JAI SHRIRAM ENGINEERING COLLEGE, TIRUPPUR – 638 660
(An Autonomous Institution)
Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai
Recognized by UGC & Accredited by NAACandNBA (CSE and ECE)

REGULATIONS 2024

B. E. CIVIL ENGINEERING

CHOICE BASED CREDIT SYSTEM

CURRICULUM FOR SEMESTERS I TO VIII

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B. E. CIVIL ENGINEERING
CHOICE BASED CREDIT SYSTEM
CURRICULUM FOR SEMESTERS I TO VIII

SEMESTER - I

S.NO.	COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	C
1.	24UIP001	Induction Programme		-	-	-	0
		THEORY					
2.	24UHS101	Professional English-I	HSM	3	0	0	3
3.	24UMA101	Matrices and Calculus	BS	3	1	0	4
4.	24UPH101	Engineering Physics	BS	3	0	0	3
5.	24UCY101	Engineering Chemistry	BS	3	0	0	3
6.	24UGE101	Problem Solving and Python Programming	ES	3	0	0	3
7.	24UHS102	தமிழர்மரபு/ Heritage of Tamil	HSM	1	0	0	1
		PRACTICAL					
8.	24UGE111	Problem Solving and Python Programming Laboratory	ES	0	0	4	2
9.	24UBS111	Physics and Chemistry Laboratory	BS	0	0	4	2
10.	24UHS111	English Laboratory	EE	0	0	2	1
			Total Credits	**16**	**1**	**10**	**22**

SEMESTER - II

S.NO.	COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	C
		THEORY					
1.	24UHS201	Professional English-II	HSM	2	0	0	2
2.	24UMA201	Statistics and Numerical Methods	BS	3	1	0	4
3.	24UBE201	Basic Electrical and Electronics Engineering	ES	3	0	0	3
4.	24UME201	Engineering Mechanics	ES	3	1	0	4
5.	24UHS202	தமிழரும்தொழில்நுட்பமும்/ Tamils and Technology	HSM	1	0	0	1
		THEORY CUM PRACTICAL					
6.	24UGEI201	Engineering Graphics and Drafting	ES	3	0	2	4
		PRACTICAL					
7.	24UGE211	Engineering Fundamentals Laboratory	ES	0	0	4	2
8.	24UBE211	Basic Electrical and Electronics Laboratory	ES	0	0	4	2
9.	24UHS211	Communication Laboratory	EE	0	0	4	2
			Total Credits	**15**	**2**	**14**	**24**

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SEMESTER - III

S.NO	COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	C
		THEORY					
1.	24UMA301	Transforms and Partial Differential Equations	BS	3	1	0	4
2.	24UCE301	Strength of Materials	PC	3	0	0	3
3.	24UCE302	Fluid Mechanics	PC	3	1	0	4
4.	24UCE303	Construction Materials and Technology	PC	3	0	0	3
5.	24UCE304	Water Supply and Wastewater Engineering	PC	3	0	0	3
6.	24UCE305	Surveying	PC	3	0	0	3
		PRACTICAL					
7.	24UCE311	Surveying Laboratory	PC	0	0	4	2
8.	24UCE312	Water and Wastewater Analysis Laboratory	PC	0	0	4	2
9.	24UCE313	Computer Aided Building Drawing	EE	0	0	2	1
			Total Credits	**18**	**2**	**10**	**25**

SEMESTER - IV

S.NO.	COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	C
		THEORY					
1.	24UCE401	Applied Hydraulics Engineering	PC	3	1	0	4
2.	24UCE402	Highway and Railway Engineering	PC	3	0	0	3
3.	24UCE403	Structural Analysis I	PC	3	0	0	3
4.	24UCE404	Soil Mechanics	PC	3	0	0	3
5.	24UGE401	Environmental Science and Sustainability	BS	2	0	0	2
6.	24UCE405	Concrete Technology	PC	3	0	0	3
		PRACTICAL					
7.	24UCE411	Hydraulic Engineering Laboratory	PC	0	0	4	2
8.	24UCE412	Materials Testing Laboratory	PC	0	0	4	2
9.	24UCE413	Soil Mechanics Laboratory	PC	0	0	4	2
			Total Credits	**17**	**1**	**12**	**24**

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SEMESTER - V

S.NO.	COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	C
		THEORY					
1.	24UCE501	Design of Reinforced Concrete Structural Elements	PC	3	0	0	3
2.	24UGE501	Human Values and Ethics	HSM	3	0	0	3
3.	24UCE502	Structural Analysis II	PC	3	0	0	3
4.	24UCE503	Foundation Engineering	PC	3	0	0	3
5.		Professional Elective - I	PE	3	0	0	3
6.		Open Elective - I	OE	3	0	0	3
7.		Mandatory Course-I	MC	3	0	0	NC
		PRACTICAL					
8.	24UCE511	Concrete and Highway Engineering Laboratory	PC	0	0	4	2
9.	24UCE512	Survey Camp (2 weeks)	EE	0	0	0	1
			Total Credits	**21**	**0**	**4**	**21**

SEMESTER - VI

S.NO.	COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	C
		THEORY					
1.	24UCE601	Design of Steel Structural Elements	PC	3	0	0	3
2.	24UCE602	Irrigation Engineering	PC	3	0	0	3
3.		Professional Elective - II	PE	3	0	0	3
4.		Professional Elective - III	PE	3	0	0	3
5.		Professional Elective - IV	PE	3	0	0	3
6.		Open Elective - II	OE	3	0	0	3
7.		Mandatory Course-II	MC	3	0	0	NC
		PRACTICAL					
8.	24UCE611	Structural Design and Detailing Laboratory	PC	0	0	4	2
			Total Credits	**21**	**0**	**4**	**20**

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SEMESTER - VII

S.NO.	COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	C
		THEORY					
1.	24UCE701	Estimation, Costing and Valuation Engineering	PC	3	0	0	3
2.	24UCE702	Construction Planning and Scheduling	PC	3	0	0	3
3.	24UMG701	Principles of Management	HSM	3	0	0	3
4.		Professional Elective - V	PE	3	0	0	3
5.		Professional Elective - VI	PE	3	0	0	3
6.		Open Elective - III	OE	3	0	0	3
		PRACTICAL					
7.	24UCE711	Design Project	EE	0	0	4	2
			Total Credits	**18**	**0**	**4**	**20**

SEMESTER - VIII

S.NO.	COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	C
		PRACTICAL					
1.	24UCE811	Project Work/Internship	EE	0	0	20	10
			Total Credits	**0**	**0**	**20**	**10**

Total Credits: 166

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LIST OF PROFESSIONAL ELECTIVE (I – VI)

S.NO.	COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	C
PROFESSIONAL ELECTIVE-I							
1.	24UCEP501	Construction Equipment and Machinery	PE	3	0	0	3
2.	24UCEP502	Construction Management and Safety	PE	3	0	0	3
3.	24UCEP503	Advanced Construction Techniques	PE	3	0	0	3
4.	24UCEP504	Energy Efficient Buildings	PE	3	0	0	3
5.	24UCEP505	Digitalized Construction Lab	PE	3	0	0	3
PROFESSIONAL ELECTIVE-II							
1.	24UCEP601	Airports and Harbours	PE	3	0	0	3
2.	24UCEP602	Traffic Engineering and Management	PE	3	0	0	3
3.	24UCEP603	Urban Planning and Development	PE	3	0	0	3
4.	24UCEP604	Smart cities	PE	3	0	0	3
5.	24UCEP605	Pavement Engineering	PE	3	0	0	3
PROFESSIONAL ELECTIVE-III							
1.	24UCEP606	Concrete Structures	PE	3	0	0	3
2.	24UCEP607	Steel Structures	PE	3	0	0	3
3.	24UCEP608	Prefabricated Structures	PE	3	0	0	3
4.	24UCEP609	Prestressed Concrete Structures	PE	3	0	0	3
5.	24UCEP610	Rehabilitation/ Heritage Restoration	PE	3	0	0	3
PROFESSIONAL ELECTIVE-IV							
1.	24UCEP611	Geo Environmental Engineering	PE	3	0	0	3
2.	24UCEP612	Ground Improvement Techniques	PE	3	0	0	3
3.	24UCEP613	Soil Dynamics and Machine Foundations	PE	3	0	0	3
4.	24UCEP614	Earth and Earth Retaining structures	PE	3	0	0	3
5.	24UCEP615	Tunneling Engineering	PE	3	0	0	3
PROFESSIONAL ELECTIVE-V							
1.	24UCEP701	Climate Change Adaptation and Mitigation	PE	3	0	0	3
2.	24UCEP702	Air and Noise Pollution Control Engineering	PE	3	0	0	3
3.	24UCEP703	Industrial Wastewater Management	PE	3	0	0	3
4.	24UCEP704	Solid and Hazardous Waste Management	PE	3	0	0	3

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5.	24UCEP705	Environment, Health and Safety	PE	3	0	0	3
PROFESSIONAL ELECTIVE-VI							
1.	24UCEP706	Urban water Infrastructure	PE	3	0	0	3
	24UCEP707	Groundwater Engineering	PE	3	0	0	3
3.	24UCEP708	Water Resources Systems Engineering	PE	3	0	0	3
4.	24UCEP709	Watershed Conservation and Management	PE	3	0	0	3
5.	24UCEP710	Water Quality and Management	PE	3	0	0	3

CREDITS SUMMARY

S. No.	Course Components	Credits per Semester								Total Credits
		I	II	III	IV	V	VI	VII	VIII	
1	HSM	4	3	3				3		13
2	BS	12	4	4	2					22
3	ES	5	15							20
4	PC			17	22	14	8	6		67
5	PE					3	9	6		18
6	OE					3	3	3		9
7	EE	1	2	1		1		2	10	17
8	MC					√	√			
Total Credits		**22**	**23**	**25**	**24**	**21**	**20**	**20**	**10**	**166**

Total Credits for the entire Programme: 166

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CHOICE BASED CREDIT SYSTSEM

OPEN ELECTIVE

S. No.	COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	C
1.	24UCEO01	Augmented Reality /Virtual Reality	OE	3	0	0	3
2.	24UCEO02	Remote Sensing Concepts	OE	3	0	0	3
3.	24UCEO03	Geographical Information System	OE	3	0	0	3
4.	24UCEO04	Fire Safety Engineering	OE	3	0	0	3
5.	24UCSO01	Java Programming	OE	3	0	0	3
6.	24UCSO02	UI & UX Design	OE	3	0	0	3
7.	24UCSO03	Cloud Computing	OE	3	0	0	3
8.	24UCSO04	Data Science	OE	3	0	0	3
9.	24UEEO01	Renewable Energy Technologies	OE	3	0	0	3
10.	24UEEO02	Hybrid Electric Vehicles	OE	3	0	0	3
11.	24UEEO03	Introduction to PLC Programming	OE	3	0	0	3
12.	24UEEO04	Energy Conservation & Management	OE	3	0	0	3
13.	24UEEO05	Fundamentals of Electronic Devices	OE	3	0	0	3
14.	24UEEO06	Batteries and Management System	OE	3	0	0	3
15.	24UEEO07	Sensors and Actuators	OE	3	0	0	3
16.	24UEEO08	Electrical, Electronic & Magnetic Materials	OE	3	0	0	3
17.	24UECO01	Basics of Communication Technologies	OE	3	0	0	3
18.	24UECO02	Image Processing	OE	3	0	0	3
19.	24UECO03	Basics of IoT	OE	3	0	0	3
20.	24UECO04	Introduction to PLC Programming	OE	3	0	0	3
21.	24UECO05	Sensors for Engineering Applications	OE	3	0	0	3
22.	24UECO06	Industry 4.0 and Industrial IoT	OE	3	0	0	3
23.	24UFTO01	Basics of Textile Technology	OE	3	0	0	3
24.	24UFTO02	Fundamentals of Fashion Design	OE	3	0	0	3
25.	24UFTO03	Garment Manufacturing Technology	OE	3	0	0	3
26.	24UFTO04	Retail Management	OE	3	0	0	3
27.	24UFTO05	Industrial Engineering for Garment Industry	OE	3	0	0	3
28.	24UFTO06	Fashion Branding and Advertisement	OE	3	0	0	3
29.	24UMEO01	Fundamentals of Robotics	OE	3	0	0	3
30.	24UMEO02	Nano Technology	OE	3	0	0	3
31.	24UMEO03	Reverse Engineering	OE	3	0	0	3
32.	24UMEO04	Industrial Engineering	OE	3	0	0	3
33.	24UMEO05	Introduction to Additive Manufacturing	OE	3	0	0	3

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34.	24UMEO06	Energy Conservation in Industries	OE	3	0	0	3
35.	24UITO01	Digital Image Processing and Its Applications	OE	3	0	0	3
36.	24UITO02	Fundamentals of Databases	OE	3	0	0	3
37.	24UITO03	Internet Programming	OE	3	0	0	3
38.	24UITO04	Fundamentals of Internet of Things	OE	3	0	0	3
39.	24UITO05	Fundamentals of Blockchain	OE	3	0	0	3

MANDATORY COURSES I

S. No.	COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	C
1.	24UMC801	Introduction to Women and Gender Studies	MC	3	0	0	0
2.	24UMC802	Automotive Safety	MC	3	0	0	0
3.	24UMC803	State, Nation Building and Politics in India	MC	3	0	0	0
4.	24UMC804	Disaster Risk Reduction and Management	MC	3	0	0	0
5.	24UMC805	Film Appreciation	MC	3	0	0	0
6.	24UMC806	Elements of Literature	MC	3	0	0	0
7.	24UMC807	Inclusive Work Culture	MC	3	0	0	0
8.	24UMC808	Quality Systems	MC	3	0	0	0
9.	24UMC809	Industrial Practices and Requirements	MC	3	0	0	0
10.	24UMC810	Electrical Safety	MC	3	0	0	0
11.	24UMC811	Indian Constitution	MC	3	0	0	0

MANDATORY COURSES II

S. No.	COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	C
1.	24UMC901	Well Being with Traditional Practices - Yoga, Ayurveda and Siddha	MC	3	0	0	0
2.	24UMC902	History of Science and Technology in India	MC	3	0	0	0
3.	24UMC903	Political and Economic Thought for a Humane Society	MC	3	0	0	0
4.	24UMC904	Industrial Safety	MC	3	0	0	0
5.	24UMC905	Quantitative and verbal proficiency	MC	3	0	0	0
6.	24UMC906	Industrial Hydraulic Circuits	MC	3	0	0	0

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COMPARISON OF CREDIT SUMMARY

S. No	Course Components	AICTE Recommendation		Anna University Curriculum R2021		JSREC Autonomous Curriculum R2024	
		Credits	% Credits	Credits	% Credits	Credits	% Credits
1	Humanities, Social Science and Management (HSM)	8	5%	12	7%	**13**	**8%**
2	Basic Sciences (BS)	24	15%	25	15%	**22**	**13%**
3	Engineering Sciences (ES)	20	12%	19	12%	**20**	**12%**
4	Professional Core (PC)	58	35%	65	39%	**67**	**40%**
5	Professional Electives (PE)	26	16%	18	11%	**18**	**11%**
6	Open Electives (OE)	12	7%	12	7%	**9**	**6%**
7	Employment Enhancement Course (EE)	16	10%	15	9%	**17**	**10%**
8	Mandatory (Non-Credit Course (MC)	-	-	√	√	√	√
TOTAL CREDITS		***164***	***100%***	***166***	***100%***	***166***	***100%***

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B. E. CIVIL ENGINEERING

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SYLLABUS FOR I SEMESTER

24UHS101	PROFESSIONAL ENGLISH I (Common to all Branches)	L	T	P	C
		3	0	0	3

Prerequisites:
• Basic Knowledge in Language usage

COURSE OBJECTIVES:

- To improve the communicative competence of learners
- To learn to use basic grammatical structures in suitable contexts
- To acquire lexical competence and use them appropriately in a sentence and understand their meaning in a text
- To help learners use language effectively in professional contexts
- To develop learners' ability to read and write complex texts, summaries, articles, blogs, definitions, essays and user manuals

UNIT-I	INTRODUCTION TO FUNDAMENTALS OF COMMUNICATION	9

Reading - Reading brochures (technical context), telephone messages / social media messages relevant to technical contexts and emails. Writing - Writing emails / letters introducing oneself. Grammar - Present Tense (simple and progressive); Question types: Wh/ Yes or No/ and Tags. Vocabulary - Synonyms; One word substitution; Abbreviations & Acronyms (as used in technical contexts).

UNIT-II	NARRATION AND SUMMATION	9

Reading - Reading biographies, travelogues, newspaper reports, Excerpts from literature, and travel & technical blogs. Writing - Guided writing-- Paragraph writing Short Report on an event (field trip etc.) Grammar –Past tense (simple); Subject-Verb Agreement; and Prepositions. Vocabulary - Word forms (prefixes& suffixes); Synonyms and Antonyms. Phrasal verbs.

UNIT-III	DESCRIPTION OF A PROCESS / PRODUCT	9

Reading – Reading advertisements, gadget reviews; user manuals. Writing - Writing definitions; instructions; and Product /Process description. Grammar - Imperatives; Adjectives; Degrees of comparison; Present & Past Perfect Tenses. Vocabulary - Compound Nouns, Homonyms; and Homophones, discourse markers (connectives & sequence words).

UNIT-IV	CLASSIFICATION AND RECOMMENDATIONS	9

Reading – Newspaper articles; Journal reports –and Non Verbal Communication (tables, pie charts etc,.). Writing – Note-making / Note-taking (*Study skills to be taught, not tested); Writing recommendations; Transferring information from non verbal (chart, graph etc, to verbal mode) Grammar – Articles; Pronouns - Possessive & Relative pronouns. Vocabulary - Collocations; Fixed / Semi fixed expressions.

UNIT-V	EXPRESSION	9

Reading – Reading editorials; and Opinion Blogs; Writing – Essay Writing (Descriptive or narrative). Grammar – Future Tenses, Punctuation; Negation (Statements & Questions); and Simple, 27 Compound & Complex Sentences. Vocabulary - Cause & Effect Expressions – Content vs Function words.

L: 45	T: 00	P: 00	Total :45 Periods

TEXT BOOKS

1. English for Engineers & Technologists Orient Blackswan Private Ltd. Department of English, Anna University, (2020 edition)
2. English for Science & Technology Cambridge University Press, 2021. Authored by Dr. Veena Selvam, Dr. Sujatha Priyadarshini, Dr. Deepa Mary Francis, Dr. KN. Shoba, and Dr. Lourdes Joevani, Department of English, Anna University.

REFERENCES

1. Technical Communication – Principles And Practices By Meenakshi Raman & Sangeeta Sharma, Oxford Univ. Press, 2016, New Delhi.
2. A Course Book On Technical English By Lakshminarayanan, Scitech Publications (India) Pvt. Ltd.
3. English For Technical Communication (With CD) By Aysha Viswamohan, Mcgraw Hill Education, ISBN : 0070264244.
4. Effective Communication Skill, Kulbhusan Kumar, RS Salaria, Khanna Publishing House.
5. Learning to Communicate – Dr. V. Chellammal, Allied Publishing House, New Delhi, 2003.

WEB RESOURCES

- https://www.lisedunetwork.com/the-fundamentals-of-communication/#google_vignette
- http://hdl.handle.net/10603/58170
- https://www.vedantu.com/english/narration
- https://asana.com/resources/product-development-process
- https://onlinelibrary.wiley.com/doi/10.1155/2019/8043905

COURSE OUTCOMES

At the end of the course students should be able to

CO1: To use appropriate words in a professional context
CO2: To gain understanding of basic grammatical structures and use them in right context
CO3: To read and infer the denotative and connotative meanings of technical texts
CO4: To read and interpret information presented in tables, charts and other graphic forms
CO5: To write definitions, descriptions, narrations and essays on various topics

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24UMA101	MATRICES AND CALCULUS (Common to All Branches)	L	T	P	C
		3	1	0	4

Prerequisites:

- Knowledge in Basic Calculus

COURSE OBJECTIVES:

- To develop the use of matrix algebra techniques that is needed by engineers for practicalapplications.
- To familiarize the students with differential calculus.
- To familiarize the student with functions of several variables. This is needed in many branches of engineering.
- To make the students understand various techniques of integration.
- To acquaint the student with mathematical tools needed in evaluating multiple integrals andtheir applications.

UNIT-I	MATRICES	9+3

Eigenvalues and Eigenvectors of a real matrix – Characteristic equation – Properties of Eigenvalues and Eigenvectors – Cayley - Hamilton theorem – Diagonalization of matrices by orthogonal transformation – Reduction of a quadratic form to canonical form by orthogonal transformation – Nature of quadratic forms – Applications: Stretching of an elastic membrane.

UNIT-II	DIFFERENTIAL CALCULUS	9+3

Representation of functions - Limit of a function - Continuity - Derivatives - Differentiation rules (sum, product, quotient, chain rules) - Implicit differentiation - Logarithmic differentiation - Applications : Maxima and Minima of functions of one variable.

UNIT-III	FUNCTIONS OF SEVERAL VARIABLES	9+3

Partial differentiation – Homogeneous functions and Euler's theorem – Total derivative – Change of variables – Jacobians – Partial differentiation of implicit functions – Taylor's series for functions of two variables – Applications : Maxima and minima of functions of two variables and Lagrange's method of undetermined multipliers.

UNIT-IV	INTEGRAL CALCULUS	9 + 3

Definite and Indefinite integrals - Substitution rule - Techniques of Integration: Integration by parts, Trigonometric integrals, Trigonometric substitutions, Integration of rational functions by partial fraction, Integration of irrational functions - Improper integrals - Applications: Hydrostatic force and pressure, moments and centres of mass.

UNIT-V	MULTIPLE INTEGRALS	9 + 3

Double integrals – Change of order of integration – Double integrals in polar coordinates – Area enclosed by plane curves – Triple integrals – Volume of solids – Change of variables in double and triple integrals – Applications: Moments and centres of mass, moment of inertia.

L:45	T: 15	P: 00	Total : 60 Periods

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TEXT BOOKS

1. Kreyszig.E, "Advanced Engineering Mathematics", John Wiley and Sons, 10th Edition, New Delhi, 2016.
2. Grewal.B.S., "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 44th Edition, 2018.
3. James Stewart, "Calculus: Early Transcendentals", Cengage Learning, 8th Edition, New Delhi, 2015. [For Units II & IV - Sections 1.1, 2.2, 2.3, 2.5, 2.7 (Tangents problems only), 2.8, 3.1 to 3.6, 3.11, 4.1, 4.3, 5.1 (Area problems only), 5.2, 5.3, 5.4 (excluding net change theorem), 5.5, 7.1 - 7.4 and 7.8].

REFERENCES

1. Anton. H, Bivens. I and Davis. S, " Calculus ", Wiley, 10th Edition, 2016
2. Bali. N., Goyal. M. and Watkins. C., "Advanced Engineering Mathematics", Firewall Media (An imprint of Lakshmi Publications Pvt., Ltd.,), New Delhi, 7th Edition, 2009.
3. Jain. R.K. and Iyengar. S.R.K., "Advanced Engineering Mathematics", Narosa Publications, New Delhi, 5th Edition, 2016.
4. Narayanan. S. and Manicavachagom Pillai. T. K.,"Calculus" Volume I and II, S. Viswanathan Publishers Pvt. Ltd., Chennai, 2009.
5. Ramana. B.V., "Higher Engineering Mathematics", McGraw Hill Education Pvt. Ltd, New Delhi, 2016.
6. Srimantha Pal and Bhunia. S.C, "Engineering Mathematics "Oxford University Press, 2015.
7. Thomas. G. B., Hass. J, and Weir. M.D, "Thomas Calculus ", 14th Edition, Pearson India, 2018.

WEB RESOURCES

- http://explained.ai/matrix-calculus/index.html
- https://www.comp.nus.edu.sg/~cs5240/lecture/matrix-differentiation.pdf
- https://github.com/LynnHo/Matrix-Calculus
- https://nptel.ac.in/

COURSE OUTCOMES

At the end of the course students should be able to

CO1: Use the matrix algebra methods for solving practical problems.

CO2: Apply differential calculus tools in solving various application problems.

CO3: Able to use differential calculus ideas on several variable functions.

CO4: Apply different methods of integration in solving practical problems.

CO5: Apply multiple integral ideas in solving areas, volumes and other practical problems.

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24UPH101	ENGINEERING PHYSICS (Common to All Branches)	L	T	P	C
		3	0	0	3

Prerequisites:

Nil

COURSE OBJECTIVES:

- To make the students effectively achieve an understanding of mechanics.
- To enable the students to gain knowledge of electromagnetic waves and its applications.
- To introduce the basics of oscillations, optics and lasers.
- Equipping the students to successfully understand the importance of quantum physics.
- To motivate the students towards the applications of quantum mechanics.

UNIT-I	MECHANICS	9

Multiparticle dynamics: Center of mass (CM) – CM of continuous bodies – motion of the CM – kinetic energy of system of particles. Rotation of rigid bodies: Rotational kinematics – rotational kinetic energy and moment of inertia - theorems of M .I –moment of inertia of continuous bodies – M.I of a diatomic molecule - torque – rotational dynamics of rigid bodies – conservation of angular momentum – rotational energy state of a rigid diatomic molecule - gyroscope - torsional pendulum – double pendulum –Introduction to nonlinear oscillations.

UNIT-II	ELECTROMAGNETIC WAVES	9

The Maxwell's equations - wave equation; Plane electromagnetic waves in vacuum, Conditions on the wave field - properties of electromagnetic waves: speed, amplitude, phase, orientation and waves in matter - polarization - Producing electromagnetic waves - Energy and momentum in EM waves: Intensity, waves from localized sources, momentum and radiation pressure - Cell-phone reception. Reflection and transmission of electromagnetic waves from a non-conducting medium-vacuum interface for normal incidence.

UNIT-III	OSCILLATIONS, OPTICS AND LASERS	9

Simple harmonic motion - resonance –analogy between electrical and mechanical oscillating systems - waves on a string - standing waves - traveling waves - Energy transfer of a wave - sound waves - Doppler effect. Reflection and refraction of light waves - total internal reflection - interference –Michelson interferometer –Theory of air wedge and experiment. Theory of laser - characteristics - Spontaneous and stimulated emission - Einstein's coefficients - population inversion - Nd-YAG laser, CO_2 laser, semiconductor laser –Basic applications of lasers in industry.

UNIT-IV	BASIC QUANTUM MECHANICS	9

Photons and light waves - Electrons and matter waves –Compton effect - The Schrodinger equation (Time dependent and time independent forms) - meaning of wave function - Normalization –Free particle - particle in a infinite potential well: 1D,2D and 3D Boxes-Normalization, probabilities and the correspondence principle.

UNIT-V	APPLIED QUANTUM MECHANICS	9

The harmonic oscillator(qualitative)- Barrier penetration and quantum tunneling(qualitative)-Tunneling microscope - Resonant diode - Finite potential wells (qualitative)- Bloch's theorem for particles in a periodic potential –Basics of Kronig-Penney model and origin of energy bands.

L:45	T: 00	P: 00	Total : 45 Periods

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TEXT BOOKS

1. D.Kleppner and R.Kolenkow. An Introduction to Mechanics. McGraw Hill Education (Indian Edition), 2017.
2. E.M.Purcell and D.J.Morin, Electricity and Magnetism, Cambridge Univ.Press, 2013.
3. Arthur Beiser, Shobhit Mahajan, S. Rai Choudhury, Concepts of Modern Physics, McGraw- Hill (Indian Edition), 2017.

REFERENCES

1. R.Wolfson. Essential University Physics. Volume 1 & 2. Pearson Education (Indian Edition), 2009.
2. Paul A. Tipler, Physic – Volume 1 & 2, CBS, (Indian Edition), 2004.
3. K.Thyagarajan and A.Ghatak. Lasers: Fundamentals and Applications, Laxmi Publications, (Indian Edition), 2019.
4. D.Halliday, R.Resnick and J.Walker. Principles of Physics, Wiley (Indian Edition), 2015.
5. N.Garcia, A.Damask and S.Schwarz. Physics for Computer Science Students. Springer-Verlag, 2012.

WEB RESOURCES

- https://www.youtube.com/watch?v=caitynfev64
- https://youtu.be/SqhWxOjBb74
- https://youtu.be/F11MHPDd5D8
- https://youtu.be/NGGSROr3Tlc
- https://youtu.be/b-w4TSkhlhE

COURSE OUTCOMES

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

CO1: Understand the importance of mechanics.
CO2: Express their knowledge in electromagnetic waves.
CO3: Demonstrate a strong foundational knowledge in oscillations, optics and lasers.
CO4: Understand the importance of quantum physics.
CO5: Compare and apply quantum mechanical principles towards the formation of energybands.

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24UCY101	ENGINEERING CHEMISTRY (Common to all Branches)	L	T	P	C
		3	0	0	3

Prerequisites:
Nil

COURSE OBJECTIVES:
• To inculcate sound understanding of water quality parameters and water treatment techniques. • To impart knowledge on the basic principles and preparatory methods of nanomaterials. • To introduce the basic concepts and applications of phase rule and composites • To facilitate the understanding of different types of fuels, their preparation, properties and combustion characteristics. • To familiarize the students with the operating principles, working processes and applications ofenergy conversion and storage devices.

UNIT-I	WATER AND ITS TREATMENT	9
Water: Sources and impurities, Water quality parameters: Definition and significance of- color, odour, turbidity, pH, hardness, alkalinity, TDS, COD and BOD, fluoride and arsenic. Municipal water treatment: primary treatment and disinfection (UV, Ozonation, break-point chlorination). Desalination of brackishwater: Reverse Osmosis. Boiler troubles: Scale and sludge, Boiler corrosion, Caustic embrittlement, Priming &foaming. Treatment of boiler feed water: Internal treatment (Phosphate, Colloidal, Sodiumaluminate and Calgon conditioning) and External treatment—Ion exchange demineralization and Zeolite process.		

UNIT-II	NANO CHEMISTRY	9
Basics: Distinction between molecules, nanomaterials and bulk materials; Size-dependent properties (optical, electrical, mechanical and magnetic); Types of nanomaterials: Definition, properties and uses of – nanoparticle, nanocluster, nanorod, nanowire and nanotube. Preparation of nanomaterials: sol-gel, solvothermal, laser ablation, chemical vapour deposition, electrochemical deposition and electro spinning. Applications of nanomaterials in medicine, agriculture, energy, electronics and catalysis.		

UNIT-III	PHASE RULE AND COMPOSITES	9
Phase rule: Introduction, definition of terms with examples. One component system - water system; Reduced phase rule; Construction of a simple eutectic phase diagram - Thermal analysis; Two component system: lead-silver system - Pattinson process.Composites: Introduction: Definition & Need for composites; Constitution: Matrix materials (Polymer matrix, metal matrix and ceramic matrix) and Reinforcement (fiber, particulates, flakes and whiskers). Properties and applications of: Metal matrix composites (MMC), Ceramic matrix composites and Polymer matrix composites. Hybrid composites - definition and examples.		

UNIT-IV	FUELSAND COMBUSTION	9
Fuels: Introduction: Classification of fuels; Coal and coke: Analysis of coal (proximate and ultimate), Carbonization, Manufacture of metallurgical coke (Otto Hoffmann method). Petroleum and Diesel: Manufacture of synthetic petrol (Bergius process), Knocking - octane number, diesel oil- cetane number; Power alcohol and biodiesel.Combustion of fuels: Introduction: Calorific value - higher and lower calorific values, Theoretical calculation of calorific value; Ignition temperature: spontaneous ignition temperature, Explosive range; Flue gas analysis - ORSAT Method. CO_2 emission and carbon footprint.		

UNIT-V	ENERGY SOURCESAND STORAGE DEVICES	9

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Stability of nucleus: mass defect (problems), binding energy; Nuclear energy: light water nuclear power plant, breeder reactor. Solar energy conversion: Principle, working and applications of solar cells; Recent developments in solar cell materials. Wind energy; Geothermal energy; Batteries: Types of batteries, Primary battery - dry cell, Secondary battery - lead acid battery and lithium-ion- battery; Electric vehicles - working principles; Fuel cells: H_2-O_2 fuel cell, microbial fuelcell; Supercapacitors: Storage principle, types and examples.

L:45	T: 00	P: 00	Total : 45 Periods

TEXT BOOKS

1. P. C. Jain and Monica Jain, "Engineering Chemistry", 17th Edition, DhanpatRai PublishingCompany (P) Ltd, New Delhi, 2018.
2. Sivasankar B., "Engineering Chemistry", Tata McGraw-Hill Publishing Company Ltd, NewDelhi, 2008.
3. S.S. Dara, "A text book of Engineering Chemistry", S. Chand Publishing, 12th Edition,2018.

REFERENCES

1. B. S. Murty, P. Shankar, Baldev Raj, B. B. Rath and James Murday, "Text book of nanoscience and nanotechnology", Universities Press-IIM Series in Metallurgy and Materials Science, 2018.
2. O.G. Palanna, "Engineering Chemistry" McGraw Hill Education (India) Private Limited, 2nd Edition, 2017.
3. Friedrich Emich, "Engineering Chemistry", Scientific International PVT, LTD, New Delhi, 2014.
4. ShikhaAgarwal, "Engineering Chemistry-Fundamentals and Applications", Cambridge University Press, Delhi, Second Edition, 2019.
5. O.V. Roussak and H.D. Gesser, Applied Chemistry-A Text Book for Engineers andTechnologists, Springer Science Business Media, New York, 2nd Edition, 2013.

WEB RESOURCES

- https://testbook.com/ias-preparation/water-treatment
- https://onlinelibrary.wiley.com/doi/full/10.1002/nano.202300038
- https://www.pratapsir.com/2023/01/notes-on-phase-rule_21.html
- https://en.wikipedia.org/wiki/Fuel

COURSE OUTCOMES

At the end of the course students should be able

CO1: To infer the quality of water from quality parameter data and propose suitable treatment methodologies to treat water.

CO2: To identify and apply basic concepts of nanoscience and nanotechnology in designing the synthesis of nanomaterials for engineering and technology applications.

CO3: To apply the knowledge of phase rule and composites for material selection requirements.

CO4: To recommend suitable fuels for engineering processes and applications.

CO5: To recognize different forms of energy resources and apply them for suitable applications in energy sectors.

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24UGE101	PROBLEM SOLVING AND PYTHON PROGRAMMING (Common to All Branches)	L	T	P	C
		3	0	0	3

Prerequisites:

Nil

COURSE OBJECTIVES:

- To understand the basics of algorithmic problem solving.
- To learn to solve problems using Python conditionals and loops.
- To define Python functions and use function calls to solve problems.
- To use Python data structures - lists, tuples, dictionaries to represent complex data.
- To do input/output with files in Python.

UNIT-I	COMPUTATIONAL THINKING AND PROBLEM SOLVING	9

Fundamentals of Computing – Identification of Computational Problems -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). Illustrative problems: find minimum in a list, insert a card in a list of sorted cards, guess an integer number in a range, Towers of Hanoi.

UNIT-II	DATA TYPES, EXPRESSIONS, STATEMENTS	9

Python interpreter and interactive mode, debugging; values and types: int, float, boolean, string , and list; variables, expressions, statements, tuple assignment, precedence of operators, comments; Illustrative programs: exchange the values of two variables, circulate the values of n variables, distance between two points.

UNIT-III	CONTROL FLOW, FUNCTIONS, STRINGS	9

Conditionals:Boolean values and operators, conditional (if), alternative (if-else),chained conditional (if-elif-else);Iteration: state, while, for, break, continue, pass; Fruitful functions: return values, parameters, local and global scope, function composition, recursion; Strings: string slices, immutability, string functions and methods, string module; Lists as arrays. Illustrative programs: square root, gcd, exponentiation, sum an array of numbers, linear search, binary search.

UNIT-IV	LISTS, TUPLES, DICTIONARIES	9

Lists: list operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, list parameters; Tuples: tuple assignment, tuple as return value; Dictionaries: operations and methods; advanced list processing - list comprehension; Illustrative programs: simple sorting, histogram, Students marks statement, Retail bill preparation.

UNIT-V	FILES, MODULES, PACKAGES	9

Files and exceptions: text files, reading and writing files, format operator; command line arguments, errors and exceptions, handling exceptions, modules, packages; Illustrative programs: word count, copy file, Voter's age validation, Marks range validation (0-100).

L:45	T:0	P:0	Total: 45 PERIODS

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TEXT BOOKS

1. Allen B. Downey, "Think Python: How to Think like a Computer Scientist", 2nd Edition, O'Reilly Publishers, 2016.
2. Karl Beecher, "Computational Thinking: A Beginner's Guide to Problem Solving and Programming", 1st Edition, BCS Learning & Development Limited, 2017.

REFERENCES

1. Paul Deitel and Harvey Deitel, "Python for Programmers", Pearson Education, 1st Edition, 2021.
2. G Venkatesh and Madhavan Mukund, "Computational Thinking: A Primer for Programmers and Data Scientists", 1st Edition, Notion Press, 2021.
3. John V Guttag, "Introduction to Computation and Programming Using Python: With Applications to Computational Modeling and Understanding Data", Third Edition, MIT Press, 2021
4. Eric Matthes, "Python Crash Course, A Hands - on Project Based Introduction to Programming", 2nd Edition, No Starch Press, 2019.
5. Martin C. Brown, "Python: The Complete Reference", 4th Edition, Mc-Graw Hill, 2018.

WEB RESOURCES

- https://www.python.org/
- https://nptel.ac.in/courses/106106145/

COURSE OUTCOMES

Upon completion of the course, the students will be able to

CO1: Develop algorithmic solutions to simple computational problems and and execute simple Python programs.
CO2: Write simple Python programs using conditionals and loops for solving problems.
CO3: Decompose a Python program into functions.
CO4: Represent compound data using Python lists, tuples, dictionaries etc.
CO5: Read and write data from/to files in Python programs.

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24UHS102	HERITAGE OF TAMILS (Common to All Branches)	L	T	P	C
		1	0	0	1

Prerequisites:

Nil

COURSE OBJECTIVES:

- Appreciate Tamil art, culture and literature.
- Learn the history and culture of Tamil language.
- Relate to various art forms and their relevance to development.
- Acknowledge the rich heritage and significant achievements of the Tamilians.
- Appreciate the contribution of Tamilians to nation building.

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, VilluPattu, KaniyanKoothu, 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 NATIONALEMENT 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.

L:15	T: 00	P: 00	Total : 15 Periods

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TEXT-CUM-REFERENCE BOOKS

1. தமிழகவரலாறு - மக்களும்பண்பாடும் - கே .கே .பிள்ளை (வெளியீடு: தழிழ்நாடு பாடநூல்மற்றும்கல்வியியல்பணிகள்கழகம்).
2. கணினித்தமிழ் -முனைவர்இல .சுந்தரம்.(விகடன்பிரசுரம்).
3. கீழடி – வைகைநதிக்கரையில்சங்ககாலநகரநாகரிகம் (தொல்லியல்துறை வெளியீடு)
4. பொருநை - ஆற்றங்கரைநாகரிகம் (தொல்லியல்துறை 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:Institute of Tamil Studies).
8. The Contribution of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: Institute of Tamil Studies).
9. Keeladi – Sangam City Civilization on the banks of banks of river Vaigai' (Jointly Published by: Department of archaeology & Tamil Nadu Text book and Educational Services Corporation, Tamil Nadu)
10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (published by: The Author).
11. Porunai Civilization (jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
12. Journey of Civilzation Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

COURSE OUTCOMES

At the end of the course students should be able

CO1: Understand the significance of Tamil as a classical language.

CO2: Relate the art and culture in Tamil language.

CO3: Explain the importance of music, dance and martial arts that were derived from Tamil Culture.

CO4: Understand the poetic mode or theme of classical language.

CO5: Relate the contribution of Tamils to Nation building.

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24UHS102	தமிழர் மரபு (Common to All Branches)	L	T	P	C
		1	0	0	1

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 .

L:15	T: 00	P: 00	Total : 15 Periods

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TEXT-CUM-REFERENCE BOOKS

1. தமிழகவரலாறு - மக்களும்பண்பாடும் - கே .கே .பிள்ளை (வெளியீடு: தழிழ்நாடு பாடநூல்மற்றும்கல்வியியல்பணிகள்கழகம்).
2. கணினித்தமிழ் -முனைவர்இல .சுந்தரம்.(விகடன்பிரசுரம்).
3. கீழடி – வைகைநதிக்கரையில்சங்ககாலநகரநாகரிகம் (தொல்லியல்துறை வெளியீடு)
4. பொருநை - ஆற்றங்கரைநாகரிகம் (தொல்லியல்துறை 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:Institute of Tamil Studies).
8. The Contribution of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: Institute of Tamil Studies).
9. Keeladi – Sangam City Civilization on the banks of banks of river Vaigai' (Jointly Published by: Department of archaeology & Tamil Nadu Text book and Educational Services Corporation, Tamil Nadu)
10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (published by: The Author).
11. Porunai Civilization (jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
12. Journey of Civilzation Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

COURSE OUTCOMES

At the end of the course students should be able

CO1: Understand the significance of Tamil as a classical language.

CO2: Relate the art and culture in Tamil language.

CO3: Explain the importance of music, dance and martial arts that were derived from Tamil Culture.

CO4: Understand the poetic mode or theme of classical language.

CO5: Relate the contribution of Tamils to Nation building.

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24UGE111	PROBLEM SOLVING AND PYTHON PROGRAMMING LABORATORY (Common to All Branches)	L	T	P	C
		0	0	4	2

Prerequisites:
Nil

COURSE OBJECTIVES:
• To understand the basics of algorithmic problem solving.
• To learn to solve problems using Python conditionals and loops.
• To define Python functions and use function calls to solve problems.
• To use Python data structures - lists, tuples, dictionaries to represent complex data.
• To do input/output with files in Python.

S.No.	LIST OF EXERCISES:
1	I/O statements, operators, expressions
2	Decision-making constructs: if-else, goto, switch-case, break-continue
3	Loops: for, while, do-while
4	Arrays: 1D and 2D, Multi-dimensional arrays
5	Strings: operations
6	Functions: call, return, passing parameters by (value, reference), passing arrays to function.
7	Recursion
8	Pointers: Pointers to functions, Arrays, Strings, Pointers to Pointers, Array of Pointers
9	Structures: Nested Structures, Pointers to Structures, Arrays of Structures and Unions.
10	Files: reading and writing, file operations, Sequential Access ,Random Access

L:00	P:60	T:00	Total: 60 PERIODS

LIST OF EQUIPMENTS REQUIRED
HARDWARE REQUIREMENTS
Standard PC
SOFTWARE REQUIREMENTS
1. Windows 7 or higher
2.Python latest version

COURSE OUTCOMES
Upon completion of the course, the students will be able to
CO1: Demonstrate knowledge on C programming constructs develop programs in C using basic constructs.
CO2: Develop programs in C using arrays.
CO3: Develop applications in C using strings, pointers, functions.
CO4: Develop applications in C using structures.
CO5: Develop applications in C using file processing.

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24UBS111	PHYSICS AND CHEMISTRY LABORATORY (Common to All Branches)	L	T	P	C
		0	0	4	2

PHYSICS EXPERIMENTS (Any Seven Experiments)

Prerequisites:

Nil

COURSE OBJECTIVES:

- To learn the proper use of various kinds of physics laboratory equipment.
- To learn how data can be collected, presented and interpreted in a clear and concise manner.
- To learn problem solving skills related to physics principles and interpretation of experimental data.
- To determine error in experimental measurements and techniques used to minimize such error.
- To make the student an active participant in each part of all lab exercises.

1. Torsion pendulum - Determination of rigidity modulus of wire and moment of inertia of regular and irregular objects.
2. Simple harmonic oscillations of cantilever.
3. Non-uniform bending - Determination of Young's modulus.
4. Uniform bending – Determination of Young's modulus.
5. Laser- Determination of the wave length of the laser using grating.
6. Air wedge - Determination of thickness of a thin sheet/wire.
7. a) Optical fibre -Determination of Numerical Aperture and acceptance angle.
   b) Compact disc- Determination of width of the groove using laser.
8. Acoustic grating- Determination of velocity of ultrasonic waves in liquids.
9. Ultrasonic interferometer – determination of the velocity of sound and compressibility of liquids.
10. Post office box -Determination of Band gap of a semiconductor.
11. Photoelectric effect.
12. Michelson Interferometer.
13. Melde's string experiment.
14. Experiment with lattice dynamics kit.

TEXT BOOKS

1. Marko Pinteric, Building Physics, Springer 2017.
2. D.S.Mathur. Elements of Properties of Matter. S Chand & Company, 2010.
3. Hugo Hens, Building Physics: Heat, Air and Moisture, Wiley, 2017.

REFERENCES

1. W.R.Stevens. Building Physics: Lighting. Pergamon Press, 2013.
2. Hugo Hens, Applied Building Physics, Wiley, 2016.
3. K.G.Budinski and M.K.Budinski. Engineering Materials: Properties and Selection. Pearson Education, 2016.
4. Peter A. Claisse, Civil Engineering Materials, Elsevier, 2016.

COURSE OUTCOMES

Upon completion of the course, the students should be able to

CO1: Understand the functioning of various physics laboratory equipment.
CO2: Use graphical models to analyze laboratory data.
CO3: Use mathematical models as a medium for quantitative reasoning and describing physical reality.
CO4: Access, process and analyze scientific information.
CO5:Solve problems individually and collaboratively.

TOTAL: 30 PERIODS

CHEMISTRY EXPERIMENTS (Any Seven Experiments to be conducted)

Prerequisites:

Nil

COURSE OBJECTIVES:

- To inculcate experimental skills to test basic understanding of water quality parameters, such as, acidity, alkalinity, hardness, DO, chloride and copper.
- To induce the students to familiarize with electroanalytical techniques such as, pH metry, potentiometry and conductometry in the determination of impurities in aqueous solutions.
- To demonstrate the analysis of metals and alloys.
- To demonstrate the synthesis of nanoparticles.

1. Preparation of Na_2CO_3 as a primary standard and estimation of acidity of a water sample using the primary standard
2. Determination of types and amount of alkalinity in a water sample. Split the first experiment into two
3. Determination of total, temporary & permanent hardness of water by EDTA method.
4. Determination of DO content of water sample by Winkler's method.
5. Determination of chloride content of water sample by Argentometric method.
6. Estimation of copper content of the given solution by Iodometry.
7. Estimation of TDS of a water sample by gravimetry.
8. Determination of strength of given hydrochloric acid using pH meter.
9. Determination of strength of acids in a mixture f acids using conductivity meter.
10. Conductometric titration of barium chloride against sodium sulphate (precipitation titration)
11. Estimation of iron content of the given solution using potentiometer.
12. Estimation of sodium/potassium present in water using a flame photometer.
13. Preparation of nano particles (TiO2/ZnO/CuO) by Sol-Gel method.
14. Estimation of Nickel in steel
15. Proximate analysis of Coal

L: 00	T: 00	P: 60	Total : 60 Periods

TEXT BOOKS

1. J.Mendham, R.C.Denney, J.D. Barnes, M. Thomas and B. Sivasankar, Vogel's Textbook of Quantitative Chemical Analysis (2009).

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WEB RESOURCES
• https://en.wikipedia.org/wiki/Titration • https://en.wikipedia.org/wiki/Conductivity_(electrolytic).
COURSE OUTCOMES At the end of the course students should be able
CO1: To analyse the quality of water samples with respect to their acidity, alkalinity, hardness and DO. CO2: To determine the amount of metal ions through volumetric and spectroscopic techniques CO3: To analyse and determine the composition of alloys. CO4: To learn simple method of synthesis of nanoparticles. CO5: To quantitatively analyse the impurities in solution by electroanalytical Techniques.

TOTAL: 30 PERIODS

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24UHS111	ENGLISH LABORATORY (Common to all Branches)	L	T	P	C
		0	0	2	1

Prerequisites:

- Basic Knowledge in Language usage

COURSE OBJECTIVES:

- To improve the communicative competence oflearners
- To help learners use language effectively in academic /work contexts
- To develop various listening strategies to comprehend various types of audio materials like lectures, discussions, videos etc
- To build on students' English language skills by engaging them in listening, speaking and grammar learning activities that are relevant to authentic contexts
- To use language efficiently in expressing their opinions via various media

UNIT-I	INTRODUCTION TO FUNDAMENTALS OF COMMUNICATION	6

Listening for general information-specific details- conversation: Introduction to classmates - Audio / video (formal & informal); Telephone conversation; Listening to voicemail & messages; Listening and filling a form. Speaking - making telephone calls-Self Introduction; Introducing a friend; - 42 politeness strategies- making polite requests, making polite offers, replying to polite requests and offers- understanding basic instructions(filling out a bank application for example).

UNIT-II	NARRATION AND SUMMATION	6

Listening - Listening to podcasts, anecdotes / stories / event narration; documentaries and interviews with celebrities. Speaking - Narrating personal experiences / events-Talking about current and temporary situations & permanent and regular situations* - describing experiences and feelings engaging in small talk- describing requirements and abilities.

UNIT-III	DESCRIPTION OF A PROCESS / PRODUCT	6

Listening - Listen to product and process descriptions; a classroom lecture; and advertisements about products. Speaking – Picture description- describing locations in workplaces- Giving instruction to use the product- explaining uses and purposes- Presenting a product- describing shapes and sizes and weights- talking about quantities(large & small)-talking about precautions.

UNIT-IV	CLASSIFICATION AND RECOMMENDATIONS	6

Listening – Listening to TED Talks; Listening to lectures - and educational videos. Speaking – Small Talk; discussing and making plans-talking about tasks-talking about progress- talking about positions and directions of movement-talking about travel preparations- talking about transportation.

UNIT-V	EXPRESSION	6

Listening – Listening to debates/ discussions; different viewpoints on an issue; and panel discussions. Speaking -making predictions- talking about a given topic-giving opinions- understanding a website-describing processes

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L:00	T: 00	P: 30	Total : 30 Periods

WEB RESOURCES

- https://www.lisedunetwork.com/the-fundamentals-of-communication/#google_vignette
- http://hdl.handle.net/10603/58170
- https://www.vedantu.com/english/narration
- https://asana.com/resources/product-development-process
- https://onlinelibrary.wiley.com/doi/10.1155/2019/8043905

COURSE OUTCOMES

At the end of the course students should be able to

CO1: To listen to and comprehend general as well as complex academic information

CO2: To listen to and understand different points of view in a discussion

CO3: To speak fluently and accurately in formal and informal communicative contexts

CO4: To describe products and processes and explain their uses and purposes clearly and accurately

CO5: To express their opinions effectively in both formal and informal discussions

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REGULATIONS 2024

B. E. CIVIL ENGINEERING

CHOICE BASED CREDIT SYSTEM

SYLLABUS FOR II SEMESTER

24UHS201	PROFESSIONAL ENGLISH II (Common to all Branches)	L	T	P	C
		2	0	0	2

Prerequisites:

- Basic Knowledge in Language usage

COURSE OBJECTIVES:

- To engage learners in meaningful language activities to improve their reading and writing skills
- To learn various reading strategies and apply in comprehending documents in professional context
- To help learners understand the purpose, audience, contexts of different types of writing
- To develop analytical thinking skills for problem solving in communicative contexts
- To demonstrate an understanding of job applications and interviews for internship and placements

UNIT-I	MAKING COMPARISONS	6

Reading – Reading comprehension task :Reading strategies, Methods-skimmimg,scanning,parapharasing vs summarizing, Reading advertisements, user manuals, brochures; Proforma invoices Writing – Professional emails, Email etiquette, Creative Writing-Content writing,blog writing , Grammar –Preposition & Prepositional phrases Vocabulary – Words on Engineering materials

UNIT-II	EXPRESSING CAUSAL RELATIONS IN SPEAKING AND WRITING	6

Reading - Reading longer technical texts, Reading short articles& Journals Writing -Writing responses to complaints, Letters / emails of complaint, writing a travelogue, Agenda with Minutes of meeting(MoM), Cause and Effect Essays, Grammar - If conditional sentences, Active & Passive Voice transformations,

UNIT-III	PROBLEM SOLVING	6

Reading - Case Studies, excerpts from literary texts, etc. Writing – Letter to the Editor, Sequence of Jumbled paragraph, Checklists, Hints Development - Problem solution essay / Argumentative Essay. Grammar – Error correction; Modals Vocabulary – Idioms and phrases.

UNIT-IV	REPORTING OF EVENTS AND RESEARCH	6

Reading –Newspaper articles; Writing – Recommendations, Transcoding, Structure of Reports-Accident Report, Survey Report, Project Report Grammar – Reported Speech, Vocabulary – Conjunctions.

UNIT-V	THE ABILITY TO PUT IDEAS OR INFORMATION COGENTLY	6

Reading – Company profiles, Statement of Purpose, (SOP), an excerpt of interview with professionals; Writing – Job / Internship application – Cover letter & Resume; Business communication letters, Grammar – Numerical adjectives, Relative Clauses, Vocabulary – Infinitive and Gerunds.

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L:30	T: 00	P: 00	Total : 30 Periods

TEXT BOOKS

1. English for Engineers & Technologists (2020 edition) Orient Blackswan Private Ltd. Department of English, Anna University.
2. English for Science & Technology Cambridge University Press 2021.
3. Authored by Dr. Veena Selvam, Dr. Sujatha Priyadarshini, Dr. Deepa Mary Francis, Dr. KN. Shoba, and Dr. Lourdes Joevani, Department of English, Anna University.

REFERENCES

1. Raman. Meenakshi, Sharma. Sangeeta (2019). Professional English. Oxford university press. New Delhi.
2. Improve Your Writing ed. V.N. Arora and Laxmi Chandra, Oxford Univ. Press, 2001, NewDelhi.
3. Learning to Communicate – Dr. V. Chellammal. Allied Publishers, New Delhi, 2003.
4. Business Correspondence and Report Writing by Prof. R.C. Sharma & Krishna Mohan, Tata McGraw Hill & Co. Ltd., 2001, New Delhi.
5. Developing Communication Skills by Krishna Mohan, Meera Bannerji- Macmillan India Ltd. 1990, Delhi.

WEB RESOURCES

- https://academicguides.waldenu.edu/writingcenter/grammar/comparisons#:~:text=Adjectives%20and%20adverbs%20can%20be,to%20hedge%20or%20boost%20language.
- https://www.linkedin.com/pulse/causality-expressed-natural-language-text-vivek-khetan
- https://www.sessionlab.com/blog/problem-solving-techniques/

COURSE OUTCOMES

At the end of the course students should be able to

CO1: Compare and contrast products and ideas in technical texts
CO2: Identify cause and effects in events, industrial processes through technical texts
CO3: Analyse problems in order to arrive at feasible solutions and communicate them orally and in the written format
CO4: Report events and the processes of technical and industrial nature
CO5: Present their opinions in a planned and logical manner, and draft effective resumes in context of job search

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24UMA201	STATISTICS AND NUMERICAL METHODS (Common to All Branches)	L	T	P	C
		3	1	0	4

Prerequisites:

- Basic Knowledge in Scientific Calculator usage

COURSE OBJECTIVES:

- This course aims at providing the necessary basic concepts of a few statistical and numerical methods and give procedures for solving numerically different kinds of problems occurring in engineering and technology.
- To acquaint the knowledge of testing of hypothesis for small and large samples which plays an important role in real life problems.
- To introduce the basic concepts of solving algebraic and transcendental equations.
- To introduce the numerical techniques of interpolation in various intervals and numerical
- Techniques of differentiation and integration which plays an important role in engineering and technology disciplines.
- To acquaint the knowledge of various techniques and methods of solving ordinary differential equations.

UNIT-I	TESTING OF HYPOTHESIS	9 + 3

Sampling distributions - Tests for single mean, proportion and difference of means (Large and small samples) – Tests for single variance and equality of variances – Chi square test for goodness of fit – Independence of attributes. Application of chi square test.

UNIT-II	DESIGN OF EXPERIMENTS	9 + 3

One way and two way classifications - Completely randomized design – Randomized block design – Latin square design - 22 factorial design. Application of Design of experiment SPSS software (Practical oriented).

UNIT-III	SOLUTION OF EQUATIONS AND EIGENVALUE PROBLEMS	9 + 3

Solution of algebraic and transcendental equations - Fixed point iteration method – Newton Raphson method- Solution of linear system of equations - Gauss elimination method – Pivoting - Gauss Jordan method – Iterative methods of Gauss Jacobi and Gauss Seidel - Eigenvalues of a matrix by Power method and Jacobi's method for symmetric matrices.

UNIT-IV	INTERPOLATION, NUMERICAL DIFFERENTIATION AND NUMERICAL INTEGRATION	9 + 3

Lagrange's and Newton's divided difference interpolations – Newton's forward and backward difference interpolation – Approximation of derivates using interpolation polynomials – Numerical single and double integrations using Trapezoidal and Simpson's 1/3 rules.

UNIT-V	NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS	9 + 3

Single step methods: Taylor's series method - Euler's method - Modified Euler's method - Fourth order Runge-Kutta method for solving first order differential equations - Multi step methods: Milne's and Adams - Bash forth predictor corrector methods for solving first order differential equations.

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L:45	T: 15	P: 00	Total : 60 Periods

TEXT BOOKS

1. Grewal, B.S., and Grewal, J.S., "Numerical Methods in Engineering and Science", Khanna Publishers, 10th Edition, New Delhi, 2015.
2. Johnson, R.A., Miller, I and Freund J., "Miller and Freund's Probability and Statistics for Engineers", Pearson Education, Asia, 8th Edition, 2015.

REFERENCES

1. Burden, R.L and Faires, J.D, "Numerical Analysis", 9th Edition, Cengage Learning, 2016.
2. Devore. J.L., "Probability and Statistics for Engineering and the Sciences", Cengage Learning, New Delhi, 8th Edition, 2014.
3. Gerald. C.F. and Wheatley. P.O. "Applied Numerical Analysis" Pearson Education, Asia, New Delhi, 7th Edition, 2007.
4. Gupta S.C. and Kapoor V. K., "Fundamentals of Mathematical Statistics", Sultan Chand & Sons, New Delhi, 12th Edition, 2020.
5. Spiegel. M.R., Schiller. J. and Srinivasan. R.A., "Schaum's Outlines on Probability and Statistics ", Tata McGraw Hill Edition, 4th Edition, 2012.
6. Walpole. R.E., Myers. R.H., Myers. S.L. and Ye. K., "Probability and Statistics for Engineers and Scientists", 9th Edition, Pearson Education, Asia, 2010.

WEB RESOURCES

- http://www.davidmlane.com/hyperstat/index.html
- http://www.robertniles.com/stats/
- http://webserv.jcu.edu/math/ISEP/ISEP.htm
- http://rt.uits.iu.edu/visualization/analytics/stats/spss-getting-started-windows.php
- http://www.ats.ucla.edu/stat/

COURSE OUTCOMES

At the end of the course students should be able to

CO1: Apply the concept of testing of hypothesis for small and large samples in real life problems.

CO2: Apply the basic concepts of classifications of design of experiments in the field of agriculture.

CO3: Appreciate the numerical techniques of interpolation in various intervals and apply the numerical techniques of differentiation and integration for engineering problems.

CO4: Solve the partial and ordinary differential equations with initial and boundary conditions by using certain techniques with engineering applications.

CO5: Understand the knowledge of various techniques and methods for solving first and second order ordinary differential equations.

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24UBE201	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING (Common to B.E. Civil, Mechanical & B.Tech FT)	L	T	P	C
		3	0	0	3

PREREQUISITES

Engineering Physics and Mathematics

COURSE OBJECTIVES

- To introduce the basics of electric circuits and analysis
- To impart knowledge of working principles and application of electrical machines
- To introduce analog devices and their characteristics
- To educate on the fundamental concepts of digital electronics
- To introduce the functional elements and working of measuring instruments

UNIT-I	ELECTRICAL CIRCUITS	9

DC Circuits: Circuit Components: Conductor, Resistor, Inductor, Capacitor – Ohm's Law - Kirchhoff's Laws – Simple problems- Nodal Analysis, Mesh analysis Introduction to AC Circuits and Parameters: Waveforms, Average value, RMS Value, Instantaneous power, real power, reactive power and apparent power, power factor.

UNIT-II	ELECTRICAL MACHINES	9

Construction and Working principle- DC Separately and Self excited Generators, EMF equation, Types and Applications. Working Principle of DC motors, Torque Equation, Types and Applications. Construction, Working principle and Applications of Transformer and Three Phase Induction Motor.

UNIT-III	ANALOG ELECTRONICS	9

PN Junction Diodes, Zener Diode –Characteristics and Applications – Bipolar Junction Transistor - Types, I-V Characteristics and Applications – Rectifiers.

UNIT-IV	DIGITAL ELECTRONICS	9

Review of number systems, binary codes, Combinational logic - representation of logic functions-SOP and POS forms, K-map representations - minimization using K maps (4 Variable Problems only) – Multiplexer and Demultiplexer.

UNIT-V	MEASUREMENTS & INSTRUMENTATION	9

Functional elements of an instrument, Standards and calibration, Operating Principle, types - Moving Coil and Moving Iron meters, Measurement of three phase power, Energy Meter, Instrument Transformers-CT and PT.

L: 45	T: 00	P: 00	Total: 45 Periods

TEXT BOOKS

1. Kothari DP and I.J Nagrath, "Basic Electrical and Electronics Engineering", 2nd Edition, McGraw Hill, 2020
2. S.K. Bhattacharya "Basic Electrical and Electronics Engineering", Pearson Education, 2nd Edition, 2017.

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3. Sedha R.S., "A text book book of Applied Electronics", S. Chand & Co., 2008
4. James A. Svoboda, Richard C. Dorf, "Dorf's Introduction to Electric Circuits", Wiley, 2018.
5. A.K. Sawhney, Puneet Sawhney 'A Course in Electrical & Electronic Measurements & Instrumentation', Dhanpat Rai and Co, 2015.

REFERENCES

1. Kothari DP and I.J Nagrath, "Basic Electrical Engineering", 4th Edition, McGraw Hill Education, 2019.
2. Thomas L. Floyd, 'Digital Fundamentals', 11th Edition, Pearson Education, 2017.
3. Albert Malvino, David Bates, 'Electronic Principles, McGraw Hill; 7th edition, 2017.
4. Mahmood Nahvi and Joseph A. Edminister, "Electric Circuits", Schaum' Outline Series, McGraw Hill, 2002.
5. H.S. Kalsi, 'Electronic Instrumentation', Tata McGraw-Hill, New Delhi, 2010

WEB RESOURCES

1. https://archive.nptel.ac.in/courses/108/105/108105112/
2. https://archive.nptel.ac.in/courses/108/101/108101091/
3. https://nptel.ac.in/courses/108108076

COURSE OUTCOMES

After completing this course, the students will be able to:

CO1: Compute the electric circuit parameters for simple problems.

CO2: Explain the working principle and applications of electrical machines.

CO3: Analyze the characteristics of analog electronic devices.

CO4: Explain the basic concepts of digital electronics.

CO5: Explain the operating principles of measuring instruments.

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24UME201	ENGINEERING MECHANICS (Common to B. E. Civil & Mechanical)	L	T	P	C
		3	1	0	4

Prerequisites:
Nil

COURSE OBJECTIVES:
• To determine the resultant and equivalent systems of forces in engineering applications. • To introduce the equilibrium of rigid bodies, vector methods and free body diagram. • To study and understand the distributed forces, surface, loading on beam and intensity. • To learn the principles of friction, forces and to determine the concepts of frictional forces at the contact surfaces of various engineering systems. • To develop basic dynamics concepts – force, momentum, work and energy.

UNIT-I	STATICS OF PARTICLES	12
Introduction - Systems of Units, Statics of Particles -Laws of Mechanics – Lami's theorem, Parallelogram and triangular Law of forces – Vectors –Vectorial representation of forces and moments – Vector operations on forces - Coplanar Forces –Resultant of several concurrent forces - Equilibrium of a forces – Forces in space – Equilibrium of particle in space - Equivalent systems of forces – Principle of transmissibility – Single equivalent force.		

UNIT-II	EQUILIBRIUM OF RIGID BODIES	12
Free body diagram – Types of supports and their reactions – requirements of stable equilibrium – Moments and Couples – Moment of a force about a point and about an axis –Vectorial representation of moments and couples– Scalar components of a moment – Varignon's theorem - Equilibrium of Rigid bodies in two dimensions -Equilibrium of Rigid bodies in three dimensions.		

UNIT-III	DISTRIBUTED FORCES	15
Centroids of lines and areas – symmetrical and unsymmetrical shapes, Determination of Centroids by Integration, Theorems of Pappus - Guldinus, Centre of Gravity of a Three Dimensional Body, Centroid of a Volume, Composite Bodies, Moments of Inertia of Areas and Mass - Determination of the Moment of Inertia of an Area by Integration, Polar Moment of Inertia, Radius of Gyration of an Area, Parallel-Axis Theorem, Moments of Inertia of Composite Areas, Moments of Inertia of a Mass - Moments of Inertia of Thin Plates, Determination of the Moment of Inertia of a Three-Dimensional Body by Integration.		

UNIT-IV	FRICTION	9
Frictional force – Laws of Coloumb friction – Cone of friction – Angle of repose – Wheel friction – Wedge friction - Ladder friction - Rolling resistance.		

UNIT-V	MECHANISMS FOR CONTROL	12
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 of bodies.		

L:45	T:15	P:0	Total :60 Periods

24/10/24

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TEXT BOOKS

1. Beer Ferdinand P, Russel Johnston Jr., David F Mazurek, Philip J Cornwell, Sanjeev Sanghi, Vector Mechanics for Engineers: Statics and Dynamics, McGraw Higher Education., 12th Edition, 2019.
2. Vela Murali, "Engineering Mechanics-Statics and Dynamics", Oxford University Press, 2018.
3. Meriam J L and Kraige L G, Engineering Mechanics: Statics and Engineering Mechanics: Dynamics, 7th edition, Wiley student edition, 2013.

REFERENCES

1. Boresi P and Schmidt J, Engineering Mechanics: Statics and Dynamics, 1/e, Cengage learning, 2008.
2. Hibbeller, R.C., Engineering Mechanics: Statics, and Engineering Mechanics: Dynamics, 13th edition, Prentice Hall, 2013.
3. Irving H. Shames, Krishna Mohana Rao G, Engineering Mechanics – Statics and Dynamics, 4th Edition, Pearson Education Asia Pvt. Ltd., 2005.
4. Timoshenko S, Young D H, Rao J V and Sukumar Pati, Engineering Mechanics, 5th Edition, McGraw Hill Higher Education, 2013.

COURSE OUTCOMES:

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

CO1: Illustrate the resultant and equivalent systems of forces.
CO2: Analyse the rigid body in equilibrium.
CO3: Evaluate the properties of distributed forces.
CO4: Determine the friction and the effects by the laws of friction.
CO5: Calculate dynamic forces exerted in rigid body.

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24UHS202	TAMILS AND TECHNOLOGY (Common to All Branches)	L	T	P	C
		1	0	0	1

Prerequisites:
Nil

COURSE OBJECTIVES:

- Appreciate weaving and ceramic technology.
- Learn the design and construction technology of ancient times.
- Understand the engineering principles of manufacturing technology.
- Introduce the methods of irrigation and agricultural technology.
- Learn the scientific tamil and tamil computing.

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)-ThirumalaiNayakar 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 goldCoins 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 in Silappathikaram.

UNIT IV	AGRICULTURE AND IRRIGATION TECHNOLOGY	3

Dam, Tank, ponds, Sluice, Significance of KumizhiThoompu 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.

L:15	T: 00	P: 00	Total : 15 Periods

TEXT-CUM-REFERENCE BOOKS

HEAD OF DEPARTMENT
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1. .தமிழகவரலாறு - மக்களும்பண்பாடும் - கே .கே .பிள்ளை (வெளியீடு:
2. தமிழ்நாடுபாடநூல்மற்றும்கல்வியியல்பணிகள்கழகம்).
3. கனிவித்தமிழ் -முனைவர்இல .சுந்தரம்.(விகடன்பிரகரம்).
4. கீழடி – வைகைநதிக்கரையில்சங்ககாலநகரநாகரிகம் (தொல்லியல் துறை வெளியீடு)
5. பொருநை - ஆற்றங்கரைநாகரிகம் (தொல்லியல்துறை வெளியீடு)
6. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
7. Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.
8. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
9. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.) 55
10. 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)
11. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by: The Author)
12. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
13. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

COURSE OUTCOMES

At the end of the course students should be able

CO1: Explain the principles behind weaving and ceramic technology of ancient tamils.
CO2: Correlate the present and ancient design and construction technology.
CO3: Apply engineering principles to ancient manufacturing technology.
CO4: Apply engineering principles to irrigation and agricultural technology.
CO5: Develop scientific tamil and new techniques in tamil computing.

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24UHS202	தமிழரும் தொழில்நுட்பமும் (Common to All Branches)	L	T	P	C
		1	0	0	1

அலகு I	தெசவு மற்றும் பானைத்ததொழில்நுட்பம	3

சங்க காலத்தில் நெசவுத்தொழில்- பானைத்தொழில் நுட்பம் கருப்பு சிவப்பு பாண்டங்கள் - பாண்டங்களில் கீறல் குறியீடுகள்.

அலகு II	வடிவமைப்பு மற்றும் கட்டிடத் தொழில்நுட்பம்	3

சங்க காலத்தில் வடிவமைப்பு மற்றும் கட்டுமானங்கள் வடிவமைப்பு மற்றும் கட்டிடத் தொழில்நுட்பம் சங்க காலத்தில் வடிவமைப்பு மற்றும் கட்டுமானங்கள் & சங்க காலத்தில் வீட்டுப் பொருட்களில் வடிவமைப்பு சங்க காலத்தில் கட்டுமான பொருட்களும் நடுகல்லும் - சிலப்பதிகாரத்தில் மேடை அமைப்பு பற்றிய விவரங்கள் கோவில்களும் மாமல்லபுரச் சிற்பங்களும், 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	உற்பத்தி தொழில்நுட்பம்	3

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

அலகு IV	வேளாண்மை மற்றும் நீர்ப்பாசனத் தொழில்நுட்பம்	3

அணை, ஏரி, குளங்கள், மதகு - சோழர் காலக் குமுழித் தூம்பின் முக்கியத்துவம் கால்நடை பராமரிப்பு காலநடைகளுக்காக 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 நூல்கள் மின்பதிப்பு செய்தல் - தமிழ் மென்பொருட்கள் உருவாக்கம் - தமிழ் இணையக் கல்விக்கழகம் - தமிழ் மின் நூலகம் - இணையத்தில் தமிழ் அகராதிகள் சொற்குவைத்திட்டம்

L:15	T: 00	P: 00	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 பிரகரம்).
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) (Publishid by: International institute of Tamil Studies).
7. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.k.D.Thirunavukkarasu) (Published by:Institute of Tamil Studies).
8. The Contribution of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: Institute of Tamil Studies).

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9. Keeladi – Sangam City Civilization on the banks of banks of river Vaigai' (Jointly Published by: Department of archaeology & Tamil Nadu Text book and Educational Services Corporation, Tamil Nadu)
10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (published by: The Author).
11. Porunai Civilization (jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
12. Journey of Civilzation Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

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24UGEI201	ENGINEERING GRAPHICS AND DRAFTING (Common to B.E. Civil, ECE, EEE, Mechanical & B. Tech. FT)	L	T	P	C
		3	0	2	4

Prerequisites:
Nil

COURSE OBJECTIVES:
• Drawing engineering curves. • Drawing freehand sketch of simple objects. • Drawing orthographic projection of solids and section of solids. • Drawing development of solids. • Drawing isometric and perspective projections of simple solids.

UNIT-I	PLANE CURVES AND FREEHAND SKETCHING	6+12
Basic Geometrical constructions, 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. Visualization concepts and Free Hand sketching: Visualization principles —Representation of Three Dimensional objects — Layout of views- Freehand sketching of multiple views from pictorial views of objects.		

UNIT-II	PROJECTION OF POINTS, LINES AND PLANE SURFACES	6+12
Orthographic projection- principles-Principal planes-First angle projection-projection of points (All Quadrants).Projection of straight lines (only First angle projections) inclined to both the principal planes - Determination of true lengths and true inclinations by rotating line method Projection of planes (polygonal and circular surfaces) inclined to both the principal planes by rotating object method.		

UNIT-III	PROJECTION OF SOLIDS AND SECTION OF SOLIDS	6+12
Projection of simple solids like prisms, pyramids, cylinder, cone and truncated solids when the axis is inclined to one of the principal planes and parallel to the other by rotating object method. Solids suspended from corner and real time application of projection of solids. Sectioning of above solids in simple vertical position when the cutting plane is inclined to the one of the principal planes and perpendicular to the other — obtaining true shape of section. Practicing three-dimensional modeling of simple objects by CAD Software.		

UNIT-IV	DEVELOPMENT OF SURFACES	6+12
Development of lateral surfaces of simple and sectioned solids — Prisms, pyramids cylinders and cones. Development of lateral surfaces of simple solids with square and cylindrical cut-outs — Prisms, pyramids cylinders and cones. Practicing three-dimensional modeling of simple objects by CAD Software.		

UNIT-V	ISOMETRIC AND PERSPECTIVE PROJECTIONS	6+12
Principles of isometric projection — Isometric scale - Isometric projections of simple solids and truncated solids - Prisms, pyramids, cylinders, cones- combination of two solid objects in simple vertical positions - Perspective projection of simple solids-Prisms, pyramids and cylinders by visual ray method. Practicing three-dimensional modeling of isometric projection of simple objects by CAD Software. Engineering Applications of isometric, orthographic and perspective projections		

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L:30	T:0	P:60	Total :90 Periods

TEXT BOOKS

1. Bhatt N.D. and Panchal V.M., "Engineering Drawing", Charotar Publishing House, 53rd Edition, 2019.
2. Natrajan K.V., "A Text Book of Engineering Graphics", Dhanalakshmi Publishers, Chennai, 2018.
3. Parthasarathy, N. S. and Vela Murali, "Engineering Drawing", Oxford University Press, 2015

REFERENCES

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

COURSE OUTCOMES:

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

CO1: Use BIS conventions and specifications for engineering drawing.
CO2: Construct the conic curves, involutes and cycloid.
CO3: Solve practical problems involving projection of lines.
CO4: Draw the orthographic, isometric and perspective projections of simple solids.
CO5: Draw the development of simple solids.

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24UGE211	ENGINEERING FUNDAMENTALS LABORATORY (Common to All branches)	L	T	P	C
		0	0	4	2

Prerequisites:
Nil

COURSE OBJECTIVES:

- Drawing pipe line plan; laying and connecting various pipe fittings used in common household plumbing work; Sawing; planing; making joints in wood materials used in commonhousehold wood work.
- Wiring various electrical joints in common household electrical wire work.
- Welding various joints in steel plates using arc welding work; Machining various simple processes like turning, drilling, tapping in parts; Assembling simple mechanical assembly of common household equipments; Making a tray out of metal sheet using sheet metal work.
- Soldering and testing simple electronic circuits; Assembling and testing simple electronic components on PCB.
- Understand the component parts of computer systems.
- Understand the master programming constructs, and develop, test, and debug programs.
- Identify and analyze problems, and design and implement solutions.

Part – A (Civil and Mechanical) (Students will be offered any 10 experiments)	
1.	Land documents reading and understanding
2.	Material identification and testing as per BIS & NBC
3.	Basic surveying and land area measurement
4.	Water analysis
5.	Basic vasthu
6.	Make a Butt/Lap/Tee joint of MS plate using Arc welding and also make Lap joint using riveting
7.	Prepare T/L/Lap joint from the given wooden workpiece and make a Box /Tray out of plywood using modern power tools
8.	Perform the simple turning, drilling, tapping using lathe
9.	Demonstration of basic foundry operations
10.	Making a square tray using sheet metal
11.	Study of various metals and alloys
12.	Hands on training to use measuring instruments
13.	Study of 3-D printer / Robotics architecture / Mechatronics system
Part – B (Electrical and Electronics)	
Students will be offered any 07 experiments	
1.	Study of electrical switches, fuses, indicators, circuit breakers, contactors and relays
2.	Wiring circuit for fluorescent lamp and Stair case wiring
3.	Wiring Circuit of ceiling fan
4.	Measurement of Earth Resistance

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5.	House wiring with energy meter, RCCB and ELCB
6.	Study of electronic components resistor, diode, transistors, measuring devices
7.	Soldering and Assembly of Simple Circuits and trouble shooting
8.	Assembly and dismantle of smartphone
Part- C (Computer Technologies)	
1.	Office automation tools - Word processing
2.	Office automation tools –Spread sheets
3.	Office automation tools - Presentation preparation
4.	Network topology configuration
5.	Network crimping & I/O outlet termination
6.	Types of operating systems and installation

L:0	T:0	P:60	Total :60 Periods

COURSE OUTCOMES:

Upon completion of this course, the students will be able to:

CO1: Draw pipe line plan; lay and connect various pipe fittings used in common household plumbing work; Saw; plan; make joints in wood materials used in common household wood work.

CO2: Wire various electrical joints in common household electrical wire work.

CO3:Weld various joints in steel plates using arc welding work; Machine various simple processes like turning, drilling, tapping in parts; Assemble simple mechanical assembly of common household equipments; Make a tray out of metal sheet using sheet metal work.

CO4: Solder and test simple electronic circuits; Assemble and test simple electronic components on PCB.

CO5: Evaluate the performance of different types of CPU scheduling algorithm.

CO6: Use different systems calls for writing application programs.

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24UBE211	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LABORATORY (Common to B. E. Civil & Mechanical)	L	T	P	C
		0	0	4	2

PREREQUISITES

Engineering Physics

COURSE OBJECTIVES

- To train the students in conducting load tests on electrical machines
- To gain practical experience in characterizing electronic devices

LIST OF EXPERIMENTS

1. Verification of ohms Laws and Kirchhoff's Laws.
2. Load test on DC Series Motor.
3. Load test on DC Shunt Motor.
4. Load test on DC Generator.
5. Load test on Single phase Transformer.
6. Load Test on Three Phase Induction Motor.
7. Characteristics of PN and Zener Diodes.
8. Characteristics of BJT.
9. Half wave and Full Wave rectifiers.
10. Verification of Logic Gates.
11. Implementation of Binary Adder and Subtractor.
12. Measurement of three phase power.

L: 00	T: 00	P: 60	Total: 60 Periods

LIST OF EQUIPMENTS REQUIRED

(for batch of 30 students)

1. DC Shunt Motor/Generator, Single Phase Induction Motor – 1 Each
2. Rheostat / Variable Resistors – Necessary Quantity
3. Tachometer – 3 No's
4. PN Diode / Zener Diode and BJT – 10 No's
5. Resistor, Capacitor, CRO & Transformer (6V) - Necessary Quantity
6. Regulated Power Supply (0-30V) – 15 No's
7. AC/DC – Voltmeters of required rating – 10 No's
8. AC/DC -Ammeters of required rating - 10 No's
9. Multimeters (Digital) - 10 No's
10. Single Phase Wattmeter of suitable rating - 5 No's
11. Circuit Connection Boards / Bread Board – 20 No's
12. Connecting Wires / Patch Chords - Necessary Quantity
13. Digital IC Trainer with IC 7400, 7402, 7404,7408,7432,7486 – 5 Each
14. Three phase star& delta connected load / Single phase load of suitable rating - 3 No's
15. Necessary Quantities of Resistors, Inductors, Capacitors of various capacities (Quarter Watt to 10 Watt)

COURSE OUTCOMES

After completing this course, the students will be able to:

CO1: Use experimental methods to verify the Ohm's and Kirchhoff's Laws.

CO2: Analyze experimentally the load characteristics of electrical machines.

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CO3: Analyze the characteristics of basic electronic devices.
CO4: Use experimental methods to verify the logic gates and operations.
CO5: Use power measurement meters to measure the various parameters.

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24UHS211	COMMUNICATION LABORATORY (Common to all Branches)	L	T	P	C
		0	0	4	2

Prerequisites:
• Basic Knowledge in Language usage

COURSE OBJECTIVES:
• To identify varied group discussion skills and apply them to take part in effective discussions in a professional context. • To analyse concepts and problems and make effective presentations explaining them clearly and precisely. • To be able to communicate effectively through formal and informal writing. • To be able to use appropriate language structures to write emails, reports and essays • To give instructions and recommendations that are clear and relevant to the context

UNIT-I	MAKING COMPARISONS	12
Speaking-Role Play Exercises Based on Workplace Contexts, - talking about competition discussing progress toward goals-talking about experiences- talking about events in life-discussing past events-Writing: writing emails (formal& semi-formal).		

UNIT-II	EXPRESSING CAUSAL RELATIONS IN SPEAKING AND WRITING	12
Speaking: discussing news stories-talking about frequency-talking about travel problems discussing travel procedures- talking about travel problems- making arrangements-describing arrangements-discussing plans and decisions- discussing purposes and reasons- understanding common technology terms-Writing: - writing different types of emails.		

UNIT-III	PROBLEM SOLVING	12
Speaking: discussing predictions-describing the climate-discussing forecasts and scenarios-talking about purchasing-discussing advantages and disadvantages- making comparisons-discussing likes and dislikes- discussing feelings about experiences-discussing imaginary scenarios Writing: short essays and reports-formal/semi-formal letters.		

UNIT-IV	REPORTING OF EVENTS AND RESEARCH	12
Speaking: discussing the natural environment-describing systems-describing position and movement- explaining rules - (example- discussing rental arrangements) - understanding technical instructions-Writing: writing instructions-writing a short article.		

UNIT-V	THE ABILITY TO PUT IDEAS OR INFORMATION COGENTLY	12
Speaking: describing things relatively-describing clothing-discussing safety issues (making recommendations) talking about electrical devices-describing controlling actions- Writing: job application (Cover letter + Curriculum vitae)-writing recommendations.		

L:00	T: 00	P: 60	Total :60 Periods

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WEB RESOURCES

- https://academicguides.waldenu.edu/writingcenter/grammar/comparisons#:~:text=Adjectives%20and%20adverbs%20can%20be,to%20hedge%20or%20boost%20language.
- https://www.linkedin.com/pulse/causality-expressed-natural-language-text-vivek-khetan
- https://www.sessionlab.com/blog/problem-solving-techniques/

COURSE OUTCOMES

At the end of the course students should be able to

CO1: Speak effectively in group discussions held in formal/semi formal contexts.
CO2: Discuss, analyse and present concepts and problems from various perspectives to arrive at suitable solutions
CO3: Write emails, letters and effective job applications.
CO4: Write critical reports to convey data and information with clarity and precision
CO5: Give appropriate instructions and recommendations for safe execution of tasks

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REGULATIONS 2024

B. E. CIVIL ENGINEERING

CHOICE BASED CREDIT SYSTEM

SYLLABUS FOR III SEMESTER

24UMA301	TRANSFORMS AND PARTIAL DIFFERENTIAL EQUATIONS (Common to B.E CIVIL, MECH, EEE)	L	T	P	C
		3	1	0	4

COURSE OBJECTIVE:

- To introduce the basic concepts of PDE for solving standard partial differential equations.
- To introduce Fourier series analysis which is central to many applications in engineering apart from its use in solving boundary value problems.
- To acquaint the student with Fourier series techniques in solving heat flow problems used in various situations.
- To acquaint the student with Fourier, transform techniques used in wide variety of situations.
- To introduce the effective mathematical tools for the solutions of partial differential equations that model several physical processes and to develop Z transform techniques for discrete time systems.

UNIT-I	PARTIAL DIFFERENTIAL EQUATIONS	9+3

Formation of partial differential equations – Solutions of standard types of first order partial differential equations - First orders partial differential equations reducible to standard types- Lagrange's linear equation - Linear partial differential equations of second and higher order with constant coefficients of both homogeneous and non-homogeneous types.

UNIT-II	FOURIER SERIES	9+3

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

UNIT-III	APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS	9+3

Classification of PDE – Method of separation of variables - Fourier series solutions of one dimensional wave equation – One dimensional equation of heat conduction – Steady state solution of two dimensional equation of heat conduction (Cartesian coordinates only).

UNIT-IV	FOURIER TRANSFORMS	9 + 3

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

UNIT-V	Z -TRANSFORMS	9 + 3

Z-transforms - Elementary properties – Convergence of Z-transforms - – Initial and final value theorems - Inverse Z-transform using partial fraction and convolution theorem - Formation of difference equations – Solution of difference equations using Z - transforms.

L:45	T:15	T: 60 PERIODS

TEXT BOOKS

1. Grewal B.S.,"Higher Engineering Mathematics" 44thEdition, Khanna Publishers,New Delhi, 2018.
2. Kreyszig E, "Advanced Engineering Mathematics ", 10th Edition, John Wiley, New Delhi, India, 2016.

REFERENCES

1. Andrews. L.C and Shivamoggi. B, "Integral Transforms for Engineers" SPIE Press, 1999
2. Bali. N.P and Manish Goyal, "A Textbook of Engineering Mathematics", 10th Edition, Laxmi Publications Pvt. Ltd, 2015.
3. James. G., "Advanced Modern Engineering Mathematics", 4thEdition, Pearson Education, New Delhi, 2016.
4. Narayanan. S., Manicavachagom Pillay.T.K and Ramanaiah.G "Advanced Mathematics for Engineering Students", Vol. II & III, S.Viswanathan Publishers Pvt. Ltd, Chennai, 1998.
5. Ramana. B.V., "Higher Engineering Mathematics", McGraw Hill Education Pvt. Ltd, New Delhi, 2018.
6. Wylie. R.C. and Barrett. L.C. "Advanced Engineering Mathematics "Tata McGraw Hill Education Pvt. Ltd, 6th Edition, New Delhi, 2012.

COURSE OUTCOMES

At the end of the course students should be able to

CO1: Understand how to solve the given standard partial differential equations.

CO 2: Solve differential equations using Fourier series analysis which plays a vital role in engineering applications.

CO3: Appreciate the physical significance of Fourier series techniques in solving one and two dimensional heat flow problems and one dimensional wave equations.

CO4: Understand the mathematical principles on transforms and partial differential equations would provide them the ability to formulate and solve some of the physical problems of engineering.

CO5: Use the effective mathematical tools for the solutions of partial differential equations by using Z transform techniques for discrete time systems.

24UCE301	STRENGTH OF MATERIALS	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To learn the fundamental concepts of Stress in simple and complex states and to know the mechanism of load transfer in beams and the induced stresses due to simple bending and unsymmetrical bending and to determine the deformation in determinate beams and to know the basic concepts of analysis of indeterminate beams

UNIT-I	SIMPLE AND COMPOUND STRESSES	9

Stresses in simple and compound bars – Thermal stresses – Elastic constants - Thin cylindrical and spherical shells – Biaxial state of stress – Principal stresses and principal planes– Mohr's circle of stresses - Torsion on circular shafts

UNIT-II	BENDING OF BEAMS	9

Types of beams and transverse loadings– Shear force and bending moment for simply supported, cantilever and over-hanging beams - Theory of simple bending – Bending stress distribution – Shear stress distribution – Shear force and Bending moment calculation for different load conditions (Point Load, UDL, uniformly varying loads UVL)

UNIT-III	DEFLECTION OF BEAMS	9

Double Integration method – Macaulay's method – Area moment method – Conjugate beam method for determinate beams

UNIT-IV	INDETERMINATE BEAMS	9

Propped Cantilever and Fixed Beams – Fixed end moments reactions, slope and deflection for standard cases of loading — Continuous beams – support reactions and moments – Theorem of three moments – Shear Force and Bending Moment Diagrams

UNIT-V	ADVANCED TOPICS	9

Unsymmetrical bending of beams - shear center applied - thick cylinders - Theories of failure –Principal stress, principal strain, shear stress, strain energy and distortion energy theories – application problems

L:45	T: 00	P: 00	Total: 45 Periods

TEXT BOOKS

1. Rajput R.K. "Strength of Materials (Mechanics of Solids)", S.Chand& company Ltd., NewDelhi, 2018.
2. Rattan.S.S., "Strength of Materials", Tata McGraw Hill Education Pvt. Ltd., New Delhi,2017.
3. Punmia B.C., Ashok Kumar Jain and Arun Kumar Jain,"Theory of Structures" (SMTS) Vol -II,Laxmi Publishing Pvt Ltd, New Delhi 2017.

4. Basavarajiah and Mahadevapa, Strength of Materials, University press, Hyderabad, 2016
5. Vazirani.V.N, Ratwani.M.M, Duggal .S.K Analysis of Structures: Analysis, Design and Detailingof Structures-Vol.1, Khanna Publishers, New Delhi 2014.

REFERENCES

1. Kazimi S.M.A, "Solid Mechanics", Tata McGraw-Hill Publishing Co., New Delhi, 2017
2. William A. Nash, "Theory and Problems of Strength of Materials", Schaum's Outline Series, TataMcGraw Hill Publishing company, 2017.
3. Singh. D.K., "Strength of Materials", Ane Books Pvt. Ltd., New Delhi, 2021
4. Egor P Popov, "Engineering Mechanics of Solids", 2nd edition, PHI Learning Pvt. Ltd., NewDelhi,2015
5. Irwing H.Shames, James M.Pitarresi, Introduction to Solid Mechanics, Prentice Hall of India, New Delhi, 2002
6. 6. Beer. F.P. & Johnston.E.R."Mechanics of Materials", Tata McGraw Hill, Sixth Edition, New Delhi 2010.

COURSE OUTCOMES

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

CO1: Understand the concepts of stress and strain, principal stresses and principal planes.

CO2: Determine Shear force and bending moment in beams and understand concept of theory of simple bending.

CO3: Calculate the deflection of beams by different methods and selection of method for determining slope or deflection.

CO4: Analyze propped cantilever, fixed beams and continuous beams for external loadings and support settlements.

CO5: Determine the stresses due to Unsymmetrical bending of beams, locate the shear center, and study the various theories of failure.

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24UCE302	FLUID MECHANICS	L	T	P	C
		3	1	0	4

COURSE OBJECTIVES:

- To introduce the students about properties and behaviour of the fluids under static conditions and to impart basic knowledge of the dynamics of fluids through the control volume approach and to expose to the applications of the conservation laws to a) flow measurements b) flow through pipes (both laminar and turbulent) and c) forces on pipe bends with an exposure to the significance of boundary layer theory and its applications

UNIT-I	FLUIDS PROPERTIES AND FLUID STATICS	9+3

Scope of fluid mechanics – Definitions of a fluid – Methods of analysis – Continuum hypothesis – System and Control volume approach – Reynold's transportation theorem – Fluid properties – Fluid statics – Manometry – Forces on plane and curved surfaces – Buoyancy and floatation

UNIT-II	BASIC CONCEPTS OF FLUID FLOW	9+3

Kinematics: Classification of flows – Streamline, streak-line and path-lines – Stream function and velocity potentials – Flow nets; Dynamics : Application of control volume to continuity, energy and momentum – Euler's equation of motion along a stream line – Bernoulli's equation – Applications to velocity and discharge measurements – Linear momentum equation – Application to Pipe bends – Moment of momentum equation

UNIT-III	DIMENSIONAL ANALYSIS AND MODEL STUDIES	9+3

Dimensions Analysis – Dimensional parameter – Rayleigh's method and Buckingham Pi theorem – Dimensionless parameters – Similitude and model studies – Distorted and undistorted models

UNIT-IV	INCOMPRESSIBLE VISCOUS FLOW	9+3

Reynolds experiment – Laminar flow in pipes and between parallel plates – Development of laminar and turbulent flows in pipes – Darcy-Weisbach equation – Moody diagram – Major and minor losses of flow in pipes – Total energy line – Hydraulic grade line – Siphon – Pipes in series and parallel – Equivalent pipes

UNIT-V	BOUNDARY LAYERS	9+3

Definition of boundary layers – Laminar and turbulent boundary layers – Displacement, momentum and energy thickness – Momentum integral equation – Applications – Separation of boundary layer – Drag and Lift forces

L:45	T: 15	P: 00	Total: 60 Periods

TEXT BOOKS

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1. Modi P.N and Seth Hydraulics and Fluid Mechanics including Hydraulic Machines Standard Book House New Delhi. 2015.
2. Streeter, V.L. Wylie, E. B. and Bedford K.W, Fluid Mechanics. (9th Ed.) Tata McGraw Hill, New Delhi, 1998.

REFERENCES

1. S K Som; Gautam Biswas and S Chakraborty, Introduction to Fluid Mechanics and Fluid Machines, Tata McGraw Hill Education Pvt. Ltd., 2012.
2. Pani B S, Fluid Mechanics: A Concise Introduction, Prentice Hall of India Private Ltd, 2016.
3. Jain A. K. Fluid Mechanics including Hydraulic Machines, Khanna Publishers, New Delhi, 2014.
4. Narayana Pillai N. Principles of Fluid Mechanics and Fluid Machines, (3rd Ed.) University Press (India) Pvt. Ltd. 2009

COURSE OUTCOMES

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

CO1: Demonstrate the difference between solid and fluid, its properties and behaviour in static conditions.
CO2: Apply the conservation laws applicable to fluids and its application through fluid kinematics and dynamics
CO3: Formulate the relationship among the parameters involved in the given fluid phenomenon and to predict the performance of prototypes by model studies
CO4: Estimate the losses in pipelines for both laminar and turbulent conditions and analysis of pipes connected in series and parallel
CO5: Explain the concept of boundary layer and its application to find the drag force excreted by the fluid on the flat solid surface

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24UCE303	CONSTRUCTION MATERIALS AND TECHNOLOGY	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To introduce students to various construction materials and the techniques that are commonly used in civil engineering construction

UNIT-I	STONES - BRICKS - CONCRETE BLOCKS - LIME	9

Stone as building material – Criteria for selection – Tests on stones – Bricks – Classification – Manufacturing of clay bricks – Tests on bricks – Compressive strength – Water Absorption – Efflorescence – Lime –Concrete hollow blocks – Lightweight concrete blocks

UNIT-II	OTHER MATERIALS	9

Timber – Market forms – Plywood – Veneer – False ceiling materials – Steel – Mechanical treatment – Aluminum – Uses – Market forms – Glass – Ceramics – Refractories – Composite Materials – Types and applications – FRP – Fibre textiles – Geomembranes and Geotextiles for earth reinforcement

UNIT-III	CONSTRUCTION PRACTICES & SERVICE REQUIREMENTS	9

Types of Foundations – Shallow and Deep Foundations – Stone Masonry – Brick Masonry – Plastering and Pointing – Cavity Walls – Diaphragm Walls – Formwork – Centering and Shuttering – Shoring – Scaffolding – Underpinning – Roofing – Flooring – Joints in concrete Contraction/Construction/Expansion joints – Fire Protection – Thermal Insulation – Ventilation and Air conditioning – Acoustics and Sound Insulation – Damp Proofing.

UNIT-IV	CONSTRUCTION EQUIPMENTS	9

Selection of equipment for earthwork excavation, concreting, material handling and erection of structures – Dewatering and pumping equipment- Tunneling equipment- TBM

UNIT-V	CONSTRUCTION PLANNING	9

Introduction to construction planning – Scheduling for activities – Critical path method (CPM) and PERT network modelling and time analysis – Project Crashing– Case illustrations

L:45	T: 00	P: 00	Total: 45 Periods

TEXT BOOKS

1. Varghese.P.C, Building Materials, Second Edition PHI Learning Ltd., 2015.
2. Arora S.P and Bindra S.P Building construction, Dhanpat Rai and sons, 2013.

REFERENCES

1. Varghese.P.C, Building Construction, Second Edition PHI Learning ltd., 2016.
2. Punmia ,B.C Building construction , Laxmi publication (p)ltd..,2008.
3. Peurifoy R.L., Schexnayder,C.J., Shapira A., Schmitt.R., Construction Planning

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Equipment and Methods, Tata McGraw-hill, 2011.
4. Srinath L.S., PERT and CPM -Principles and applications, Affliated East West Press 2001

COURSE OUTCOMES

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

CO1: Identify the good quality brick, stone and blocks for construction.
CO2: Recognize the market forms of timber, steel, aluminum and applications of various composite materials.
CO3: Identify the best construction and service practices such as thermal insulations and air conditioning of the building
CO4: Select various equipments for construction works conditioning of building
CO5: Understand the construction planning and scheduling techniques

24UCE304	WATER SUPPLY AND WASTEWATER ENGINEERING	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To introduce students to various components and design of water supply scheme, water treatment methods, water storage distribution system, sewage treatment and disposal and deign of intake structures and sewerage system

UNIT-I	WATER SUPPLY	9

Estimation of surface and subsurface water resources - Predicting demand for water- Impurities of water and their significance - Physical, chemical and bacteriological analysis - Waterborne diseases- Standards for potable water. Intake of water: Pumping and gravity schemes – Population Forecasting methods

UNIT-II	WATER TREATMENT	9

Objectives - Unit operations and processes - Principles, functions, and design of water treatment plant units, aerators of flash mixers, Coagulation and flocculation – Clari floccuator - Plate and tube settlers – Pulsator clarifier - sand filters -Disinfection - softening, removal of iron and manganese – Defluoridation- Softening - Desalination process - Residue Management -Construction, Operation and Maintenance aspects

UNIT-III	WATER STORAGE AND DISTRIBUTION	9

Storage and balancing reservoirs - types, location and capacity. Distribution system: layout, hydraulics of pipe lines, pipe fittings, valves including check and pressure reducing valves, meters, analysis of distribution systems, leak detection, maintenance of distribution systems, pumping stations and their operations - House service connections

UNIT-IV	PLANNING AND DESIGN OF SEWERAGE SYSTEM	9

Characteristics and composition of sewage - Population equivalent – Sanitary sewage flow estimation- Sewer materials - Hydraulics of flow in sanitary sewers - Sewer design - Storm drainage-Storm runoff estimation - Sewer appurtenances - Corrosion in sewers - Prevention and control – Sewage pumping-drainage in buildings - Plumbing systems for drainage

UNIT-V	SEWAGE TREATMENT AND DISPOSAL	9

Objectives - Selection of Treatment Methods - Principles, Functions, -Activated Sludge Process and Extended aeration systems - Trickling filters - UASB – Waste Stabilization Ponds - Other treatment methods - Reclamation and Reuse of sewage – Recent Advances in Sewage Treatment - Construction, Operation and Maintenance aspects. – Discharge standards-sludge treatment -Disposal of sludge - Self Purification of River

L:45	T: 00	P: 00	Total: 45 Periods

TEXT BOOKS

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1. Garg, S.K. Environmental Engineering, Vol.I Khanna Publishers, New Delhi, 2010.
2. Modi, P.N., Water Supply Engineering, Vol.I Standard Book House, New Delhi, 2016.
3. Garg, S.K., Environmental Engineering Vol.II, Khanna Publishers, New Delhi, 2015.
4. Duggal K.N., "Elements of Environmental Engineering" S. Chand and Co. Ltd., New Delhi, 2014.
5. Punmia, B.C., Jain, A.K., and Jain.A.K.., Environmental Engineering, Vol.II, Laxmi Publications, 2010.

REFERENCES

1. Punmia B.C, Ashok Jain and Arun Jain, Water Supply Engineering, Laxmi Publications (P) Ltd., New Delhi 2010.
2. Manual on Water Supply and Treatment, CPHEEO, Ministry of Urban Development, Government of India, New Delhi, 1999.
3. 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.
4. Of Urban Development, Government of India, New Delhi, 2013.
5. Metcalf and Eddy – Waste water Engineering – Treatment and Reuse, Tata Mc. Graw – Hill Company, New Delhi, 2010.
6. Gray N.F, "Water Technology", Elsevier India Pvt.Ltd. New Delhi, 2006

COURSE OUTCOMES

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

CO1: Understand the various components of water supply scheme and design of intake structure and conveyance system for water transmission

CO2: Understand on the characteristics and composition of sewage, ability to estimate sewage generation and design sewer system including sewage pumping stations

CO3: Understand the process of conventional treatment and design of water and wastewater treatment system and gain knowledge of selection of treatment process and biological treatment process

CO4: Ability to design and evaluate water distribution system and water supply in buildings and understand the self-purification of streams and sludge and septage disposal methods.

CO5: Able to understand and design the various advanced treatment system and knowledge about the recent advances in water and wastewater treatment process and reuse of sewage.

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24UCE305	SURVEYING	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To introduce the rudiments of plane surveying and geodetic principles to Civil Engineers and to learn the various methods of plane and geodetic surveying to solve the real-world problems. To introduce the concepts of Control Surveying. To introduce the basics of Astronomical Surveying.

UNIT-I	FUNDAMENTALS OF CONVENTIONAL SURVEYING	9

Definition – Classifications – Basic principles – Equipment and accessories for ranging and chaining – Methods of ranging – Well conditioned triangles – Chain traversing – Compass – Basic principles – Types – Bearing – System and conversions – Sources of errors and Local attraction – Magnetic declination – Dip – compass traversing – Plane table and its accessories – Merits and demerits – Radiation – Intersection – Resection – Plane table traversing

UNIT-II	LEVELLING	9

Level line – Horizontal line – Datum – Benchmarks – Levels and staves – Temporary and permanent adjustments – Methods of leveling – Fly leveling – Check leveling – Procedure in leveling – Booking – Reduction – Curvature and refraction – Reciprocal leveling – Precise leveling - Contouring.

UNIT-III	THEODOLITE SURVEYING	9

Horizontal and vertical angle measurements – Temporary and permanent adjustments – Heights and distances – Tacheometric surveying – Stadia Tacheometry – Tangential Tacheometry – Trigonometric leveling – Single Plane method – Double Plane method

UNIT-IV	CONTROL SURVEYING AND ADJUSTMENT	9

Horizontal and vertical control – Methods – Triangulation – Traversing – Gale's table – Trilateration – Concepts of measurements and errors – Error propagation and Linearization – Adjustment methods - Least square methods – Angles, lengths and levelling network

UNIT-V	DIGITAL SURVEYING	9

Introduction, aerial photogrammetry, types of EDM instruments. Total station - Principles of remote sensing and its applications.

L:45	T: 00	P: 00	Total: 45 Periods

TEXT BOOKS

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1. Dr. B. C. Punmia, Ashok K. Jain and Arun K Jain, Surveying Vol. I & II, Lakshmi PublicationsMPvt Ltd, New Delhi, Sixteenth Edition, 2016.
2. T. P. Kanetkarand S. V. Kulkarni, Surveying and Levelling, Parts 1 & 2, Pune Vidyarthi Griha Prakashan, Pune, 2008

REFERENCES

1. R. Subramanian, Surveying and Levelling, Oxford University Press, Second Edition, 2012.
2. James M. Anderson and Edward M. Mikhail, Surveying, Theory and Practice, Seventh Edition, Mc Graw Hill 2001.
3. Bannister and S. Raymond, Surveying, Seventh Edition, Longman 2004.
4. S. K. Roy, Fundamentals of Surveying, Second Edition, Prentice^ Hall of India2010.
5. K. R. Arora, Surveying Vol I & II, Standard Book house, Twelfth Edition 2013.

COURSE OUTCOMES

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

CO1: Introduce the rudiments of various surveying and its principles.
CO2: Imparts knowledge in computation of levels of terrain and ground features
CO3: Imparts concepts of Theodolite Surveying for complex surveying operations
CO4: Understand the procedure for establishing horizontal and vertical control
CO5: Imparts the knowledge on modern surveying instruments

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24UCE311	SURVEYING LABORATORY	L	T	P	C
		0	0	4	2

COURSE OBJECTIVES:

- At the end of the course the student will possess knowledge about survey field techniques

LIST OF EXPERIMENTS:

Chain Survey

1. Study of chains and its accessories, Aligning, Ranging, Chaining and Marking Perpendicular offset
2. Setting out works – Foundation marking using tapes single Room and Double Room

Compass Survey

3. Compass Traversing – Measuring Bearings & arriving included angles

Levelling - Study of levels and levelling staff

4. Fly levelling using Dumpy level &Tilting level
5. Check levelling

Theodolite - Study of Theodolite

6. Measurements of horizontal angles by reiteration and repetition and vertical angles
7. Determination of elevation of an object using single plane method when base is Accessible / inaccessible.

Tacheometry – Tangential system – Stadia system

8. Determination of Tacheometric Constants
9. Heights and distances by stadia Tacheometry
10. Heights and distances by Tangential Tacheometry

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

11. Traverse using Total station and Area of Traverse
12. Determination of distance and difference in elevation between two inaccessible points using Total station

L:00	T: 00	P: 45	Total: 45 Periods

REFERENCES

1. T. P. Kanetkarand S. V. Kulkarni, Surveying and Levelling, Parts 1 & 2, Pune Vidyarthi Griha Prakashan, Pune, 24th Reprint, 2015.
2. Dr. B. C. Punmia, Ashok K. Jainand Arun K Jain, Surveying Vol. I & II, Lakshmi Publications Pvt Ltd, New Delhi, 17th Edition, 2016.
3. James M. Anderson and Edward M. Mikhail, Surveying, Theory and Practice, Seventh Edition, McGraw Hill 2001.
4. Bannister and S. Raymond, Surveying, Seventh Edition, Longman 2004.
5. David Clark, Plane and Geodetic Surveying for Engineers, Volume I, Constable and Company Ltd, London, CBS, 6th Edition, 2004.

COURSE OUTCOMES

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

CO1: Impart knowledge on the usage of basic surveying instruments like chain/tape, compass and levelling instruments

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CO2: Able to use levelling instrument for surveying operations
CO3: Able to use theodolite for various surveying operations
CO4: Able to carry out necessary surveys for social infrastructures
CO5: Able to prepare planimetric maps

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24UCE312	WATER AND WASTEWATER ANALYSIS LABORATORY	L	T	P	C
		0	0	4	2

COURSE OBJECTIVES:

- This subject includes the list of experiments to be conducted for characterization of water and municipal sewage. At the end of the course, the student is expected to be aware of the procedure for quantifying quality parameters for water and sewage.

LIST OF EXPERIMENTS

ANALYSIS OF WATER SAMPLE

1. Sampling and preservation methods for water and wastewater (Demonstration only)
2. Measurement of Electrical conductivity and turbidity
3. Determination of fluoride in water by spectrophotometric method /ISE
4. Determination of iron in water (Demo)
5. Determination of Sulphate in water
6. Determination of Optimum Coagulant Dosage by Jar test apparatus
7. Determination of available Chlorine in Bleaching powder and residual chlorine in water

ANALYSIS OF WASTEWATER SAMPLE

8. Estimation of suspended, volatile and fixed solids
9. Determination of Sludge Volume Index in waste water
10. Determination of Dissolved Oxygen
11. Estimation of B.O.D.
12. Estimation of C.O.D.
13. Determination of TKN and Ammonia Nitrogen in wastewater

L:00	T: 00	P: 45	Total: 45 Periods

REFERENCES

1. APHA, "Standard Methods for the Examination of Water and Waste water", 22nd Ed. Washington, 2012.
2. "Laboratory Manual for the Examination of water, wastewater soil Rump", H.H. and Krist,H. – Second Edition, VCH, Germany, 3rd Edition, 1999.
3. "Methods of air sampling & analysis",James P.Lodge Jr(Editor) 3rd Edition, Lewis publishers,Inc,USA,1989.

COURSE OUTCOMES

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

CO1 Calibrate and standardize the equipment
CO2 Collect proper sample for analysis
CO3 To know the sample preservation methods
CO4 To perform field-oriented testing of water, wastewater
CO5 To perform coliform analysis

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24UCE313	COMPUTER AIDED BUILDING DRAWING	L	T	P	C
		0	0	2	1

COURSE OBJECTIVES:

- To impart knowledge and skill relevant to Building drawing and Detailing lab using computer software

LIST OF EXPERIMENTS

LIST OF EXPERIMENTS

1. Principles of planning and orientation
2. Buildings with load bearing walls and RCC roof (Plan, section, elevation)
3. Buildings with sloping roof
4. Buildings with Framed structures.
5. Building information modeling.
6. Reinforcement details of RCC structural elements (slab, beam and column)
7. Reinforcement details of footings (Isolated, stepped, combined footing)
8. Steel structures (Steel Connections detailing, beam to column connection, beam to beam connection – bolt & Weld, Roof truss & purlin)

L:00	T: 00	P: 45	Total: 45 Periods

REFERENCES

1. V.B.Sikka, "A course in Civil Engineering Drawing" S.K.Kataria & Sons Publishers, Seventh Edition, 2015.
2. D.N.Ghose, "Civil Engineering Drawing and Design" CBS Publishers & Distributors Pvt.Ltd., 2nd Edition, 2010.
3. National Building Code of India 2016 (NBC 2016)
4. Unnikrishna Pillai and Devdas Menon, Reinforced Concrete Design (Third Edition), Tata McGraw Hill Publishing Company Ltd., New Delhi, 3rd Edition, 2017.
5. Subramanian N, Design of Steel Structures, Oxford University Press, New Delhi, 2016

COURSE OUTCOMES

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

CO1: Draft the plan, elevation and sectional view of the load bearing and framed buildings
CO2: Draw the structural detailing of RCC elements
CO3: Draw the structural detailing of RCC water tanks, footings and retaining walls
CO4: Draw the structural detailing of steel structures
CO5: Draft the structural detailing of Industrial structures

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REGULATIONS 2024

B. E. CIVIL ENGINEERING

CHOICE BASED CREDIT SYSTEM

SYLLABUS FOR IV SEMESTER

24UCE401	APPLIED HYDRAULICS ENGINEERING	L	T	P	C
		3	1	0	4

Prerequisites:

Fluid Mechanics

COURSE OBJECTIVES:

- To impart basic knowledge to the students about the open channel flows with analysis of uniform flow, gradually varied flow and rapidly varied flow and to expose them to basic principles of working of hydraulic machineries and to design Pelton wheel, Francis and Kaplan turbine, Centrifugal and Reciprocating pumps.

UNIT-I	UNIFORM FLOW	9+3

Definition and differences between pipe flow and open channel flow - Types of Flow - Properties of open channel - Fundamental equations - Sub-critical, Super-critical and Critical flow – Velocity distribution in open channel - Steady uniform flow: Chezy's equation, Manning equation – Best hydraulic sections for uniform flow.

UNIT-II	VARIED FLOWS	9+3

Dynamic equations of gradually varied - Water surface flow profile classifications: Hydraulic Slope, Hydraulic Curve - Profile determination by Numerical method: Direct step method and Standard step method – Change in Grades.

UNIT-III	RAPIDLY VARIED FLOWS	9+3

Application of the momentum equation for RVF - Hydraulic jumps - Types - Energy dissipation - Celerity – Positive and Negative surges.

UNIT-IV	TURBINES	9+3

Turbines - Classification - Impulse turbine – Pelton wheel - Reaction turbines - Francis turbine - Kaplan turbine - Draft tube - Cavitation - Performance of turbine - Specific speed - Runaway speed – Minimum Speed to start the pump.

UNIT-V	PUMPS	9+3

Centrifugal pumps - Minimum speed to start the pump - NPSH - Cavitation's in pumps - Operating characteristics - Multistage pumps - Reciprocating pumps - Negative slip - Indicator diagrams and its variations - Air vessels - Savings in work done.

L:45	T: 15	P: 00	Total: 60 Periods

TEXT BOOKS

1. Jain. A.K., Fluid Mechanics, Khanna Publishers, Delhi, 2010.
2. Chandramouli P N, Applied Hydraulic Engineering, Yes Dee Publisher, 2017

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REFERENCES

1. Ven Te Chow, Open Channel Hydraulics, McGraw Hill, New York, 2009.
2. Modi P.N. and Seth S.M., Hydraulics and Fluid Mechanics, Standard Book House, New Delhi, 19th edition, 2013.
3. Mays L. W., Water Resources Engineering, John Wiley and Sons (WSE), New York, 2019
4. Subramanya K., Flow in open channels, Tata McGraw Hill, New Delhi, 2019.

COURSE OUTCOMES

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

CO1: Describe the basics of open channel flow, its classification and analysis of uniform flow in steady state conditions with specific energy concept and its application

CO2: Analyse steady gradually varied flow, water surface profiles and its length calculation using direct and standard step methods with change in water surface profiles due to change in grades.

CO3: Derive the relationship among the sequent depths of steady rapidly varied flow and estimating energy loss in hydraulic jump with exposure to positive and negative surges.

CO4: Design turbines and explain the working principle

CO5: Differentiate pumps and explain the working principle with characteristic curves and design centrifugal and reciprocating pumps.

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24UCE402	HIGHWAY AND RAILWAY ENGINEERING	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To give an overview about the highway and railway engineering with respect to, planning, design, construction and maintenance as per IRC standards, specifications and methods.

UNIT-I	HIGHWAY ENGINEERING	9

Classification of highways – Institutions for Highway planning, design and construction at different levels – factors influencing highway alignment –Typical cross sections of Urban and Rural roads – Engineering surveys for alignment- Conventional and Modern method

UNIT-II	DESIGN OF HIGHWAY ELEMENTS	9

Cross sectional elements – Horizontal curves, super elevation, transition curves, widening of curves – Sight distances – Vertical curves, gradients– pavement components and their role - Design practice for flexible and rigid pavements (IRC methods only).

UNIT-III	HIGHWAY CONSTRUCTION AND MAINTENANCE	9

Highway construction materials, properties, testing methods – Construction practice of flexible and concrete pavement- Highway drainage – Evaluation and Maintenance of pavements.

UNIT-IV	RAILWAY PLANNING AND CONSTRUCTION	9

Elements of permanent way – Rails, Sleepers, Ballast, rail fixtures and fastenings, Selection of gauges - Track Stress, coning of wheels, creep in rails, defects in rails – Route alignment surveys, conventional and modern methods-Geometric design of railway, gradient, super elevation, widening of gauge on curves (Problems)-Railway drainage- Level Crossings-Signalling.

UNIT-V	RAILWAY TRACK CONSTRUCTION MAINTENANCE AND OPERATION	9+3

Points and Crossings - Design of Turnouts, Working Principle-Track Circuiting - Construction & Maintenance – Conventional, Modern methods and Materials, Lay outs of Railway Stations and Yards, Role of Indian Railways in National Development – Railways for Urban Transportation – LRT & MRTS Feasibility study, Planning and construction.

L:45	T: 00	P: 00	Total: 45 Periods

TEXT BOOKS

1. Khanna.S. K., Justo.C.E.G and Veeraragavan A. "Highway Engineering", Nemchand Publishers, 2014.

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2. Subramanian K.P., "Highways, Railways, Airport and Harbour Engineering", Scitech Publications (India), Chennai,2010
3. Kadiyali.L.R. "Principles and Practice of Highway Engineering", Khanna Technical Publications, 6th edition Delhi, 2015.
4. C. Venkatramaiah., Transportation Engineering-Vol.2 Railways, Airports, Docks and Harbours, Bridges and Tunnels., Universities Press (India) Private Limited, Hyderabad, 2015.

REFERENCES

1. Indian Road Congress (IRC), Guidelines for the Design of Flexible Pavements, (Third Revision), IRC:37-2012
2. Indian Road Congress (IRC), Guidelines for the Design of Plain Jointed Rigid Pavements for Highways, (Third Revision), IRC:58-2012
3. Yang H. Huang, "Pavement Analysis and Design", Pearson Education Inc, Nineth Impression, South Asia, 2012
4. Ian D. Walsh, "ICE manual of highway design and management", ICE Publishers, Ist Edition, USA, 2011
5. Fred L. Mannering, Scott S. Washburn and Walter P.Kilareski, "Principles of Highway Engineering and Traffic Analysis", Wiley India Pvt. Ltd., New Delhi,2011
6. Garber and Hoel, "Principles of Traffic and Highway Engineering", CENGAGE Learning, New Delhi, 2010
7. O'Flaherty.C.A "Highways, Butterworth – Heinemann, Oxford,2006
8. IRC-37–2012, The Indian roads Congress, Guidelines for the Design of Flexible Pavements, New Delhi.
9. IRC 58-2012. The Indian Road Congress, Guideline for the Design of Rigid Pavements for Highways, New Delhi
10. Saxena Subhash, C and Satyapal Arora, A Course in Railway Engineering, Dhanapat Rai and Sons, Delhi, 1998.

COURSE OUTCOMES

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

CO1: Plan a highway according to the principles and standards adopted in various institutions in India.
CO2: Design the geometric features of road network and components of pavement.
CO3: Test the highway materials and construction practice methods and know its properties and able to perform pavement evaluation and management.
CO4: Understand the methods of route alignment and design elements in railway planning and constructions.
CO5: Understand the construction techniques and maintenance of track laying and railway stations.

24UCE403	STRUCTURAL ANALYSIS I	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To introduce the students to the basic theory and concepts of classical methods of structural analysis

UNIT-I	ANALYSIS OF TRUSSES	9

Determinate and indeterminate trusses - analysis of determinate trusses - method of joints – method of sections - Deflections of pin-jointed plane frames - lack of fit - change in temperature method of tension coefficient - Application to space trusses.

UNIT-II	SLOPE DEFLECTION METHOD	9

Slope deflection equations – Equilibrium conditions - Analysis of continuous beams and rigid frames – Rigid frames with inclined members - Support settlements - symmetric frames with symmetric and skew-symmetric loadings.

UNIT-III	MOMENT DISTRIBUTION METHOD	9

Stiffness - distribution and carry over factors — Analysis of continuous Beams- Plane rigid frames with and without sway – Support settlement - symmetric frames with symmetric and skew-symmetric loadings.

UNIT-IV	FLEXIBLITY METHOD	9

Primary structures - Compatibility conditions – Formation flexibility matrices - Analysis of indeterminate pin- jointed plane frames, continuous beams and rigid jointed plane frames by direct flexibility approach.

UNIT-V	STIFFNESS METHOD	9

Restrained structure –Formation of stiffness matrices - equilibrium condition - Analysis of Continuous Beams, Pin-jointed plane frames and rigid frames by direct stiffness method.

L:45	T: 00	P: 00	Total: 45 Periods

TEXT BOOKS

1. Bhavikatti, S.S,Structural Analysis,Vol.1,& 2, Vikas Publishing House Pvt.Ltd.New Delhi-4, 2014.
2. Punmia.B.C, Ashok Kumar Jain & Arun Kumar Jain, Theory of structures, Laxmi Publications, New Delhi, 2004.

REFERENCES

1. William Weaver, Jr and James M.Gere, Matrix analysis of framed structures, CBS Publishers & Distributors, Second Edition, Delhi, 2004
2. Reddy.C. S, "Basic Structural Analysis", Tata McGraw Hill Publishing Company, 2005.
3. Negi L.S. and Jangid R.S., Structural Analysis, Tata McGraw Hill Publishing. Co. Ltd. 2004
4. Bhavikatti, S.S, Matrix Method of Structural Analysis, I. K. International Publishing House Pvt.Ltd.,New Delhi-4, 2014.

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COURSE OUTCOMES At the end of the course, students should be able to
CO1: Analyze the pin-jointed plane and space frames. CO2: Analyse the continuous beams and rigid frames by slope defection method. CO3: Understand the concept of moment distribution and analysis of continuous beams and rigid frames with and without sway. CO4: Analyse the indeterminate pin jointed plane frames continuous beams and rigid frames using matrix flexibility method. CO5: Understand the concept of matrix stiffness method and analysis of continuous beams, pin jointed trusses and rigid plane frames.

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24UCE405	CONCRETE TECHNOLOGY	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To study the properties of concrete making materials.
- To have better knowledge about the chemical and mineral admixtures in concrete.
- To familiarize with the IS method of mix design as per the latest code.
- To understand the fresh and hardened properties of concrete. To know the importance and applications of special concretes

UNIT-I	CONSTITUENT MATERIALS	9

Cement-Different types -Chemical composition and Properties -Tests on cement-IS Specifications- Aggregates-Classification-Mechanical properties -Water- Quality of water for use in concrete.

UNIT-II	CHEMICAL AND MINERAL ADMIXTURES	9

Accelerators-Retarders- Plasticisers- Super plasticizers- Water proofers - Mineral Admixtures like Fly Ash, Silica Fume, Ground Granulated Blast Furnace Slag and Metakaoline -Their effects on concrete properties

UNIT-III	PROPORTIONING OF CONCRETE MIX	9

Principles of Mix Proportioning-Properties of concrete related to Mix Design-Physical properties of materials required for Mix Design - Design Mix and Nominal Mix-BIS Method of Mix Design - Mix Design Examples - Examples – ACI Method of Mix design.

UNIT-IV	FRESH AND HARDENED PROPERTIES OF CONCRETE	9

Workability-Tests for workability of concrete-Slump Test and Compacting factor Test-Segregation and Bleeding-Determination of Compressive and Flexural strength as per BIS - Properties of Hardened concrete- Stress-strain curve for concrete-Determination of Modulus of elasticity.

UNIT-V	SPECIAL CONCRETES	9+3

High strength concrete - Fibre reinforced concrete – Ferrocement – Ready mix concrete - SIFCON - Shotcrete – Polymer concrete - High performance concrete- self compacting concrete - Geopolymer Concrete.

L:45	T: 00	P: 00	Total: 45 Periods

TEXT BOOKS

1. Gupta.B.L., Amit Gupta, "Concrete Technology", Jain Book Agency, 2010.
2. Shetty,M.S, "Concrete Technology", S.Chand and Company Ltd, New Delhi, 2003

REFERENCES

1. Neville, A.M; "Properties of Concrete", Pitman Publishing Limited, London,1995

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2. Gambhir.M.L.Concrete Technology,Fifth Edition, McGraw Hill Education,2017.
3. Job Thomas., Concrete Technology, Cencage learning India Private Ltd, New Delhi, 2015.
4. IS10262-2019 Recommended Guidelines for Concrete Mix Design, Bureau of Indian Standards, New Delhii.

COURSE OUTCOMES

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

CO1: Understand the requirements of cement, aggregates and water for concrete
CO2: Select suitable admixtures for enhancing the properties of concrete
CO3: Design concrete mixes as per IS method of mix design
CO4: Determine the properties of concrete at fresh and hardened state.
CO5: Know the importance of special concretes for specific requirements

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24UCE404	SOIL MECHANICS	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To impart knowledge to classify the soil based on index properties and to assess their engineering properties based on the classification. To familiarize the students about the fundamental concepts of compaction, flow through soil, stress transformation, stress distribution, consolidation and shear strength of soils. To impart knowledge of design of both finite and infinite slopes.

UNIT-I	SOIL CLASSIFICATION AND COMPACTION	9

Formation of soil - Soil description – Particle – Size shape and colour – Composition of gravel, sand, silt, clay particles – Particle behaviour – Soil structure – Phase relationship – Index properties – Significance – BIS classification system – Unified classification system - Textural Classification – Compaction of soils – Theory, Laboratory and field tests – Field Compaction methods – Factors influencing compaction of soils.

UNIT-II	EFFECTIVE STRESS AND PERMEABILITY	9

Soil - water – Static pressure in water - Effective stress concepts in soils – Capillary phenomena– Permeability interaction – Hydraulic conductivity – Darcy's law – Determination of Hydraulic Conductivity – Laboratory Determination (Constant head and falling head methods) and field measurement pumping out in unconfined and confined aquifer – Factors influencing permeability of soils – Seepage - Two dimensional flow – Laplace's equation – Introduction to flow nets – Construction and Application of Flow net - Simple problems. (Sheet pile and weir).

UNIT-III	STRESS DISTRIBUTION AND SETTLEMENT	9

Stress distribution in homogeneous and isotropic medium – Boussinesq theory – (Point land, Line land and udl) Use of New marks influence chart –Components of settlement — Immediate and consolidation settlement – Terzaghi's one dimensional consolidation theory – Computation of rate of settlement. - √t and log t methods– e-log p relationship.

UNIT-IV	SHEAR STRENGTH	9

Shear strength of cohesive and cohesion less soils – Mohr-Coulomb failure theory – Measurement of shear strength - Direct shear, Triaxial compression, UCC and Vane shear tests – Pore pressure parameters – Cyclic mobility – Liquefaction.

UNIT-V	SLOPE STABILITY	9+3

Stability Analysis - Infinite slopes and finite slopes – Total stress analysis for saturated clay – Friction circle method – Use of stability number – Method of slices – Fellenious and Bishop's method – Slope protection measures - Swedish slip circle method.

L:45	T: 00	P: 00	Total: 45 Periods

TEXT BOOKS

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1. Murthy, V.N.S., "Soil Mechanics and Foundation Engineering", CBS Publishers Distribution Ltd., New Delhi. 2015
2. Gopal Ranjan and Rao, A.S.R., "Basic and Applied Soil Mechanics", New Age Ltd. International Publisher New Delhi (India) 2006.

REFERENCES

1. McCarthy, D.F., "Essentials of Soil Mechanics and Foundations". Prentice-Hall, 2006.
2. Coduto, D.P., "Geotechnical Engineering – Principles and Practices", Prentice Hall of India Pvt.Ltd. New Delhi, 2010.
3. Das, B.M., "Principles of Geotechnical Engineering". Brooks / Coles / Thompson Learning Singapore, 8th Edition, 2013.
4. Punmia, B.C., "Soil Mechanics and Foundations", Laxmi Publications Pvt. Ltd. New Delhi, 2005.

COURSE OUTCOMES

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

CO1: Demonstrate an ability to identify various types of soils and its properties, formulate and solve engineering Problems

CO2: Show the basic understanding of flow through soil medium and its impact of engineering solution

CO3: Understand the basic concept of stress distribution in loaded soil medium and soil settlement due to consolidation

CO4: Show the understanding of shear strength of soils and its impact of engineering solutions to the loaded soil medium and also will be aware of contemporary issues on shear strength of soils.

CO5: Demonstrate an ability to design both finite and infinite slopes, component and process as per needs and specifications.

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24UT E401	ENVIRONMENTAL SCIENCES AND SUSTAINABILITY (Common to B.E CIVIL, ECE & EEE, B.Tech FT)	L	T	P	C
		2	0	0	2

COURSE OBJECTIVES:

- To introduce the basic concepts of environment, ecosystems and biodiversity and emphasize on the biodiversity of India and its conservation.
- To impart knowledge on the causes, effects and control or prevention measures of environmental pollution and natural disasters.
- To facilitate the understanding of global and Indian scenario of renewable and nonrenewable resources, causes of their degradation and measures to preserve them.
- To familiarize the concept of sustainable development goals and appreciate the interdependence of economic and social aspects of sustainability, recognize and analyze climate changes, concept of carbon credit and the challenges of environmental management.
- To inculcate and embrace sustainability practices and develop a broader understanding on green materials, energy cycles and analyze the role of sustainable urbanization.

UNIT-I	ENVIRONMENT AND BIODIVERSITY	6

Definition, scope and importance of environment – need for public awareness. Eco-system and Energy flow– ecological succession. Types of biodiversity: genetic, species and ecosystem diversity– values of biodiversity, India as a mega-diversity nation – hot-spots of biodiversity – 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.

UNIT-II	ENVIRONMENTAL POLLUTION	6

Causes, Effects and Preventive measures of Water, Soil, Air and Noise Pollutions. Solid, Hazardous and E-Waste management. Case studies on Occupational Health and Safety Management system (OHASMS). Environmental protection, Environmental protection acts.

UNIT-III	RENEWABLE SOURCES OFENERGY	6

Energy management and conservation, New Energy Sources: Need of new sources. Different types new energy sources. Applications of- Hydrogen energy, Ocean energy resources, Tidal energy conversion. Concept, origin and power plants of geothermal energy.

UNIT-IV	SUSTAINABILITY AND MANAGEMENT	6

Development, GDP, Sustainability- concept, needs and challenges-economic, social and aspects of sustainability - from un sustainability to sustainability - millennium development goals, and protocols - Sustainable Development Goals-targets, indicators and intervention areas Climate change – Application of AI on climate change and environmental safety - Global, Regional and local environmental issues and possible solutions-case studies. Concept of Carbon Credit, Carbon Footprint. Environmental management in industry-A case study.

UNIT-V	SUSTAINABILITY PRACTICES	6

Zero waste and R concept, Circular economy, ISO 14000 Series, Material Life cycle assessment, Environmental Impact Assessment. Sustainable habitat: Green buildings, Green materials, Energy efficiency, Sustainable transports. Sustainable energy: Non-conventional Sources, Energy Cycles carbon cycle, emission and sequestration, Green Engineering: Sustainable urbanization- Socio economical and technological change.

L:30	T:00	T: 30 PERIODS

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TEXT BOOKS

1. Anubha Kaushik and C. P. Kaushik's "Perspectives in Environmental Studies", 6th Edition, New Age International Publishers ,2018.
2. Benny Joseph, 'Environmental Science and Engineering', Tata McGraw-Hill, New Delhi, 2016. 3. Gilbert M.Masters, 'Introduction to Environmental Engineering and Science', 2nd edition, Pearson Education, 2004.
3. Allen, D. T. and Shonnard, D. R., Sustainability Engineering: Concepts, Design and Case Studies, Prentice Hall.
4. Bradley. A.S; Adebayo, A.O., Maria, P. Engineering applications in sustainable design and development, Cengage learning.
5. Environment Impact Assessment Guidelines, Notification of Government of India, 2006.
6. 7. Mackenthun, K.M., Basic Concepts in Environmental Management, Lewis Publication, London, 1998.

REFERENCES

1. R.K. Trivedi, 'Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards', Vol. I and II, Enviro Media.38 .edition 2010.
2. Cunningham, W.P. Cooper, T.H. Gorhani, 'Environmental Encyclopedia', Jaico Publ., House, Mumbai, 2001.
3. Dharmendra S. Sengar, 'Environmental law', Prentice hall of India PVT. LTD, New Delhi, 2007.
4. Rajagopalan, R, 'Environmental Studies-From Crisis to Cure', Oxford University Press, Third Edition, 2015.
5. ErachBharucha "Textbook of Environmental Studies for Undergraduate Courses" Orient Blackswan Pvt. Ltd. 2013.

COURSE OUTCOMES

At the end of the course students should be able

CO1 To recognize and understand the functions of environment, ecosystems and biodiversity and their conservation.
CO 2: To identify the causes, effects of environmental pollution and natural disasters and contribute to the preventive measures in the society.
CO3: To identify and apply the understanding of renewable and non-renewable resources and contribute to the sustainable measures to preserve them for future generations
CO4: To recognize the different goals of sustainable development and apply them for suitable technological advancement and societal development.
CO5: To demonstrate the knowledge of sustainability practices and identify green materials, energy cycles and the role of sustainable urbanization.

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24UCE411	HYDRAULIC ENGINEERING LABORATORY	L	T	P	C
		0	0	4	2

COURSE OBJECTIVES:

- To provide hands on experience in calibration of flow meters, performance characteristics of pumps and turbines.

LIST OF EXPERIMENTS (Any 10 of the following)

A. FLOW MEASUREMENT

1. Calibration of Rotameter
2. Flow through Orifice meter/mouthpiece, Venturimeter and Notches
3. Bernoulli's Experiment

B. LOSSES IN PIPES

4. Determination of friction factor in pipes.
5. Determination of minor losses

C. PUMPS

6. Characteristics of Centrifugal pumps
7. Characteristics of Reciprocating pump
8. Characteristics of Gear pump
9. Characteristics of Submersible pump

D. TURBINES

10. Characteristics of Pelton wheel turbine
11. Characteristics of Francis turbine

E. DETERMINATION OF METACENTRIC HEIGHT

12. Determination of metacentric height of floating bodies.

L:00	T: 00	P: 45	Total: 45 Periods

REFERENCES

1. Hydraulic Laboratory Manual, Centre for Water Resources, Anna University, 2015.
2. Modi P.N. and Seth S.M., Hydraulics and Fluid Mechanics. Standard Book House. New Delhi, 2017.
3. Subramanya K, Fluid Mechanics and Hydraulic Machines, Tata McGraw Hill Edu. Pvt. Ltd. 2011

COURSE OUTCOMES

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

CO1: Apply Bernoulli equation for calibration of flow measuring devices.
CO2: Measure friction factor in pipes and compare with Moody diagram
CO3: Determine the performance characteristics of rotodynamic pumps.
CO4: Determine the performance characteristics of positive displacement pumps.
CO5: Determine the performance characteristics of turbines.

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24UCE412	MATERIALS TESTING LABORATORY	L	T	P	C
		0	0	4	2

COURSE OBJECTIVES:

- To develop skills to test various construction materials.

I. TESTS ON METALS

a. Tension test on steel rod
b. Torsion test on mild steel rod
c. Deflection test on metal beam
d. Double shear test on metal
e. Impact test on metal specimen (Izod and Charpy)
f. Hardness test on metals (Rockwell and Brinell Hardness Tests)
g. Compression test on helical spring
h. Deflection test on carriage spring

II. TESTS ON CEMENT

a. Determination of fineness of cement
b. Determination of consistency of cement
c. Determination of specific gravity of cement
d. Determination of initial and final setting time of cement

III. TESTS ON FINE AGGREGATE

a. Determination of specific gravity and water absorption of fine aggregate
b. Determination of grading of fine aggregate
c. Determination of water absorption for fine aggregate

IV. TESTS ON COARSE AGGREGATE

a. Determination of compacted and loose bulk density of coarse aggregate
b. Determination of impact value of coarse aggregate
c. Determination of elongation index of coarse aggregate
d. Determination of flakiness index of coarse aggregate
e. Determination of aggregate crushing value of coarse aggregate
f. Determination of specific gravity and water absorption of coarse aggregate

V. TESTS ON BRICKS

a. Determination of compressive strength of bricks
b. Determination of water absorption of bricks
c. Determination of efflorescence of bricks

VI. TESTS ON CONCRETE

a. Determination of slump of concrete
b. Determination of compressive strength of concrete
c. Determination of flowability of self-compacting concrete (Demo only)

VII. TEST ON WOOD

a. Determination of Compression test on wood

L:00	T: 00	P: 45	Total: 45 Periods

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COURSE OUTCOMES
At the end of the course, students should be able to
CO1: Determine the mechanical properties of steel.
CO2: Determine the physical properties of cement
CO3: Determine the physical properties of fine and coarse aggregate.
CO4: Determine the workability and compressive strength of concrete.
CO5: Determine the strength of brick and wood.

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24UCE413	SOIL MECHANICS LABORATORY	L	T	P	C
		0	0	4	2

COURSE OBJECTIVES:

- To develop skills to test the soils for their index and engineering properties and to characterize the soil based on their properties.

LIST OF EXPERIMENT

1. DETERMINATION OF INDEX PROPERTIES

a. Specific gravity of soil solids
b. Grain size distribution – Sieve analysis
c. Grain size distribution - Hydrometer analysis
d. Liquid limit and Plastic limit tests
e. Shrinkage limit and Differential free swell tests

2. DETERMINATION OF INSITU DENSITY AND COMPACTION CHARACTERISTICS

a. Field density Test (Sand replacement method)
b. Determination of moisture – density relationship using standard proctor compaction test.

3. DETERMINATION OF ENGINEERING PROPERTIES

a. Permeability determination (constant head and falling head methods)
b. One dimensional consolidation test (Determination of co-efficient of consolidation only)
c. Direct shear test in cohesion less soil
d. Unconfined compression test in cohesive soil
e. Laboratory vane shear test in cohesive soil
f. Tri-axial compression test in cohesion less soil (Demonstration only)
g. California Bearing Ratio Test
h. Standard Penetration Test

4.TEST ON GEOSYNTHETICS (Demonstration only)

a. Determination of tensile strength and interfacial friction angle.
b. Determination of apparent opening sizes and permeability.

L:00	T: 00	P: 45	Total: 45 Periods

REFERENCES

1. Soil Engineering Laboratory Instruction Manual" published by Engineering College Co-Operative Society, Anna University, Chennai, 2010.
2. "Saibaba Reddy, E. Ramasastri, K. "Measurement of Engineering Properties of Soils", New age International (P) limited publishers, New Delhi, 2008.
3. Lambe T.W., "Soil Testing for Engineers", John Wiley and Sons, New York, 1951. Digitized 2008.
4. IS Code of Practice (2720) Relevant Parts, as amended from time to time, Bureau of Indian Standards, New Delhi.
5. G.Venkatappa Rao and Goutham .K. Potable, "Geosynthetics Testing – A laboratory Manual", Sai Master Geoenvironmental Services Pvt. Ltd., 1st Edition 2008.

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6. Braja M.Das., "Soil Mechanics: Laboratory Manual", Oxford University Press, eighth edition, 2012.

COURSE OUTCOMES

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

CO1: Conduct tests to determine the index properties of soils
CO2: Determine the insitu density and compaction characteristics.
CO3: Conduct tests to determine the compressibility, permeability and shear strength of soils
CO4: Understand the various tests on Geosynthetics.
CO5: Evaluate the performance of geotechnical systems, including foundations, slopes, and retaining walls