Design criteria-Site sustainability-Efficiency: Water use- Energy-Indoor environmental quality- Green building materials-Cost of construction- Comparisons of green building with conventional building- Assessment and evaluation of green building- Green building certification-Green buildings in India.

UNIT-V	BUILDING DRAWING	9 Hours

Introduction to building drawing-Preparation of drawing-Working drawing. Building plans approval procedure as per NBC.-Documents to be submitted for approval of proposed building to the sanctioning authority. Conventional symbols-Preparation of the site plan, plan, elevation, and sectional drawing- Interpretation of Structural, Architectural, and services drawings.

TOTAL: 45 Hours

TEXTBOOKS:

1.	Kumara Swamy N. "Building Planning and Drawing", Charator Publishing House Pvt.Ltd, 8th edition 2015.
2.	Sahu G.C, Joygopal Jena, "Building Material s and Construction", McGraw Hill Education (India) Pvt. Ltd, New Delhi, 2015.
REFERENCES:	
1.	Shah M.G. Kalec. M. and Patki SY, "Building Drawing". Tata Mcgraw Hill, New Delhi, 2012.

22/12/23

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COURSE CODE	COURSE NAME	L	T	P	C
U19CE904	ENERGY EFFICIENCY AND GREEN BUILDING	3	0	0	3

Course Objective (s): The Purpose of learning this course is to:

1.	Describe the importance of energy resources, their availability, and conservation for sustainability goals.
2.	Study and identify the methods adopted to make the building energy efficient.
3.	Gain knowledge about the use of construction materials based on embodied energy values.
4.	Study about different green building rating systems with real-time examples.
5.	Create awareness about clean development mechanisms and the role of UNFCCC in sustainability.

Course Outcome (s) (COs): At the end of this course, the students will be able to:

CO1	Acquire a basic understanding of the green building concept and associated resources. **(K1)**
CO2	Analyze the various methods to design green building parameters. **(K3)**
CO3	Understand the availability of construction materials for energy-efficient construction **(K4)**
CO4	Aware of the various green building rating systems prevail in the country**(K3)**
CO5	Understand the role of UNFCCC and know about clean development mechanism **(K2)**

Knowledge Level: K1 – Remember: K2 – Understand: K3 – Apply: K4 – Analyze: K5 – Evaluate:

CO – PO Mapping

COs	Pos												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	-	2	1	2	2	3	3	1	-	-	1	2	1
CO2	2	1	3	2	1	1	1	1	1	-	-	1	2	1
CO3	1	2	3	2	3	2	2	1	1	-	-	2	2	1
CO4	1	1	2	3	2	2	3	2	1	-	-	2	1	2
CO5	1	3	3	2	2	2	1	1	1	-	-	2	1	2
CO	**1.2**	**1.8**	**2.6**	**2.0**	**2.0**	**1.8**	**2.0**	**1.6**	**1.0**	**-**	**-**	**1.6**	**1.6**	**1.4**

Correlation Level: 1:Slight (Low) 2:Moderate (Medium) 3:Substantial (High)

UNIT-I	INTRODUCTION	9 Hours

Definition and concepts. Energy and water as a resource - Criticality of resources - Needs of modern living - Heat loss and heat gain in buildings- thermal comfort improvement methods - other building comforts -indoor air quality requirements - electrical energy conservation.

UNIT-II	ENERGY-EFFICIENT BUILDINGS	9 Hours

Zero Energy Building (ZEB) - Nearly Zero Energy Building (NZEB) - energy consumption - defining low energy buildings- opportunities and techniques for energy conservation in buildings - water conservation - water management system - water-efficient landscaping - green roofing - rainwater harvesting - sanitary fixtures and plumbing systems - wa4stewater treatment and reuse - process water strategies - adoption to sustainable resources. process and technologies- Energy Conservation Opportunities in Public and Private Buildings.

UNIT-III	CONSTRUCTION MATERIALS AND PRACTICES	9 Hours

Construction materials - Embodied energy, carbon content, and emission of CO_2, SO_2, and NO_x of building materials, elements, and construction process- Current practice and low environmental impact alternatives

UNIT-IV	BUILDING ASSESSMENT SCHEMES	9 Hours

Energy efficiency ratings & ECBC - 2007 - Various energy efficiency rating systems for buildings - LEED, BEE, & GRIHA - case studies -Introduction to BIM.

UNIT-V	CLEAN DEVELOPMENT MECHANISM	9 Hours

Clean Development Mechanism - CDM Benefits for energy conservation methodology and procedure - Eligibility Criteria - UNFCCC - the role of UNFCCC and Government of India - Energy analysis using Equest software, daylight analysis, insulation materials, sun path, and grid analysis - calculation of embodied energy for residential building as a case study.

TOTAL: 45 Hours

TEXTBOOKS:

1. Sustainable Building, Design Manual: Published by The Energy and Resources Institute, Darbari Seth block, IHC Complex, Lodhi Road, New Delhi-110003.

2.	KILBERT, Charles , (2016) Sustainable construction : Green Building Design and Delivery John Wiley and Sons.
3.	BROWN, G.Z. and DEKAY, Mark, 2001. Sun, Wind & Light - Architectural Design Strategies, Second Edition , John Wiley & sons, Inc.
REFERENCES:	
1.	ECBC Code 2007 (Edition 2008) published by Bureau of Energy Efficiency, New Delhi
2.	Bureau of Energy Efficiency Publications - rating System, TERI PUBLICATIONS .
3.	GRIHA Rating System, LEED Publications

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U19GE403 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	PSO3
CO1	2	2	2	-	-	2	-	-	-	-	-	-	-	-	2
CO2	2	2	2	-	-	2	-	-	-	-	-	-	-	-	2
CO3	3	2	2	-	-	2	-	-	-	-	-	-	-	-	2
CO4	3	2	2	-	-	2	-	-	-	-	-	-	-	-	2
CO5	2	2	2	-	-	2	-	-	-	-	-	-	-	-	2

Unit I 6

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

Unit II 6

- Basics of Applied Vedic Science
- 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

- India's contribution to science and technology (from ancient to modern) 6
- 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

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

22/12/2023

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22/12/23

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Professor & Head,
Department of Humanities & Languages,
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

18/12/2023

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