B.E. Civil Engineering

CURRICULUM AND SYLLABI

I to VIII Semesters

Regulation – 2023/V2

EXcêl

ENGINEERING COLLEGE

(Autonomous)

Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai

Accredited by NBA and NAAC with "A+"and Recognized by UGC (2f&12B)

KOMARAPALAYAM – 637303

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Anna University, Chennai Accredited by NBA
(AERO, MECH, CSE&ECE) and NAAC with
"A+"
KOMARAPALAYAM - 637303

B E CIVIL ENGINEERING
REGULATION 2023
CHOICE BASED CREDIT SYSTEM
I TO VIII SEMESTER CURRICULUM AND SYLLABI

I SEMESTER									
Code No.	**Course**	**Category**	**Periods / Week**			**C**	**Maximum Marks**		
			L	**T**	**P**		**CA**	**FE**	**Total**
Theory Course (s)									
23CE101	Engineering Geology	ES	3	0	0	3	40	60	100
23MA102	Matrices and Calculus	BS	3	2	0	4	40	60	100
23LET07	Heritage of Tamils	HSS	1	0	0	1	100	0	100
Theory with Practical Course (s)									
23LEE01	Communicative English	HSS	2	0	2	3	50	50	100
23CH102	Chemistry for Material Sciences (Common to Aero, Agri, Civil, FT, Mech, PCT & SF)	BS	3	0	2	4	50	50	100
23ME101	Engineering Graphics	ES	1	0	4	3	50	50	100
Practical Course (s)									
23CE102	Civil Engineering Practices Laboratory	ES	0	0	2	1	60	40	100
Mandatory Course - I									
23MC101	Induction Programme	MC	2 Weeks			0	100	0	100
Total			13	2	10	19	490	310	800

Code No.	Course	Category	Periods / Week			C	Maximum Marks		
			L	T	P		CA	FE	Total
full: **II SEMESTER**									

II SEMESTER

Code No.	Course	Category	L	T	P	C	CA	FE	Total
Theory Course (s)									
23MA202	Mathematical Foundations for Engineering (Common to All Programmes)	BS	3	2	0	4	40	60	100
23ME201	Engineering Mechanics	ES	3	2	0	4	40	60	100
23LET08	Tamils & Technology (தமிழரும் ததொழில்நுட்பமும்)	HSS	1	0	0	1	100	0	100
Theory with Practical Course (s)									
23LEE02	Advanced Communicative English	HSS	2	0	2	3	50	50	100
23LEJ06	Japanese	HSS	2	0	2	3	50	50	100
23PH202	Materials Physics	BS	3	0	2	4	50	50	100
23CS203	Problem Solving using Python Programming	ES	3	0	2	4	50	50	100
Practical Course (s)									
23CE201	Computer Aided Building Drawing Laboratory	PC	0	0	2	1	60	40	100
Mandatory Course									
23MC202	Environmental Sciences	MC	2	0	0	0	100	0	100
Total			17	4	8	21	540	360	900

III SEMESTER

Code No.	Course	Category	Periods / Week			C	Maximum Marks		
			L	T	P		CA	FE	Total
Theory Course (s)									

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Code No.	Course	Category	L	T	P	C	CA	FE	Total
23MA301	Transforms and Boundary Value Problems	BS	3	2	0	4	40	60	100
23UH001	Universal Human Values	HSS	3	0	0	3	40	60	100
23CE301	Mechanics of Solids - I	ES	3	0	0	3	40	60	100
23CE302	Fluid Mechanics	ES	3	0	0	3	40	60	100
Theory with Practical Course									
23CE303	Surveying - I	PC	3	0	2	4	50	50	100
23CE304	Construction Materials and Technology	PC	3	0	2	4	50	50	100
Mandatory Course									
23MC003	Interpersonal Skills	MC	0	0	2	0	100	0	100
Total			**18**	**2**	**6**	**21**	**360**	**340**	**700**

IV SEMESTER									
Code No.	Course	Category	Periods / Week			C	Maximum Marks		
			L	T	P		CA	FE	Total
Theory Course (s)									
23MA402	Statistical and Numerical Methods	BS	3	2	0	4	40	60	100
23CE401	Concrete Technology	PC	3	0	0	3	40	60	100
23CE402	Geotechnical Engineering - I	PC	3	0	0	3	40	60	100
23CE403	Mechanics of Solids - II	PC	3	2	0	4	40	60	100
Theory with Practical Course									
23CE404	Surveying - II	PC	3	0	2	4	50	50	100

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| 23CE405 | Applied Hydraulics Engineering | ES | 3 | 0 | 2 | 4 | 50 | 50 | 100 |

Practical Course (s)

| 23CE406 | Strength of Materials Laboratory | PC | 0 | 0 | 2 | 1 | 60 | 40 | 100 |

Mandatory Course

| 23MC005 | Yoga and Values for Holistic Development | MC | 2 | 0 | 0 | 0 | 100 | 0 | 100 |
| **Total** | | | **20** | **4** | **6** | **23** | **420** | **380** | **800** |

V SEMESTER									
Code No.	**Course**	**Category**	**Periods / Week**			**C**	**Maximum Marks**		
			L	T	P		CA	FE	Total

Theory Course (s)

23CE501	Design of Reinforced Cement Concrete Elements	PC	3	2	0	4	40	60	100
23CE502	Structural Analysis - I	PC	3	0	0	3	40	60	100
23CEEXX	Professional Elective - I	PE	3	0	0	3	40	60	100
23YYOXX	Open Elective - I	OE	3	0	0	3	40	60	100
23CE503	Environmental Engineering - I	PC	3	0	0	3	40	60	100
23CE504	Geotechnical Engineering - II	PC	3	0	0	3	40	60	100

Practical Course (s)

23CE505	Environmental Engineering Laboratory	PC	0	0	2	1	60	40	100
23CE506	Soil Mechanics Laboratory	PC	0	0	2	1	60	40	100
23CE505	Survey Camp	PC	1 Week			1	100	0	100

Mandatory Course (s)								
23MCXXX	Mandatory Course - IV	MC	2	0	0	0	100	0	100
Total			**20**	**2**	**4**	**22**	**560**	**440**	**1000**

VI SEMESTER									
Code No.	Course	Category	Periods / Week			C	Maximum Marks		
			L	T	P		CA	FE	Total
Theory Course (s)									
23CE601	Design of Steel Structural Elements	PC	3	2	0	4	40	60	100
23CE602	Structural Analysis - II	PC	3	0	0	3	40	60	100
23CE603	Environmental Engineering - II	PC	3	0	0	3	40	60	100
23CE604	Highway Engineering	PC	3	0	0	3	40	60	100
23CEEXX	Professional Elective - II	PE	3	0	0	3	40	60	100
23YYOXX	Open Elective - II	OE	3	0	0	3	40	60	100
Practical Course (s)									
23CE605	Highway Engineering Laboratory	PC	0	0	2	1	60	40	100
Employability Enhancement Course - EEC									
23EEC601	Design Thinking and Mini Project	EEC	0	0	4	2	60	40	100
23EEC602	Internship	EEC	2 Weeks			1	100	0	100
Total			**19**	**2**	**6**	**23**	**460**	**440**	**900**

Code No.	Course	Category	Periods / Week			C	Maximum Marks		
			L	T	P		CA	FE	Total
VII SEMESTER									
Theory Course (s)									
23CE701	Structural Dynamics and Earthquake Engineering	PC	3	0	0	3	40	60	100
23CE702	Estimation Costing and Valuation Engineering	PC	3	1	0	4	40	60	100
23CE703	Water Resource and Irrigation Engineering	PC	3	0	0	3	40	60	100
23CEEXX	Professional Elective - III	PE	3	0	0	3	40	60	100
23CEEXX	Professional Elective - IV	PE	3	0	0	3	40	60	100
23YYOXX	Open Elective - III	OE	3	0	0	3	40	60	100
Practical Course (s)									
23CE704	Computer Aided Design and Drawing Laboratory (Concrete and Steel)	PC	0	0	2	1	60	40	100
Employability Enhancement Course (s)									
23CE705	Design Project	EEC	0	0	4	2	40	60	100
Total			18	1	6	22	340	460	800

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VIII SEMESTER									
Code No.	Course	Category	Periods / Week			C	Maximum Marks		
			L	T	P		CA	FE	Total
Theory Course (s)									
23CEEXX	Professional Elective - V	PE	3	0	0	3	40	60	100
23CEEXX	Professional Elective - VI	PE	3	0	0	3	40	60	100
Employability Enhancement Course (s)									
23CE801	Major Project	EEC	0	0	16	08	60	40	100
Total			6	0	16	14	140	160	300

TOTAL CREDIT CALCULATION											
S. No.	Category	Credits per Semester								Total Credit	By AICTE
		Sem I	Sem II	Sem III	Sem IV	Sem V	Sem VI	Sem VII	Sem VIII		
1	HSS	4	4	3	0	0	0	0	0	11	10 to 14
2	BS	8	8	4	4	0	0	0	0	24	22 to 28
3	ES	7	8	6	4	0	0	0	0	25	24
4	PC	0	1	8	15	16	14	11	0	65	48
5	PE	0	0	0	0	3	3	6	6	18	18
6	OE	0	0	0	0	3	3	3	0	9	9
7	EEC	0	0	0	0	0	3	2	8	13	12 to 16
8	MC	0	0	0	0	0	0	0	0	0	Nil
Total		19	21	21	23	22	23	22	14	165	143 to 157

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HSS - Humanities and Social Sciences
BS - Basic Sciences
ES - Engineering Sciences
PC - Professional Core
PE - Professional Electives
OE - Open Electives
EEC - Employability Enhancement Courses
MC - Mandatory Courses (Non-Credit Courses)
CA - Continuous Assessment
FE - Final Examination

MANDATORY COURSES (MC)									
Code No.	Course	Category	Periods / Week			C	Maximum Marks		
			L	T	P		CA	FE	Total
23MC101	Induction Progamme	MC	2 Weeks			0	100	0	100
23MC102	Environmental Sciences	MC	2	0	0	0	100	0	100
23MC103	Soft Skills	MC	2	0	0	0	100	0	100
23MC104	Indian Constitution	MC	2	0	0	0	100	0	100
23MC105	Yoga and Value for Holistic Development	MC	2	0	0	0	100	0	100

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PROFESSIONAL ELECTIVES (PE)									
STREAM - I : ENVIRONMENTAL AND WATER RESOURCE ENGINEERING									
Code No.	**Course**	**Category**	**Periods / Week**			**C**	**Maximum Marks**		
			L	T	P		CA	FE	Total
23CEE01	Hydrology	PE	3	0	0	3	40	60	100
23CEE02	Groundwater Engineering	PE	3	0	0	3	40	60	100
23CEE03	Air Pollution and Control Engineering	PE	3	0	0	3	40	60	100
23CEE04	Water Resources Systems Analysis	PE	3	0	0	3	40	60	100
23CEE05	Integrated Water Resources Management	PE	3	0	0	3	40	60	100
23CEE06	Environment Impact Assessment	PE	3	0	0	3	40	60	100
23CEE07	Municipal Solid Waste Management	PE	3	0	0	3	40	60	100
23CEE08	Participatory water Resources Management	PE	3	0	0	3	40	60	100
23CEE09	Air Pollution Management	PE	3	0	0	3	40	60	100
23CEE10	Industrial Waste Management	PE	3	0	0	3	40	60	100
23CEE11	Environmental and Social Impact Assessment	PE	3	0	0	3	40	60	100
23CEE12	Geo- Environmental Engineering	PE	3	0	0	3	40	60	100
23CEE13	Climate Change Adoptation and Mitigation	PE	3	0	0	3	40	60	100
23CEE14	Water Quality and Management	PE	3	0	0	3	40	60	100

PROFESSIONAL ELECTIVES (PE)									
STREAM - II : STRUCTURAL ENGINEERING									
Code No.	**Course**	**Category**	**Periods / Week**			**C**	**Maximum Marks**		
			L	T	P		CA	FE	Total
23CEE21	Building Services	PE	3	0	0	3	40	60	100
23CEE22	Disaster Management	PE	3	0	0	3	40	60	100

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23CEE23	Industrial Structures	PE	3	0	0	3	40	60	100
23CEE24	Maintenance, Repair and Rehabilitation of Structures	PE	3	0	0	3	40	60	100
23CEE25	Design of Prestressed Concrete Structures	PE	3	0	0	3	40	60	100
23CEE26	Experimental Analysis of Stress	PE	3	0	0	3	40	60	100
23CEE27	Bridge Structures	PE	3	0	0	3	40	60	100
23CEE28	Storage Structures	PE	3	0	0	3	40	60	100
23CEE29	Ground Improvement Techniques	PE	3	0	0	3	40	60	100
23CEE30	Cost Effective Construction and Green Building	PE	3	0	0	3	40	60	100
23CEE31	Tall Buildings	PE	3	0	0	3	40	60	100
23CEE32	Prefabricated Structures	PE	3	0	0	3	40	60	100
20CEE33	Rock Mechanics	PE	3	0	0	3	40	60	100
20CEE34	Reinforced Soil Structure	PE	3	0	0	3	40	60	100
20CEE35	Geotechnical Exploration and Instrumentation	PE	3	0	0	3	40	60	100
20CEE36	Design of Masonry Timber and Steel Elements	PE	3	0	0	3	40	60	100
23CEE33	Concrete Structures	PE	3	0	0	3	40	60	100
23CEE34	Pile Foundation	PE	3	0	0	3	40	60	100

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	PROFESSIONAL ELECTIVES (PE)								
	STREAM - III : CONSTRUCTION ENGINEERING AND MANAGEMENT								
Code No.	Course	Category	Periods / Week			C	Maximum Marks		
			L	T	P		CA	FE	Total
23CEE41	Construction Planning and Scheduling	PE	3	0	0	3	40	60	100
23CEE42	Modern Construction Materials	PE	3	0	0	3	40	60	100
23CEE43	Housing Planning and Management	PE	3	0	0	3	40	60	100
23CEE44	Construction Project Management	PE	3	0	0	3	40	60	100
23CEE45	Economic and Finance Management in Construction	PE	3	0	0	3	40	60	100
23CEE46	System Integration in Construction	PE	3	0	0	3	40	60	100
23CEE47	Contract Laws and Regulation	PE	3	0	0	3	40	60	100
23CEE48	Resource Management and Control in Construction	PE	3	0	0	3	40	60	100
23CEE49	Quality Control and Assurance in Construction	PE	3	0	0	3	40	60	100
23CEE50	Design of Energy Efficient Building	PE	3	0	0	3	40	60	100
23CEE51	Project Formulation and Appraisal	PE	3	0	0	3	40	60	100
23CEE52	Project Safety Management	PE	3	0	0	3	40	60	100
23CEE53	Railway, Airport, Docks and Harbor Engineering	PE	3	0	0	3	40	60	100
23CEE54	Advanced Construction Techniques	PE	3	0	0	3	40	60	100
23CEE55	Sustainable Construction and Lean Construction	PE	3	0	0	3	40	60	100

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OPEN ELECTIVE COURSES (For Other Branches)									
Code No.	Course	Category	Periods / Week			C	Maximum Marks		
			L	T	P		CA	FE	Total
23CEO01	Energy Conservation and Management	OE	3	0	0	3	40	60	100
23CEO02	Environment and Agriculture	OE	3	0	0	3	40	60	100
23CEO03	Renewable Energy Sources	OE	3	0	0	3	40	60	100
23CEO04	Vibration and Noise Control	OE	3	0	0	3	40	60	100
23CEO05	Climate Change and its Impacts	OE	3	0	0	3	40	60	100
23CEO06	Green Building Design	OE	3	0	0	3	40	60	100
23CEO07	Industrial Safety	OE	3	0	0	3	40	60	100
23CEO08	Selection of Materials	OE	3	0	0	3	40	60	100
23CEO09	Testing of Materials	OE	3	0	0	3	40	60	100

ONE CREDIT COURSES									
Code No.	Course	Category	Periods / Week			C	Maximum Marks		
			L	T	P		CA	FE	Total
23CEA01	Drafting and Documentation of Construction Projects	PC	1	0	0	1	100	0	100
23CEA02	3D Modeling Buildings	PC	1	0	0	1	100	0	100
23CEA03	Total Station Survey	PC	1	0	0	1	100	0	100
23CEA04	Tekla	PC	1	0	0	1	100	0	100
23CEA05	Vasthu	PC	1	0	0	1	100	0	100
23CEA06	Pre-Engineered Building	PC	1	0	0	1	100	0	100
23CEA07	3D Printing Techniques in Construction	PC	1	0	0	1	100	0	100

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VALUE ADDED COURSES									
Code No.	Course	Category	Periods / Week			C	Maximum Marks		
			L	T	P		CA	FE	Total
23CEB01	Autodesk	OE	2	0	2	3	100	0	100
23CEB02	Revit Architecture	OE	2	0	2	3	100	0	100
23CEB03	E-tabs	OE	2	0	2	3	100	0	100
23CEB04	3DX Max	OE	2	0	2	3	100	0	100
23CEB05	Stadd Pro.	OE	2	0	2	3	100	0	100
23CEB06	Primavera	OE	2	0	2	3	100	0	100
23CEB07	Drone Survey	OE	2	0	2	3	100	0	100
23CEB08	Sketch up	OE	2	0	2	3	100	0	100
23CEB09	MS Project	OE	2	0	2	3	100	0	100

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23CE101	Engineering Geology	L	T	P	C
		3	0	0	3
Nature of Course	Professional Core				
Pre requisites	Engineering Science				

Course Objectives
The course is intended to
1. Learn the relevance of Engineering Geology in Civil Engineering and interpret earthquakes in relation to internal structure of the earth.
2. Learn concepts and properties of various types of minerals present in the rocks.
3. Identify common rock forming minerals and common rocks based on their physical properties
4. Impart knowledge on various natural hazards and its mitigation methods
5. Identify the attitude of geological structures and instruments used.

Course Outcomes
On successful completion of the course, students will be able to

CO. No.	Course Outcome	Bloom's Level
CO1	Explain the basic concepts of geology in civil engineering field.	Understand
CO2	Identify the formation, properties, types of rocks and its types	Understand
CO3	Recognize the physical and chemical properties of various types of minerals present in the types of rocks	Understand
CO4	Explain the causes of faults, joints, folds and its mitigation methods in detail	Understand
CO5	Identify the application of Geological investigation on construction of various structures such as dams, tunnels & bridges	Understand

Course Contents:
UNIT- I Physical Geology   9
Geology in civil engineering – branches of geology – structure of earth and its composition weathering of rocks – scale of weathering – soils – landforms and processes associated with river, wind, groundwater and sea – relevance to civil engineering. Plate tectonics – Earth quakes – Seismic zones in India.

UNIT- II Mineralogy   9
Physical properties of minerals – Quartz group, Feldspar group, Pyroxene – hypersthenes andaugite, Amphibole – hornblende, Mica – muscovite and biotite, Calcite, Gypsum and Clay minerals.

UNIT- III Petrology   9
Classification of rocks, distinction between Igneous, Sedimentary and Metamorphic rocks. Engineering properties of rocks. Description, occurrence, engineering properties, distribution and uses of Granite, Dolerite, Basalt, Sandstone, Limestone, Laterite, Shale, Quartzite, Marble, Slate, Gneiss and Schist.

UNIT- IV Structural Geology and Geophysical Methods   9
Geological maps – attitude of beds, study of structures – folds, faults and joints – relevance to civil engineering. Geophysical methods – Seismic and electrical methods for subsurface investigations.

UNIT- V Application of Geological Investigations   9
Remote sensing for civil engineering applications; Geological conditions necessary for design and construction of Dams, Reservoirs, Tunnels, and Road cuttings – Hydrogeological investigations and mining – Coastal protection structures. Investigation of Landslides, causes and mitigation.

Total: 45 Periods

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Text Books:
1. Varghese, P.C., "Engineering Geology for Civil Engineering" Prentice Hall of India LearningPrivateLimited,NewDelhi,2012.
2. Venkat Reddy. D. "Engineering Geology", Vikas Publishing House Pvt. Lt, 2010.

Reference Books:
1. Blyth F.G.H. and de Freitas M.H., "Geology for Engineers", Edward Arnold, London, 2010.
2. Bell .F.G., "Fundamentals of Engineering Geology", B.S. Publications. Hyderabad 2011.
3. Gokhale KVGK, "Principles of Engineering Geology", B.S. Publications, Hyderabad 2011.

Additional References:
1. https://nptel.ac.in/courses/105/105/105105106/
2. https://nptel.ac.in/courses/105/104/105104191/

Mapping of Course Outcomes (COs) with Programme Outcomes (POs) Programme Specific Outcomes (PSOs)														
	POs												**PSOs**	
COs	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	2	2		3	3					2		2	2	
CO2	2	2		3	3					2		2	2	
CO3	2	2		3	3					2		2	2	
CO4	2	2		3	3					2		2	2	
CO5	2	2		3	3					2		2	2	

3	High	2	Medium	1	Low

Formative assessment			
Bloom's Level	**Assessment Component**	**Marks**	**Total marks**
Remember	Online Quiz	5	
Understand	Class Presentation/Power point presentation	5	15
	Attendance	5	

Summative Assessment				
Bloom's Category	**Internal Assessment Examination**			**Final Examination (60)**
	IAE 1 (5)	IAE 2 (10)	IAE3 (10)	
Remember	10	10	10	20
Understand	10	10	10	20
Apply	30	30	30	60
Analyse				
Evaluate				
Create				

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23MA102	MATRICES AND CALCULUS (Common to all B.E/B.Tech Programmes)	L	T	P	C
		3	1	0	4

Nature of Course	Basic Sciences
Pre requisites	Nil

Course Objectives

The course is intended to

1. Introduce the concept of orthogonal transformation to convert the square matrix into diagonal form.
2. Acquaint the student with mathematical tools needed in evaluating derivatives and differentiation of one variable.
3. Familiarize the functions of two variables, Taylor series and Jacobian techniques
4. Impart knowledge of double integral techniques in evaluating volume of the solid.
5. Learn the Green's theorem, Stoke's theorem and the Divergence theorem to compute integrals

Course Outcomes

On successful completion of the course the students will be able to

CO. No	Course Outcome	Bloom's Level
CO 1	Apply the concept of orthogonal reduction for diagonalization of the given matrix	Apply
CO 2	Execute the rules of differentiation to differentiate the functions.	Apply
CO 3	Demonstrate the maxima and minima for a given function with two variables	Apply
CO 4	Apply integration to compute area and volume using multiple integrals	Apply
CO 5	Interpret the Green's theorem, Stokes' theorem and Divergence theorem to evaluate integrals.	Apply

Course Contents

Module – I   MATRICES   9+3

Eigen values and Eigenvectors of a real matrix – Characteristic Equation- Properties - Cayley Hamilton Theorem - Orthogonal transformation of a symmetric matrix to diagonal form – Reduction of quadratic form to canonical form by orthogonal transformation – Nature of Quadratic Forms.

Module – II   DIFFERENTIAL CALCULUS   9+3

Functions of single Variable -Limits and Continuity - Derivatives - Differentiation rules(sum, product, quotient, chain rule) – Implicit differentiation-Logarithmic differentiation-Maxima and Minima of function of one variable –Taylors series.

Module – III   FUNCTIONS OF TWO VARIABLES   9+3

Limits and Continuity –Partial differentiation–Homogeneous functions and Euler's theorem–Jacobians –Partial differentiation of implicit functions–Taylor's series– Maxima and minima – Lagrange's method of multipliers.

Passed in Board of Studies Meeting 17.03.23   *Passed in Academic Council Meeting 27.04.23*

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Module – IV   MULTIPLE INTEGRALS   9+3

Double integrals – Change of order of Integrations- Double integrals in polar coordinates – Areaenclosed by plane curves – Triple integrals – Volume of solids.

                                                                          9+3
Module – V   VECTOR CALCULUS

Gradient and directional derivative — Divergence and curl — Green's, Gauss divergence and Stoke's theorems — Verification andapplicationinevaluatingline, surfaceandvolumeintegrals (cube, rectangular parallelepiped).

                                                        Total : 60 Periods

Text Books

1. B.K.Pal and K.Das , "Engineering Mathematics", Volume-1, 10th Edition, U.N.Dhur and Sons private limited,2020
2. Grewal B.S. "Higher Engineering Mathematics", Khanna Publishers, Delhi, 44th Edition, 2019.

Reference Books

1. Ramana B.V, "Higher Engineering Mathematics", Tata McGraw Hill Publishing Company, 1st Edition, 2018
2. N.P.Bali, Manish Goyal, "A text book of Engineering Mathematics Semester II", Laxmi Publications, 6th Edition 2015.
3. Veerarajan T," Engineering Mathematics for Semester I and II", Tata McGraw Hill, 3rd Edition 2017.

Additional References

1. NPTEL-https://nptel.ac.in/courses/111105035
2. NPTEL-https://nptel.ac.in/courses/111104144
3. NPTEL- https://nptel.ac.in/courses/111105122

| COs | \multicolumn{12}{c|}{POs} | \multicolumn{2}{c|}{PSOs} |
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO 1	3	2	2										1	
CO 2	3	3	2										1	
CO 3	3	1	1										1	
CO 4	3	2	1										1	
CO 5	3	2	2										1	

Mapping of Course Outcomes (COs) with Programme Outcomes (POs) Programme Specific Outcomes (PSOs)

| 3-High | 2-Medium | 1-Low |

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Formative Assessment

Blooms Taxonomy	Assessment Component	Marks	Total marks
Remember	Quiz	5	
Understand	Tutorial class / Assignment	5	15
Apply			
	Attendance	5	

Summative Assessment

Bloom's Category	Internal Assessment Examinations (IAE)			Final Examinations (FE)
	IAE – I (5)	IAE – II (10)	IAE – III (10)	60
Remember	10	10	10	20
Understand	30	30	30	60
Apply	10	10	10	20
Analyse				
Evaluate				
Create				

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23L-ET07   தமிழர் மரபு   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 –   3
**   சிற்பக் கலை:**

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

அலகு III   நாட்டுப்புறக் கலைகள் மற்றும் வீர விளையாட்டுகள்:   3
தெருக்கூத்து, கரகாட்டம், வில்லுப்பாட்டு, கணியான் கூத்து, ஒயிலாட்டம், தோல்பாவைக் கூத்து, சிலம்பாட்டம், வளரி, புலியாட்டம், தமிழர்களின் விளையாட்டுகள்.

அலகு IV   தமிழர்களின் திணைக் கோட்பாடுகள்:   3
தமிழகத்தின் தாவரங்களும், விலங்குகளும் – தொல்காப்பியம் மற்றும் சங்க இலக்கியத்தில் அகம் மற்றும் புறக் கோட்பாடுகள் – தமிழர்கள் போற்றிய அறக்கோட்பாடு – சங்ககாலத்தில் தமிழகத்தில் எழுத்தறிவும், கல்வியும் – சங்ககால நகரங்களும் துறை முகங்களும் – சங்ககாலத்தில் ஏற்றுமதி மற்றும் இறக்குமதி – கடல்கடந்த நாடுகளில் சோழர்களின் வெற்றி.

அலகு V   இந்திய தேசிய இயக்கம் மற்றும் இந்திய பண்பாட்டிற்குத்
**   தமிழர்களின் பங்களிப்பு:**   3
இந்திய விடுதலைப்போரில் தமிழர்களின் பங்கு – இந்தியாவின் பிறப்பகுதிகளில் தமிழ்ப் பண்பாட்டின் தாக்கம் – சுயமரியாதை இயக்கம் – இந்திய மருத்துவத்தில், சித்த மருத்துவத்தின் பங்கு – கல்வெட்டுகள், கையெழுத்துப்படிகள் - தமிழ்ப் புத்தகங்களின் அச்சு வரலாறு.

                                                    TOTAL : 15 PERIODS

TEXT BOOKS
1. தமிழக வரலாறு – மக்களும் பண்பாடும் – கே.கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணினித் தமிழ் – முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்).
3. கீழடி – வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)

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REFERENCE BOOKS

1. பொருநை – ஆற்றங்கரை நாகரிகம். (தொல்லியல் துறை வெளியீடு)
2. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
3. Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.
4. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
5. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)

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23LET07   **HERITAGE OF TAMILS**   L T P C
                                                                        1 0 0 1

UNIT I   LANGUAGE AND LITERATURE   3
Language Families in India - Dravidian Languages – Tamil as aClassical Language - Classical Literature in Tamil – Secular Nature of Sangam Literature – Distributive Justice in Sangam Literature - Management Principles in Thirukural - Tamil Epics and Impact of Buddhism & Jainism in Tamil Land - Bakthi Literature Azhwars and Nayanmars - Forms of minor Poetry - Development of Modern literature in Tamil - Contribution of Bharathiyar and Bharathidhasan.

UNIT II   HERITAGE - ROCK ART PAINTINGS TO MODERN ART – SCULPTURE   3
Hero stone to modern sculpture - Bronze icons - Tribes and their handicrafts - Art of temple car making - - Massive Terracotta sculptures, Village deities, Thiruvalluvar Statue at Kanyakumari, Making of musical instruments - Mridhangam, Parai, Veenai, Yazh and Nadhaswaram - Role of Temples in Social and Economic Life of Tamils.

UNIT III   FOLK AND MARTIAL ARTS   3
Therukoothu, Karagattam, Villu Pattu, Kaniyan Koothu, Oyillattam, Leatherpuppetry, Silambattam, Valari, Tiger dance - Sports and Games of Tamils.

UNIT IV   THINAI CONCEPT OF TAMILS   3
Flora and Fauna of Tamils & Aham and Puram Concept from Tholkappiyam and Sangam Literature - Aram Concept of Tamils - Education and Literacy during Sangam Age - Ancient Cities and Ports of Sangam Age - Export and Import during Sangam Age - Overseas Conquest of Cholas.

**UNIT V   CONTRIBUTION OF TAMILS TO INDIAN NATIONAL MOVEMENT AND INDIAN
                CULTURE**   3
Contribution of Tamils to Indian Freedom Struggle - The Cultural Influence of Tamils over the other parts of India – Self-Respect Movement - Role of Siddha Medicine in Indigenous Systems of Medicine – Inscriptions & Manuscripts – Print History of Tamil Books.

TEXT BOOKS   **TOTAL : 15 PERIODS**

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

REFERENCE BOOKS

1.   பொருறை – ஆற்றங்கரை நாகரிகம். (தொல்லியல் துறை வெளியீடு)
2.   Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
3.   Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.
4.   Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
5.   The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)

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23LEE01	COMMUNICATIVE ENGLISH	L	T	P	C
	Common to all B.E./B.Tech Programmes	2	0	2	3
Nature of Course	Humanities and Sciences				
Pre requisites	Nil				

Course Objectives

The course is intended to
1. Improve lexical, grammatical and semantic competence.
2. Enhance communicative skills in real life situations.
3. Augment thinking in all forms of communication.
4. Equip with oral and written communication skills.
5. Gain employability skills.

Course Outcomes

On successful completion of the course, students will be able to

CO. No.	Course Outcome	Bloom's Level
CO1.	Use effectively the lexical, grammatical and semantic knowledge	Understand
CO2.	Communicate with clarity using intentional vocabulary in English	Apply
CO3.	Articulate perfectly and express their opinions confidently	Apply
CO4.	Accomplish listening and reading skills for life long learning	Apply
CO5.	Comprehend, interpret and present data	Understand

Course Contents:

MODULE I   BASIC GRAMMAR AND USAGE   9
Grammar: Parts of Speech – Verb (Primary & Modal Auxiliary) – Prefixes and Suffixes **Listening:** Listening Skills: Importance and Types of Listening – Barriers of Listening - Listening to short monologues **Speaking:** Introducing oneself – Role play **Reading:** Types of Reading – Intensive reading – Extensive Reading – Reading Comprehension **Writing:** Permission letter (Industrial Visit) – Informal letter – Dialogue writing

MODULE II   APPLICATIONS OF LANGUAGE SKILLS   9
Grammar: Tenses (Present, Past and Future) – Different Forms of a word – Types of Questions **Listening:** Listening strategies – Listening to Announcements **Speaking:** Likes and dislikes- Movie Reviews – **Reading:** Skimming - Scanning - Reading Newspaper and Articles **Writing:** Inviting Dignitaries – Accepting Invitation – Declining Invitation.

MODULE III   CONVERSATIONAL SKILLS   9
Grammar: If conditionals – Numerical Adjectives **Listening:** - Listening to Telephone calls and taking notes – Listening Lectures **Speaking:** Technical Presentation – Group Discussion **Reading:** Reading Magazines - Cloze Test **Writing:** Calling for Quotation – Complaint Letter – Process Description

MODULE IV   GRAMMATICAL ACCURACY COMPETENCE   9
Grammar: Subject verb agreement – Discourse markers - One word substitution **Listening:** Listening and gap filling – Listening and Match the answers **Speaking:** Narrating Story - Asking and giving directions **Reading:** Rearranging Jumbled sentence - Note making **Writing:** Instructions – Hints Developing – Report Writing (Fire and Accident Report)

MODULE V   TECHNICAL WRITING SKILLS

Grammar: Homophones and Homonyms - Abbreviation and Acronyms **Listening:** Listening announcements – Listening and Summing up **Speaking:** Impromptu speech – Presentation at a business meeting **Reading:** Reading and summarizing articles **Writing:** Paragraph Writing – Checklist – Story writing.

Total: 45 Periods

Laboratory Components

S.No.	List of Exercises	CO Mapping	RBT
1	Self Introduction	1	Understand
2	Movie Review	2	Apply
3	Group Discussion	3	Apply
4	Asking and Giving Directions	4	Apply
5	Impromptu Speech	5	Apply
6	Listening to short monologues	1	Understand
7	Listening to Announcement	2	Understand
8	Listening Telephone calls	3	Understand
9	Listening and Gap Filling	4	Apply
10	Listening and Match the answers	4	Apply

Text Books

1. Rizvi, Ashraf.M, "Effective Technical Communication",Tata McGraw Hill Publishing company Limited,New Delhi, 2nd Edition, 2018.
2. Hewings. M, "Advanced English Grammar", 3rd Edition, Cambridge University Press, Chennai, 9th Edition, 2019.
3. Board of Editors, "Using English – A Course book for Undergraduate Engineers and Technologists", Orient Black Swan Private Limited, Hyderabad, 3rd Edition, 2019.

Reference Books:

1. Raman M & Sangeetha Sharma, "Technical Communication", Oxford University Press,USA,13thEdition,2018.
2. Norman Whitby, Business Benchmark – "Pre-Intermediate to Intermediate, Students Book", Cambridge University Press, 1st Edition, 2006.
3. Dhanavel S. P., "English and Soft Skills", 1stEdition, Orient Black Swan Private Limited, Hyderabad, 1st Edition, 2010.

Web References:

1. https://www.englishclub.com/grammar/
2. https://learnenglish.britishcouncil.org
3. https://www.indiabix.com/verbal-ability/questions-and-answers/
4. https://www.elllo.org
5. https://englishforeveryone.org/Topics/Reading-Comprehension.html

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Passed in Board of Studies Meeting on 17.03.23   *Passed in Academic Council Meeting on 27.04.23*

Mapping of Course Outcomes (CO) with Programming Outcomes (PO) Programme Specific Outcomes (PSO)

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1										3	1	2	2		
CO2										3	1	2	2		
CO3										3	1	2	2		
CO4										3	1	2	2		
CO5										3	1	2	2		
	3	High			2	Medium				1	Low				

Bloom's Level	Summative assessment					Final Examination (Theory) [50 marks]
	Continuous Assessment					
	Theory Marks				Practical	
	IAE-I [5]	IAE-II [10]	IAE -III [10]	Attendance [5]	Rubric based CIA [20 Marks]	
Remember	-	-	-		-	-
Understand	40	40	40		40	40
Apply	60	60	60		60	60
Analyse	-	-	-		-	-
Evaluate	-	-	-		-	-
Create	-	-	-		-	-

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Passed in Board of Studies Meeting on 17.03.23   Passed in Academic Council Meeting on 27.04.23

23CH102	CHEMISTRY FOR MATERIALS SCIENCE (Common to AERO, AGRI, CIVIL, MECH, PCT and SF)	L	T	P	C
		3	0	2	4
Nature of Course	Basic Sciences				
Pre requisites	Nil				

Course Objectives

The course is intended to

1. Impart knowledge and understanding about the constituents present in water and the need for purification of water.
2. Provide knowledge about the basic principles, preparatory methods and applications of nanomaterials.
3. Understand the causes and control measures of corrosion.
4. Learn about the nature, types of the soil and suitable fertilizers for different types of soil.
5. Gain knowledge about fuels and calorific value of solid fuel, liquid fuel and gaseous fuel.

Course Outcomes

On successful completion of the course the students will be able to

CO.No	Course Outcome	Bloom's Level
CO 1	Develop innovative and eco-friendly method for water purification to meet the growing industrial demand.	Apply
CO 2	Discuss the basic principles, synthesis and applications of nanomaterials	Understand
CO 3	Demonstrate the importance of protection of metals from corrosion.	Understand
CO 4	Identify the nature of the soil and to decide fertilizer for a particular soil depending on its nature	Understand
CO 5	Classify fuels based on their efficiency of combustion.	Apply

Course Contents

Module – I   WATER ANALYSIS AND WATER TREATMENT   9

Water analysis: Sources of water, hard water and soft water, Hardness of water, acidity, alkalinity, pH value. Biological Oxygen Demand (BOD), Chemical Oxygen Demand (COD). Water treatment: Definition, Zeolite process, Conditioning methods: internal conditioning (Phosphate, Calgon) and external conditioning (Demineralization), Desalination, Reverse-osmosis (RO).

Module – II   NANOCHEMISTRY   9

Basics: Distinction between molecules, nanomaterials and bulk materials, Size-dependent properties, Types of nanomaterials: Definition, properties, and uses of nanoparticle, nanocluster, nanorod, nanowire and nanotube. Synthesis: Sol-Gel and laser ablation methods. Applications of nanomaterials in medicine, agriculture, energy, electronics and catalysis.

Module – III   CORROSION AND ITS CONTROL   9

Corrosion: Classification, Types: Chemical corrosion and Electrochemical corrosion. Corrosion control: Corrosion inhibitors, cathodic protection (sacrificial anodic protection, impressed current cathodic protection), Protective coating, Paint and Electroplating.

Passed in Board of Studies Meeting on 17.03.2023   Passed in Academic Council Meeting on 27.04.2023

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Module – IV   SOIL CHEMISTRY& FERTILIZER   9

Types of soil: saline soil, acidic soil and alkaline soil, submerged soil, salt affected and calcareous soil. Characteristics and Reclamation. Effect of N, P, K, Secondary nutrients and micronutrients on plant growth and development. Importance of nitrogenous fertilizers. Green manuring: definition and examples.

Module – V   FUELS AND COMBUSTION   9

Solid fuel: Coaland its varieties, analysis of coal: proximate and ultimate with their significance. Manufacture of metallurgical coke (Otto-Hoffmann method).Liquid fuel: petroleum oil. Knocking: octane number. Diesel: cetane number. Gaseous fuels - Water gas and Liquefied Petroleum Gas. Combustion: Introduction, Calorific value: Gross and net calorific value, Dulong's formula and problems..

Total : 45 Periods

Laboratory Component

S.No.	Name of the Experiment	CO Mapping	RBT
1	Determination of hardness of water.	3	Apply
2	Determination of chloride content in water sample.	3	Apply
3	Conductometric titration of strong acid versus strong base.	3	Apply
4	Determination of strength of HCl by pH metry.	3	Apply
5	Estimation of copper in brass by EDTA method.	3	Apply
6	Determination of rate of corrosion by weight loss method	3	Apply
7	Estimation of strength of iron by potentiometric titration	3	Apply
8	Determination of strength of acids in a mixture of acids using conductivity meter	3	Apply

Total Periods: 30

Text Books

1. Dr. A. Ravikrishnan, "Engineering Chemistry" Sri Krishna Hitech Publishing Company, Chemistry, 2021.
2. N. Krishnamurthy, "Engineering Chemistry" PHI Learning, 4th Edition, 2020.
3. Dr.Sunita Rattan. Publisher, S.K. Kataria& Sons. Edition, Reprint, 2020

Reference Books

1. S. S. Dara, "A Text Book of Engineering Chemistry", S. Chand Publishing, 12th Edition, 2018
2. 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.
3. Murthy, V.N.S. "Soil Mechanics and Foundation Engineering", UBS Publishers and Distributors, New Delhi, 2017

Additional References

1. https://nptel.ac.in/downloads/122101001
2. https://nptel.ac.in/courses/103103033/module9/lecture1.pdf
3. https://nptel.ac.in/courses/102103044/3
4. https://www.youtube.com/watch?v=jFQeDef6bug

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Passed in Board of Studies Meeting on 17.03.2023   Passed in Academic Council Meeting on 27.04.2023

Mapping of Course Outcomes (COs) with Programme Outcomes (POs) Programme Specific Outcomes (PSOs)

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO 1	3	2									1			
CO 2	3	2									1			
CO 3	3	1									1			
CO 4	3	2									1			
CO 5	3	2									1			
	3-High				2-Medium				1-Low					

Summative Assessment

Bloom's Level	Continuous Assessment				Practicals	Final Examination (Theory) [50]
	Theory				Rubric based CIA [20]	
	IAE-I [5]	IAE-II [10]	IAE-III [10]	Attendance [5]		
Remember	20	20	20		-	30
Understand	25	25	25		40	60
Apply	5	5	5		60	10
Analyze	-	-	-		-	
Evaluate	-	-	-		-	
Create	-	-	-		-	

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23ME101	Engineering Graphics (Common to Aeronautical, Agriculture, Civil, Mechanical, Safety and Fire Engineering & Food Technology)	L	T	P	C
		1	0	4	3
Nature of Course	Engineering Sciences				
Prerequisites	Nil				

Course Objectives:

The course is intended to

1. Understand technical drawings in various fields of engineering
2. Imagine and visualize the geometric details of engineering objects.
3. Translate the geometric information of engineering objects into engineering drawings.
4. Develop the graphical skills for communication of concepts, ideas and design of engineering products through technical drawings.
5. Visualize and draw isometric and perspective views

Course Outcomes

On successful completion of the course, students will be able to

CO. No.	Course Outcome	Bloom's Level
CO 1	Develop the conic sections, special curves, and draw orthographic views from pictorial views.	Apply
CO 2	Apply the principles of orthographic projections of points in all quadrants, lines and planes in first quadrant.	Apply
CO 3	Construct the projections of simple solids like prisms, pyramids, cylinder and cone.	Apply
CO 4	Build the sectional views of solids like cube, prisms, pyramids, cylinders & cones and development of its lateral surfaces.	Apply
CO 5	Organize and draw isometric view of simple solids.	Apply

Course Contents

Concepts and Conventions (Not for Examination)   **1**

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

Module -I   Plane Curves and Free Hand Sketching   **(3+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- Free hand sketching of multiple views from pictorial views of objects

Module –II   Projection of Lines and Plane Surface   **(3+12)**

Orthographic projection- principles-Principal Planes-First angle projection- Projection of points - 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.

Module –III   Projection of Solids   (3+12)
Projection of simple solids like prisms, pyramids, cylinder and cone when the axis is inclined to one of the principal planes by rotating object method.

Module- IV   Projection of Sectioned Solids and Development of Surface   (3+12)
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, Development of lateral surfaces of simple and sectioned solids – Prisms, pyramids cylinders and cones. Development of lateral surfaces of solids with cut-outs and holes

Module -V   Isometric Projections   (3+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 and miscellaneous problems.

TOTAL: (15+60) Periods

TEXT BOOKS
1.   Venugopal K. and Prabhu Raja V., "Engineering Graphics", New Age International (P) Limited, 2011
2.   Natarajan K.V., "A text book of Engineering Graphics", Dhanalakshmi Publishers, Chennai, 2012.

REFERENCE BOOKS
1. Bhatt N.D. and Panchal V.M., "Engineering Drawing", Charotar Publishing House, 50th Edition, 2010.
2. Basant Agarwal and Agarwal C.M., "Engineering Drawing", Tata McGraw Hill
Publishing Company Limited, New Delhi, 2008.
3. Parthasarathy N S and Vela Murali, "Engineering Graphics", Oxford University, Press, New Delhi, 2015.

Web References
1. http://nptel.ac.in/courses/112103019/Engineering drawing
2. http://pioneer.netserv.chula.ac.th/~kjirapon/self-practice.html

Publication of Bureau of Indian Standards
1. IS 10711 – 2001: Technical products Documentation – Size and lay out of drawing sheets.
2. IS 9609 (Parts 0 & 1) – 2001: Technical products Documentation – Lettering.
3. IS 10714 (Part 20) – 2001 & SP 46 – 2003: Lines for technical drawings.
4. IS 11669 – 1986 & SP 46 – 2003: Dimensioning of Technical Drawings.
5. IS 15021 (Parts 1 to 4) – 2001: Technical drawings – Projection Methods.

Special points applicable only to Final Examinations of Engineering Graphics:
1. There will be five questions, each of either-or type covering all units of the syllabus.
2. All questions will carry equal marks of 20 each making a total of 100.
3. The answer paper shall consist of drawing sheets of A3 size only. The students will be permitted to use appropriate scale to fit solution within A3 size.
4. The examination will be conducted in appropriate sessions on the same day

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Mapping of Course Outcomes (COs) with Programme Outcomes (POs) Programme Specific Outcomes (PSOs)

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2										1	2		
CO2	3	2										1	2		
CO3	3	2										1	2		
CO4	3	3										1	2		
CO5	3	2										1	2		
	3	High			2	Medium			1		Low				

Summative assessment

Bloom's Level	Continuous Assessment				Practical	Final Examination (Theory) [50 marks]
	Theory				Rubric based CIA [20 Marks]	
	IAE-I [5]	IAE-II [10]	IAE-III [10]	Attendance [5]		
Remember	10	10	10		20	20
Understand	20	20	20		40	40
Apply	20	20	20		40	40
Analyse						
Evaluate						
Create						

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Passed in Board of studies Meeting   *Approved in Academic Council Meeting*

23CE102	**Civil Engineering Practices Laboratory**	L	T	P	C
		0	0	2	1

Nature of Course	Engineering Sciences
Pre requisites	Nil

Course Objectives:

The course is intended to

1. To provide hands on training on plumbing works
2. To impart knowledge on carpentry using power tools
3. To practice Butt joints, Lap joints and T- Joints. by metal arc welding
4. To provide training in basic machining works
5. To fabricate different models using sheet metal

Course Outcomes

On successful completion of the course, students will be able to

CO. No.	Course Outcome	Bloom's Level
CO1	Get trained in plumbing works.	Apply
CO2	Fabricate joints in carpentry components.	Apply
CO3	Experiment with arc welding equipment to make joints.	Apply
CO4	Carry out the basic machining operations for turning and drilling.	Apply
CO5	Make the models using sheet metal.	Apply

Course Contents:

S.No	List of Experiment	CO Mapping	RBT
1	**Buildings** Study of plumbing and carpentry components of residential and industry buildings, safety aspects.	CO1	Apply

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2	**Plumbing Works** a. Pipeline joints, location and functions: valves, tapes, couplings, unions, reduces, elbows and house a. hold fittings. b. Pipe connection requirements for pumps and turbines. c. Preparation of plumbing line sketches for water supply and sewage works. d. Basic pipe connections, mixed pipe material connections, pipe connections with different	**CO1**	**Apply**
	joining components. Plumbing requirements of high rise buildings		
3	**Carpentry using power tools** a. Joints in roofs, doors, windows and furniture. b. Planning and making of various joints	**CO2**	**Apply**
4	**Welding** a. Preparation of welding symbols and edges b. Arc welding – Butt joints, Lap joints and T joints. c. Standard size of bars, rods, section and sheet metal	**CO3**	**Apply**
5	**Basic Machining** a. Facing and plain turning. b. Drilling practice. c. Different types of screw drivers, screws, bolt and nuts.	**CO4**	**Apply**
6	**Sheet metal work** a. Model making using bending and forming - trays, cone b. Study of thickness gauges, wire gauges.	**CO5**	**Apply**

Total: 30 Periods

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Mapping of Course Outcomes (COs) with Programme Outcomes (POs) Programme Specific Outcomes (PSOs)

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3		2	1	3									3
CO2	3		2	1	3									3
CO3	3		2	1	3									3
CO4	3		2	1	3									3
CO5	3		2	1	3									3
	3	High			2	Medium				1	Low			

Summative assessment based on Continuous and End Semester Examination

Bloom's Level	Rubric based Continuous Assessment [30 marks]	Preparatory Examination [25 Marks]	Attendance [5 Marks]	Final Examination [40 Marks]
Remember	20	20		20
Understand	30	20		20
Apply	50	40		40
Analyze		20		20
Evaluate				
Create				

Passed in Board of Studies Meeting   Approved in Academic Council Meeting

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23MC101	INDUCTION PROGRAMME	L	T	P	C
		2	0	0	0
Nature of Course	Mandatory, Non Credit				
Pre requisites	Completion of Schooling at Higher Secondary Level				

Course Objectives

The course is intended to

1. To nurture the character and behavior as a student.
2. To have broad understanding of society andrelationships.
3. To impart interpersonal and softskills.
4. To inspire the students in the field ofengineering.
5. To provide exposure toindustries.

Course Outcomes

On successful completion of the course, students will be able to

CO. No.	Course Outcome	Bloom's Level
CO 1	Perform curricular and co-curricular activities excellently.	Knowledge
CO 2	Do the skill based training with excellence.	Understand
CO 3	Work as team for the given task	Apply
CO 4	Gain character and behaviour	Knowledge
CO 5	Demonstrate the acquired skills effectively	Apply

Course Contents

PHYSICAL ACTIVITY

Yoga, Sports

CREATIVE ARTS (students can select any one of their choice)

Painting, sculpture, pottery, music, craft making and so on

UNIVERSAL HUMAN VALUES

Enhancing soft skills

LITERARY AND PROFICIENCY MODULES

Reading, Writing, Speaking- Debate, Role play etc., Communication and computer skills

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LECTURES BY EMINENT PEOPLE

    Guest lecture by subject experts

VISIT TO LOCAL CITIES

    Meditation centers / Industry

FAMILARIZATION TO DEPARTMENT / BRANCH INNOVATION

    Lectures by Departments Head and senior faculty members

Total Hours: 45

Mapping of COs with POs and PSOs

Mapping of Course Outcomes (COs) with Programme Outcomes (POs) Programme Specific Outcomes (PSOs)															
COs	**POs**												**PSOs**		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1						2	1	2				3	2		
CO2						2	1	2				3	2		
CO3						2	1	2				3	2		
CO4						2	1	2				3	2		
CO5						2	1	2				3	2		
	3	High				2	Medium					1	Low		

Bloom's Level	Continuous Assessment (Non-Credit, Mandatory)				
	Test -I [20]	Test -II [20]	Test - III [20]	Assignment/ Activity [20]	Attendance [20]
Remember	10	10	10		
Understand	20	20	20	10	
Apply	20	20	20	10	
Analyse					
Evaluate					
Create					

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23MA202	MATHEMATICAL FOUNDATIONS FOR ENGINEERING	L	T	P	C
	(Common to all B.E. / B.Tech Programme)	3	1	0	4
Nature of Course	Basic Sciences				
Pre requisites	Fundamentals of Basic Mathematics				

Course Objectives

The course is intended to

1. Understand the curvature and calculate the radius of curvature, centre, evolutes, involutes.
2. Acquire the mathematical skills required to solve ordinary differential equations.
3. Familiarizethe concepts of Laplace transform and its inverse.
4. Gain knowledge of analytic approach to analyse the conformal mapping.
5. Obtainthe knowledge of evaluatng contour integrals using residue theorem.

Course Outcomes

On successful completion of the course, students will be able to

CO. No.	Course Outcome	Bloom's Level
CO1	Identify the circle of curvature, evolutes and involutes of the curves.	Apply
CO2	Demonstrate various techniques to solve ordinary differential equations.	Apply
CO3	Select Laplace transform to standard functions and solve initial value problems / differential equations .	Apply
CO4	Find an analytic function ,when its real or imaginary part is known	Apply
CO5	Classify the Singularities and its corresponding Residues for the given function	Apply

Course Contents:

Module – I	APPLICATION OF DIFFERENTIAL CALCULUS	12

Curvature – Curvature in Cartesian co-ordinates - Centre and Radius of curvature- Circle of curvature- Evolutes and Involutes.

Module – II	ORDINARY DIFFERENTIAL EQUATION	12

Higher order linear differential equations with constant coefficients – Method of variation of parameters – non-Homogenous equation - Euler and Legendre Equations.

Module – III	LAPLACE TRANSFORMS	12

Laplace transform –Transform of elementary functions –Properties –Transforms of derivatives and integrals -Transform of periodic functions. Inverse Laplace transform –Statement and applications of Convolution theorem - Method of solving second order ordinary differential equations with constant coefficients by using Laplace transform technique.

Module – IV	ANALYTIC FUNCTIONS	12

Analytic functions – Necessary and sufficient conditions for analyticity in Cartesian and polar coordinates – Properties – Harmonic conjugates – Construction of analytic function – Conformal mapping : $w = a+z$, az, $1/z$ – Bilinear transformation.

Module – V	COMPLEX INTEGRATION	12

Line integral - Cauchy's integral theorem –Cauchy's integral formula – Taylor's and Laurent's series — Singularities — Residues — Residue theorem — Application of residue theorem for evaluation of real integrals.

Total: 60 Periods

Text Books:
1. Grewal B.S, "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 44th Edition, 2019.
2. Kreyszig, "Advanced Engineering Mathematics", John Wiley and Sons (Asia) Limited, 10th Edition, 2016.

Reference Books:
1. Bali.N.P and ManishGoyal N.P, "A text book of Engineering Mathematics", Laxmi Publications, 6th Edition, 2015.
2. Ramana B.V, "Higher Engineering Mathematics",Tata McGraw Hill Publishing Company, 1st Edition, 2018.
3. Veerarajan T," Engineering Mathematics for Semester I and II", Tata McGraw Hill, 3rd Edition 2017.

Additional References:
1. https://onlinecourses.nptel.ac.in/noc24_ma12/preview
2. https://onlinecourses.swayam2.ac.in/cec24_ma10/preview
3. https://onlinecourses.nptel.ac.in/noc24_ma37/preview

Mapping of Course Outcomes (COs) with Programme Outcomes (POs) Programme Specific Outcomes (PSOs)

COs	Pos												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	3												
CO2	3	3	2												
CO3	3	2	2												
CO4	3	3	3												
CO5	3	3	3												
	3	High				2	Medium					1	Low		

Formative assessment			
Bloom's Level	Assessment Component	Marks	Total marks
Remember	Online Quiz	5	
Understand	Tutorial Class /Assignment	5	15
	Attendance	5	

Passed in Board of Studies Meeting on 28.12.2023   Passed in Academic Council Meeting on 11.01.2024

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	Summative Assessment			
Bloom's Category	Internal Assessment Exam			Final Examination (60)
	IAE I (5)	IAE II (10)	IAE III (10)	
Remember	10	10	10	20
Understand	10	10	10	20
Apply	30	30	30	60
Analyze				
Evaluate				
Create				

23ME201	Engineering Mechanics (Common to Mechanical, Aeronautical, Agriculture, Civil, Safety and Fire Engineering)	L	T	P	C
		3	2	0	4

Nature of course	Engineering Science
Pre requisites	Fundamentals of Physics and Mathematics

Course Objectives

The course is intended to

1. Develop the capacity among students to predict the effect of forces and motion.
2. Make the students to understand the vector and scalar representation of forces and moment and the static equilibrium of particles.
3. Understand the effect of friction on equilibrium, laws of motion, motion kinematics and the interrelationship.
4. Make the students to understand the properties of surfaces and solids, prediction of behavior of particles and rigid bodies under the motion.
5. Make the students to familiar in laws of friction and applications of friction.

Course Outcomes

On successful completion of the course, students will be able to

COs. No.	Course Outcome	Bloom's Level
CO 1	Illustrate the Scalar and Vector representation of forces and moments.	Understanding
CO 2	Identify the Equilibrium of rigid bodies.	Apply
CO 3	Determination of properties of Surfaces and solids.	Apply
CO 4	Calculate dynamic effect of forces exerted in rigid bodies.	Apply
CO 5	Examine the laws of friction and its effects.	Apply

Course Contents

Module –I   Statics of Particles   **12**

Introduction - Units and Dimensions - Laws of Mechanics - Lami's theorem, Parallelogram and triangular Law of forces-Vectorial representation of forces - Vector operations of forces - additions, subtraction, dot product, cross product - Coplanar Forces - rectangular components - Equilibrium of a particle - Forces in space- Equilibrium of particle in a space - principle of transmissibility.

Module –II   Equilibrium of Rigid Bodies   **12**

Free body diagram - Types of supports -action and reaction forces - stable equilibrium – Moments and Couples - Moment of force about a point and an axis - Varigon's theorem - Equilibrium of Rigid bodies in two and three dimensions.

Module–III   Properties of Surfaces and Solids   **12**

Centroid and centre of gravity of masses - Centroid of lines and areas - Rectangular, circular, triangular areas by integration - T section, I section, - Angle section, Hollow section by using standard formula - Pappus Theorem - Parallel axis and perpendicular axis theorem -Principal moment of inertia.

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Module– IV Dynamics of Particles
12

Displacement, Velocity and acceleration and their relationship - Relative motion - Curvilinear motion Newton's laws of motion - Work Energy Equation- Impulse and Momentum - Impact of elastic bodies.

Module –V   Friction and Elements of Rigid Body Dynamics
12

Friction force - Laws of sliding friction - equilibrium analysis of simple systems with sliding friction wedge friction- Rolling resistance -Translation and Rotation of Rigid Bodies - General Plane motion of simple rigid bodies - cylinder and fly wheel dynamics.

Total : 60 Periods

Text Books
1. Rajasekaran, S. and Sankarasubramanian. G, 'Fundamentals of Engineering 17 Mechanics",Vikas Publishing House Pvl. Ltd., New Delhi, 2009.
2. Kumar, K.L., 'Engineering Mechanics", Tata McGraw-Hill Publishing Company, New Delhj, 3rd Revised Edition, 2008.

Reference Books
1. Beer, F.P and Johnston Jr. E.R., "Vector Mechanics for Engineers (In SI Units): Statics and Dynamics", Tata McGraw-Hill Publishing Company, New Delhi, 8th Edition 2004.
2. Hibbeller, R.C and Ashok Gupta, "Engineering Mechanics: Statics and Dynamics", Pearson Education. 11th Edition. 2010.

Online Resources
1. http://nptel.ac.in/courses/122104015/
2. http://nptel.ac in/courses/112103109/

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO 1	3	2		1								2	3		
CO 2	3	2		1								2	3		
CO 3	3	2		1								2	3		
CO 4	3	2		1								2	3		
CO 5	3	2		1								2	3		

Mapping of Course Outcomes (COs) with Programme Outcomes (POs) & Programme Specific Outcomes (PSOs)

3-High   2- Medium   1-Low

Formative assessment			
Bloom's Level	Assessment Component	Marks	Total marks
Understand	Quiz	5	
Apply	Tutorial Class / Assignment	5	15
	Attendance	5	

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Summative Assessment				
Bloom's Category	**Internal Assessment Examinations**			**Final Examination (60)**
	IAE – I (5)	**IAE – II (10)**	**IAE – III (10)**	
Remember	10	10	10	30
Understand	20	10	10	30
Apply	20	30	30	40
Analyze				
Evaluate				
Create				

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23LET08	தமிழரும் தொழில்நுட்பமும் TAMILS AND TECHNOLOGY (Common to all B.E. / B.Tech Programme)	L	T	P	C
		1	0	0	1

Nature of Course	Humanities and Sciences
Pre requisites	Tamil

Course Objectives

The course is intended to

1. Introduce students to the great technology of ancient Tamil society.
2. Realize the contribution of various technologies for the development of governing area.
3. Highlighting the different manufacturing technology to make the coins, jewels, stones, art etc.
4. Know the role of agriculture, water management system and food processing.
5. Learn about the Scientific Tamil and Tamil computing of the past and how it has evolved over the generations.

Course Outcomes

On successful completion of the course the students will be able to

CO. No	Course Outcome	Bloom's Level
CO 1	Remember the life style and technology of the Sangam people.	Remember
CO 2	Get an updated knowledge of ancient designing and construction of House, Temple, hero stones etc.	Understand
CO 3	Learnt the speciality of manufacturing technology types and usages.	Understand
CO 4	Gain the knowledge on production of agricultural products based on the ancient technologies.	Understand
CO 5	Understand the evaluation of Tamil language through the digital system.	Understand

Course Contents (in Tamil)

அலகு - I	நெசவு மற்றும் பானைத் தொழில்நுட்பம்	2
சங்க காலத்தில் நெசவுத் தொழில் – பானைத் தொழில் நுட்பம் - கருப்பு சிவப்பு பாண்டங்கள் – பாண்டங்களில் கீறல் குறியீடுகள்.		

அலகு - II	வடிவமைப்பு மற்றும் கட்டிடத் தொழில்நுட்பம்	2
சங்க காலத்தில் வடிவமைப்பு மற்றும் கட்டுமானங்கள் & சங்க காலத்தில் வீட்டுப்பொருட்களில் வடிவமைப்பு - சங்க காலத்தில் கட்டுமான பொருட்களும் நடுகல்லும் – சிலப்பதிகாரத்தில் மேடை அமைப்பு பற்றிய விவரங்கள் – மாமல்லபுரச் சிற்பங்களும், கோவில்களும் – சோழர் காலத்துப் பெருங்கோயில்கள் மற்றும் பிற வழிபாட்டுத் தலங்கள் – நாயக்கர் காலக் கோயில்கள் - மாதிரி கட்டமைப்புகள் பற்றி அறிதல், மதுரை மீனாட்சி அம்மன் ஆலயம் மற்றும் திருமலை நாயக்கர் மஹால் – செட்டிநாட்டு கட்டிடக் கலை - பிரிட்டிஷ் காலத்தில் சென்னையில் இந்தோ - சாரோசெனிக் கட்டிடக் கலை.		

அலகு - III	உற்பத்தித் தொழில் நுட்பம்	2
கப்பல் கட்டும் கலை – உலோகவியல் – இரும்புத் தொழிற்சாலை – இரும்பை உருக்குதல், எஃகு – வரலாற்றுச் சன்றுகளாக செம்பு மற்றும் தங்க நாணயங்கள் -நாணயங்கள் அச்சடித்தல் – மணி உருவாக்கும் தொழிற்சாலைகள் – கல்மணிகள், கண்ணாடி மணிகள் – சுடுமண் மணிகள் – சங்கு மணிகள் – எலும்புத்துண்டுகள் – தொல்லியல் சான்றுகள் – சிலப்பதிகாரத்தில் மணிகளின் வகைகள்.		

அலகு - IV	வேளாண்மை மற்றும் நீர்ப்பாசனத் தொழில் நுட்பம்	2
அணை, ஏரி, குளங்கள், மதகு – சோழர்காலக் குமுழிகள் முக்கியத்துவம் – கால்நடை பராமரிப்பு – கால்நடைகளுக்காக வடிவமைக்கப்பட்ட கிணறுகள் – வேளாண்மை மற்றும் வேளாண்மை சார்ந்த செயல்பாடுகள் – கடல்சார் அறிவு – மீன்வளம் – முத்து மற்றும் முத்துக்குளித்தல் – பெருங்கடல் குறித்த பண்டைய அறிவு – அறிவுசார்.		

அலகு - V	அறிவியல் தமிழ் மற்றும் கணினித்தமிழ்	2
அறிவியல் தமிழின் வளர்ச்சி – கணினித்தமிழ் வளர்ச்சி – தமிழ் நூல்களை மின் பதிப்பு செய்தல் – தமிழ் மென்பொருட்கள் உருவாக்கம் – தமிழ் இணையக் கல்விக் கழகம் - தமிழ் மின் நூலகம் – இணையத்தில் தமிழ் அகராதிகள் – சொற்குவைத் திட்டம்.		

Total : 10 Periods

Course Contents (in English)

Module – I	WEAVING AND CERAMIC TECHNOLOGY	2
Weaving Industry during Sangam Age – Ceramic technology – Black and Red Ware Potteries (BRW) – Graffiti on Potteries.		

Module – II	DESIGN AND CONSTRUCTION TECHNOLOGY	2
Designing and Structural construction House & Designs in household materials during Sangam Age - Building materials and Hero stones of Sangam age – Details of Stage Constructions in Silappathikaram - Sculptures and Temples of Mamallapuram - Great Temples of Cholas and other worship places - Temples of Nayaka Period - Type study (Madurai Meenakshi Temple)- Thirumalai Nayakar Mahal - Chetti Nadu Houses, Indo - Saracenic architecture at Madras during British Period.		

Module – III	MANUFACTURING TECHNOLOGY	2
Art of Ship Building - Metallurgical studies - Iron industry - Iron smelting, steel -Copper and gold Coins as source of history - Minting of Coins – Beads making-industries Stone beads –Glass beads - Terracotta beads -Shell beads/ bone beats - Archeological evidences - Gem stone types described in Silappathikaram.		

Module – IV	AGRICULTURE AND IRRIGATION TECHNOLOGY	2
Dam, Tank, ponds, Sluice, Significance of Kumizhi Thoompu of Chola Period, Animal Husbandry - Wells designed for cattle use - Agriculture and Agro Processing - Knowledge of Sea – Fisheries – Pearl - Conche diving - Ancient Knowledge of Ocean - Knowledge Specific Society.		

Module – V	SCIENTIFIC TAMIL & TAMIL COMPUTING	2

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

Total : 10 Periods

பார்வை நூல்கள் (TEXT-CUM-REFERENCE BOOKS)

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

23LEE02	ADVANCED COMMUNICATIVE ENGLISH	L	T	P	C
	(Common to all B.E. / B.Tech Programme)	2	0	2	3
Nature of Course	Humanities and Sciences				
Pre requisites	Communicative English				

Course Objectives

The course is intended to

1. Hone professional communication skills, including email etiquette and formal presentation.
2. Develop advanced vocabulary and collocation for official communication.
3. Communicate effectively and actively in social interactions.
4. Improve writing skills such as project and report writing for various purposes.
5. Foster collaborative communication abilities through group discussion in diverse contexts.

Course Outcomes

On successful completion of the course the students will be able to

CO.No	Course Outcome	Bloom's Level
CO 1	Communicate professionally in various contexts.	Understand
CO 2	Make use of common English phrases and vocabulary.	Understand
CO 3	Integrate basic English communication skills at a personal and a professional level in day-to- day interaction.	Apply
CO 4	Implement listening, reading and writing skills in real - life situations	Apply
CO 5	Decipher collaborative communication skills through diversified contexts.	Understand

Course Contents

Module – I	TECHNICAL VOCABULARY AND USAGE	9
Grammar: Technical Vocabulary (Synonyms and antonyms) - Articles - Reported Speech - **Listening**: Listening to video lectures (TED / INK Talks) **Speaking**: Describing pictures, places – Speaking practice to improve pronunciation **Reading**: Critical reading from the given text **Writing**: Job Application with Resume - E mail writing.		
Module – II	EFFECTIVE OFFICIAL COMMUNICATION	9
Grammar: Collocation – Question tags – Prepositions **Listening**: Listening to telephonic conversation **Speaking**: Role plays – Telephonic Etiquette and telephonic phrases **Reading**: Company profile - Advertisement (job / product) **Writing**: – Preparing Memo – Prepare Circular, Agenda and Minutes – Placing Order – Prepare Advertisement.		
Module – III	TECHNICAL LANGUAGE SKILLS FOR CONVERSATION	9
Grammar: Degrees of Comparison – Conjunctions **Listening**: Sports commentaries – Animated short stories **Speaking**: Asking for and giving directions – Describing simple process **Reading**: Reading and understand technical vocabulary **Writing**: Letter to the Editor – Review of Favourite Movie / Book – Recommendations.		

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Module – IV	LANGUAGE FOR BUSINESS CORRESPONDENCE	9

Grammar: Idioms and Phrases – Single line definitions Phrasal verbs **Listening:** Listening to informal communication **Speaking:** Narrating personal experience **Reading:** Speed reading – reading passage within the time limit **Writing:** Project writing – Report writing (Accident and Survey) – Preparing welcome address and vote of thanks.

Module – V	VERBAL ABILITY FOR WRITING	9

Grammar: Verbal Analogy – Cause and effect expressions **Listening:** Listening to Iconic Speeches - debate and reviewing the performance **Speaking:** Group communication skills – Discussing social issues and current affairs **Reading:** Short story – critical reading **Writing:** Itinerary –Interpretation of charts (Flow chart and Pie chart) - Essay Writing and Paragraph.

Total : 45 Periods

Laboratory Components:

S.No	List of Experiments	CO Mapping	RBT
1	Describing Picture / Place	1	Understand
2	Listening	1	Understand
3	Role Play	2	Understand
4	Prepare Circular, Agenda & Minutes	2	Understand
5	Asking and Giving Directions	3	Apply
6	Narrate a Favourite Movie / Book	3	Apply
7	Welcome Address	4	Apply
8	Vote of Thanks	4	Apply
9	Discussing Social Issues	5	Understand
10	Interpretation of Charts	5	Understand
		Total	15 Periods

Text Books

1. Rizvi, Ashraf.M, "Effective Technical Communication", Tata McGraw Hill Publishing Company Limited, New Delhi, 8th Edition, 2020.
2. Hewings. M, "Advanced English Grammar", 3rd Edition, Cambridge University Press, Chennai, 9th Edition, 2019.
3. Board of Editors, "Using English – A Course book for Undergraduate Engineers and Technologists", Orient Black Swan Private Limited, Hyderabad, 3rd Edition, 2019.

Reference Books

1. Dr. Krishnakumar TP, "Rudiments of Communication Skills", Buddha Publication, 1st Edition, 2023.
2. Raman M & Sangeetha Sharma, "Technical Communication", Oxford University Press, USA, 13th Edition, 2018.
3. Dhanavel S. P., "English and Soft Skills", 1st Edition, Orient Black Swan Private Limited, Hyderabad, 2010.

Web References:
1. https://nptel.ac.in/courses/111104031
2. https://nptel.ac.in/courses/111106139
3. https://nptel.ac.in/courses/111105134

Mapping of Course Outcomes (COs) with Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)														
COs	Pos												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO 1									1	3	1		2	
CO 2									1	3	1		2	
CO 3									1	3	1		2	
CO 4									1	3	1		2	
CO 5									1	3	1		2	
	3-High			2-Medium			1-Low							

Summative assessment						
Bloom's Level	Continuous Assessment (IAE)					Final Examination (FE) [50marks]
	Theory Marks				Practical	
	IAE-I [5]	IAE-II [10]	IAE-III [10]	Attendance [5]	Rubric based CIA [20 Marks]	
Remember	25				4	10
Understand	25	25	25		8	20
Apply		25	25		8	20
Analyse						
Evaluate						
Create						

23LEJ06	JAPANESE	L	T	P	C
		2	0	2	3
Nature of Course	HSS				
Pre requisites	Nil				

Course Objectives

The course is intended to

1. Read & Write Hiragana and Katakana (Japanese Alphabets) letters.
2. Use words and phrases of greeting in Japanese, identify names of objects and do a self-introduction using short and simple sentences.
3. Demonstrate the use of time-related words, verb conjunctions and make light conversation asking for directions and answering questions.
4. Express their likes and dislikes, hobbies, describe the locations of different things and demonstrate counting in Japanese.
5. Demonstrate the minimum day to day conversation and describe their ability and experiences.

Course Outcomes

On successful completion of the course, students will be able to

CO. No.	Course Outcome	Bloom's Level
CO1.	Read & Write Hiragana and Katakana (Japanese Alphabets) letters	Understand
CO2.	Identify names of objects and do self-introduction using short and simple sentences	Apply
CO3.	Demonstrate the use of time-related words	Apply
CO4.	Articulate their likes and dislikes, hobbies and describe the locations of different things	Apply
CO5.	Express day to day conversation and describe their ability to share their experiences	Understand

Course Contents

Module – I		9
INTRODUCTION- はじめまして － ALPHABET - Hiragana - NUMBERS- すうじ- Classroom Words- きょうしつのことば －LISTENING		
Module – II		9
ALPHABET-Katakana - BASIC SENTENCE- じぶんのなまえ － COUNTRY NAMES- くにのなまえ-SAYING AGE- なんさいですか - LISTENING		
Module – III		9
SAYING MONTH- なにつき － SAYING BIRTHDAY- たんじょうび － KAZOKU- かぞく - KNOWINGTHINGS-あ/こ/そ － LISTENING		

Module – IV		9
PRONOUNS - ADJECTIVES - SAYING TIME, SHOPPING – LISTENING		
Module – V		9
SELF INTRODUCTION - MY TOWN - Watashino machi - GO, COME, RETURN - BASIC VERBS – TRANSPORT – LISTENING		
	Total : 45 Periods	

Text Books

1. Minna no Nihongo – Elementary Japanese 1
2. Minna no Nihongo- Translation & Grammar Notes 1
3. Gateway to Japan Japanese Language school e-handouts / e-course materials.

	Summative Assessment					
	Continuous Assessment					Final Examination (Theory) [50 marks]
Bloom's Level	Theory Marks				Practical	
	IAE-I [5]	IAE-II [10]	IAE-III [10]	Attendance [5]	Rubric based CIA [20 Marks]	
Remember	50				4	10
Understand		20	20		8	20
Apply		30	30		8	20
Analyse						
Evaluate						
Create						

23PH202	MATERIALS PHYSICS	L	T	P	C
	(Common to Aero, Agri, Civil, FT, Mech, PCT & SF)	3	0	2	4

Nature of Course	Basic Sciences
Pre requisites	Fundamentals of Basic Physics

Course Objectives
The course is intended to
1. Impart knowledge in production of laser and their applications in engineering and medical field.
2. Understand on the concept and properties of matter like elasticity and its applications.
3. Provide a valuable theoretical introduction and an overview of the fundamental structures of the crystal physics.
4. Apply the concepts of thermal conductivity to solve the thermal coefficients.
5. Give an idea on new engineering materials like shape memory alloys, metallic glasses and nanomaterials.

Course Outcomes
On successful completion of the course the students will be able to

CO.No	Course Outcome	Bloom's Level
CO 1	Compare the types of lasers for various industrial applications.	Understand
CO 2	Study the elastic behavior and working of torsional pendulum.	Understand
CO 3	Account for how crystalline materials are studied using miller indices, including concepts like coordination number and packing factor.	Understand
CO 4	Demonstrate the thermal conductivity of good and bad conductors.	Apply
CO 5	Explain a conceptual understanding about the properties of new engineering materials like shape memory alloys, metallic glasses and nanomaterials.	Apply

Course Contents

Module – I	LASER PHYSICS	9

Lasers: Introduction- characteristics of laser - population of energy levels, Einstein's A and B coefficients derivation - resonant cavity - semiconductor lasers: homojunction and heterojunction - Applications of lasers - particle size determination and holography.

Module – II	PROPERTIES OF MATTER	9

Elasticity - stress-strain diagram and its uses - factors affecting elastic modulus and tensile strength - torsion pendulum: theory and experiment - bending of beams - bending moment – cantilever - uniform and non-uniform bending - I-shaped girders.

Module – III	CRYSTAL PHYSICS	9

Single crystalline, polycrystalline and amorphous materials – single crystals: unit cell, crystal systems, Bravais lattices, directions and planes in a crystal, Miller indices – inter-planar distances - coordination number and packing factor for SC, BCC, FCC, HCP and diamond structures.

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Module – IV	THERMAL PHYSICS	9

Transfer of heat energy - thermal expansion of solids and liquids - expansion joints - bimetallic strips - thermal conductivity - Forbe's and Lee's disc method: theory and experiment – thermal insulation - applications: heat exchangers in refrigerators, ovens and solar water heaters.

Module – V	MODERN ENGINEERING MATERIALS	9

Metallic glasses – preparation, properties and applications – Shape memory alloys – Types, characteristics and applications – Nanomaterials – preparation– Physical Vapour Deposition (PVD) - sol gel method, properties and applications. Carbon Nano Tube (CNT) –properties and applications.

Total : 45 Periods

Laboratory Components (Any Five)

S.No	List of Experiments	CO Mapping	RBT
1	Determination of wavelength and particle size of the given Laser beam.	CO1	Apply
2	Determination of numerical aperture and acceptance angle of an optical fiber.	CO1	Apply
3	Determination of the rigidity modulus of a given wire by using Torsion pendulum.	CO2	Apply
4	Determination of Young's modulus of a material by non-uniform bending method.	CO2	Apply
5	Determination of Young's modulus of a material by uniform bending method.	CO2	Apply
6	Determination of thermal conductivity of a bad conductor by Lee's Disc method.	CO4	Apply
		Total	15 Periods

Text Books

1. Bhattacharya, D.K and Poonam, T. "Engineering Physics", Oxford University Press, 2nd edition, 2015.
2. M.N. Avadhanulu, M.N. &Kshirsagar PG. "A Text book of Engineering Physics", S.Chand and company, Ltd., New Delhi, 10th edition, 2014.
3. Singh Dheeraj Kumar, "Nanomaterials", Springer International Publishing, 1st Edition, 2023.

Reference Books

1. David Halliday. Robert Resnick and Jearl Walker., "Principles of Physics", Wiley, 10th Edition, 2014.
2. Raymond A Serway and John W Jewett., "Physics for Scientists and Engineers". Cengage Learning, 9th Edition, 2019.

Web References:

1. https://nptel.ac.in/courses/115/107/115107095/
2. https://spaceplace.nasa.gov/laser/en/
3. https://www.coursera.org/lecture/fe-exam/stresses-in-beams-strains-in-pure-and-nonuniform-bending-6aMRx

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4. https://nptel.ac.in/courses/113106093

Mapping of Course Outcomes (COs) with Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO 1	3	1												
CO 2	3	1												
CO 3	3	2	2											
CO 4	3	2	2											
CO 5	3													
	3-High			2-Medium			1-Low							

Summative Assessment

Bloom's Level	Continuous Assessment (IAE)					Final Examination (FE) [50marks]
	Theory Marks				Practical	
	IAE-I [5]	IAE-II [10]	IAE-III [10]	Attendance [5]	Rubric based CIA [20 Marks]	
Remember	10	10	10			20
Understand	35	35	35		40	60
Apply	5	5	5		60	10
Analyse						10
Evaluate						
Create						

23CS203	PROBLEM SOLVING USING PYTHON (Common to AERO, CIVIL, FT, MECH, PCT, S&F)	L	T	P	C
		3	0	2	4

Nature of Course	Engineering Sciences
Prerequisites	Mathematical and Logical Knowledge

Course Objectives

The course is intended

1. Learn the basics of algorithmic problem solving.
2. Think logically and write algorithms and draw flow charts for problems.
3. Make use of python functions and call them.
4. Utilize the Python data structures — lists, tuples, dictionaries and files.

Course Outcomes

On successful completion of the course the students will be able to

CO. No	Course Outcome	Bloom's Level
CO 1	Recall algorithmic solutions to simple computational problems and read,write, execute by simple python programs	Remember
CO 2	Classify and Read, Write, Execute by hand simple python programs.	Understand
CO 3	Structure simple python programs for solving problems.	Understand
CO 4	Examine simple Python programs using conditionals and loops for solving problems	Apply
CO 5	Show the python string functions and lists	Apply
CO 6	Practice the compound data using python Tuples, Dictionaries, Files and Packages.	Apply

Course Contents

MODULE – I   Basics of Computers & Problem solving   9

Computer Basics–Components-Computer organization-Computer Software-Types of software - Software Development steps -Need for logical analysis and thinking- Algorithms –Flowchart.

MODULE – II   Introduction of Python Programming   9

Introduction- Python IDLE Installation- Python Interpreter- Interactive and script mode-Values and types, variables, operators, expressions, statements, precedence of operators, Multiple assignments, comments, Input and Output Statements.

MODULE – III   Control statements and Functions   9

Conditional (if), alternative (if-else), chained conditional (if-elif-else)- Iteration- while,for,break,continue, pass – Functions - Introduction, inbuilt functions, user defined functions, recursion.

MODULE – IV   Strings, Lists   9

Strings- String slices, immutability, string methods and operations- Lists- creating lists, list operations, list methods, mutability, aliasing, cloning lists, list and strings, list and functions.

MODULE – V   Tuples, Dictionaries, Files and Packages   9

Tuples- Tuple assignment, lists and tuples, Tuple as return value- Dictionaries- operations and methods, Files and Exception-Text files, reading and writing files.

Total : 45 Periods

Laboratory Components

S.No	List of Exercises	CO Mapping	RBT
1	Write a algorithm & draw flowchart for simple Computational problems.	CO1	Apply
2	Write a program to perform different arithmetic operations on numbers in python.	CO1	Apply
3	Write a python program to implement the various control structures.	CO2	Apply
4	Write a python program for computational problems using recursive function.	CO2	Apply
5	Demonstrate use of list for data validation.	CO3	Apply
6	Develop a python program to explore string functions.	CO3	Apply
7	Write a python program to find a given number is ODD or EVEN	CO4	Apply
8	Write a python class to reverse a string word by word	CO4	Apply
9	Develop python programs to perform operations on dictionaries.	CO5	Apply
10	Write a python program to read and write into a file.	CO5	Apply

Text Books

1. Reema Thareja, "Problem Solving and Programming with Python", Oxford University Press, 1st Edition 2021.
2. Dr. R. Nageswara Rao, 'Core Python Programming', Dream tech Press, 1st Edition 2019.

Reference Books

1. Kenneth A. Lambert, "Fundamentals of Python: First Programs", CENGAGE Learning, 2nd Edition 2021.
2. Ashok Namdev Kamthane, Amit Ashok Kamthane, "Programming and Problem Solving with Python", Mc-Graw Hill Education, 1st Edition 2020.
3. Charles Dierbach, "Introduction to Computer Science using Python: A Computational Problem Solving Focus", Wiley India Edition, 2nd Edition 2019.
4. Timothy A. Budd," Exploring Python", Mc-Graw Hill Education (India) Private Ltd., 1st Edition 2015.

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Additional References

1. Python Research Association of India - https://www.araiindia.com/services/technology-and-products
2. NPTEL - https://nptel.ac.in/courses/107/106/107106088/
3. MOOC Courses - https://www.mooc-list.com/tags/automotive-engineering

Mapping of Course Outcomes (COs) with Programme Outcomes (POs) Programme Specific Outcomes (PSOs)

COs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	3	2	3							3	3	3	3
CO2	3	3	3	2	3							3	3	3	3
CO3	3	3	3	2	3							3	3	3	3
CO4	3	3	3	2	3							3	3	3	3
CO5	3	3	3	2	3							3	3	3	3
CO6	3	3	3	2	3							3	3	3	3
	3	High				2	Medium					1	Low		

Bloom's Level	Summative Assessment						Final Examination (Theory) [50]
	Continuous Assessment						
	Theory				Practicals		
	IAE-I[5]	IAE-II[10]	IAE-III[10]	Attendance[5]	Rubric Based CIA [10]	Model Examination [10]	
Remember	10	10	10		20		20
Understand	20	20	20		20		40
Apply	20	20	20		10		40
Analyze							
Evaluate							
Create							

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23CE201	Computer Aided Building Drawing Laboratory	L	T	P	C
		0	0	4	2
Nature of Course	Professional Core				
Pre requisites	NA				

Course Objectives

The course is intended to
1. Understand the techniques of building drawing
2. Develop plan, elevation and technical uses of building
3. Follow the development and control rules
4. Satisfy orientation and functional requirements as per National Building Code
5. Visualize and draw 2D and 3D models of Engineering Components

Course Out comes

On successful completion of the course, students will be able to

CO.No.	Course Out come	Bloom's Level
CO1	Gain the various basic commands used for drafting and known the type of coordinate system.	Apply
CO2	Utilize the software packages for drafting and modeling.	Apply
CO3	Prepare the plan of building components o satisfy the functional and orientation aspects.	Apply
C04	Draw the plan, elevation and sectional views of load bearing structures and framed structures.	Apply
CO5	Visualize and draw 2D and 3D models of Engineering Components	Apply

Course Content:

S. No	List of Experiment	CO Mapping	RBT
1	**Principles of planning, orientation and complete joinery details** **(Paneled and Glazed Doors and Windows)** a. Introduce to draw the plan, elevation and sectional views of buildings as per National Building Regulations b. Making the students to get practice in various AUTOCAD Commands for preparing building plan, elevation and sections. c. Specify the Principles of Planning, Orientationand Complete Joinery Details (Paneled and Glazed Doors and Windows).	**CO1**	**Apply**
2	**Buildings with Load Bearing Walls**	**CO2**	**Apply**

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	a. Draw the Plan, Elevation and Section of the Residential Building with Load Bearing walls and RCC Flat Roof. b. Draw the Plan, Elevation and Section of the Primary Health Centre. c. Draw the Plan, Elevation and Section of the School Building.		
3	**Buildings with Sloping Roof** a. Draw the Plan, Elevation and Section of the Fully Tiled Gabled House b. Draw the Plan, Elevation and Section of the Residential Building with Load Bearing walls and Pitched Roof.	**CO3**	**Apply**
4	**R.C.C. Framed structures.** a. Draw the Plan, Elevation and Section of the A Reading Room with RCC Flat Roof. b. Draw the Plan, Elevation and Section of the Library Building with RCC Flat Roof. c. Draw the Plan, Elevation and Section of the RCC Framed Building with RCC Roof. d. Draw the Plan, Elevation and Section of the A Single Bed Room Residential Building with RCC Roof	**CO4**	**Apply**
5	**Industrial buildings–North light roof structure** a.Draw the Plan, Elevation and Section of the workshop building	**CO5**	**Apply**

Total: 45 Periods

Textbooks:
1. Sikka V.B., A Course in Civil Engineering Drawing, S.K.Kataria and Sons, 4th Edition, 2015.
2. George Omura, "Mastering in Auto cad 2005 and Autocad LT 2005"– BPB Publications, 2nd edition, 2009

References:
1. Chuck Eastman, Paul Teicholz, Rafael Sacks, Kathleen Liston, BIM Hand book: A Guideto building information modeling for Owners, Managers, Designers, Engineers,andContractors,JohnWileyandSons.Inc.,2011.
2. Marimuthu V.M., Murugesan R. and Padmini S., Civil Engineering Drawing-I, PratheebaPublishers,2008.

Passed in Board of studies meeting   *Approved in Academic Council meeting*

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3. Shah.M.G., Kale. C.M. and Patki.S.Y., Building Drawing with an Integrated
   Approach to Built Environment, Tata McGraw Hill Publishers Limited,
   2007.
4. Verma.B.P., Civil Engineering Drawing and House Planning, Khanna Publishers, 2010.

COs	\multicolumn{12}{c}{POs}	\multicolumn{2}{c}{PSOs}
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3		3		3								3	
CO2	3		3		3								3	
CO3	3		3		3								3	
CO4	3		3		3								3	
CO5	3		3		3								3	

Mapping of Course Out comes (COs) with Programme Outcomes (POs) Programme Specific Outcomes (PSOs)

3 High 2 Medium 1 Low

Summative assessment based on Continuous and End Semester Examination

Bloom's Level	Rubric based Continuous Assessment [50marks]	End Semester Examination [50marks]
Remember		
Understand	30	30
Apply	70	70
Analyze		
Evaluate		
Create		

23MC202	ENVIRONMENTAL SCIENCES (Common for all branches)	L	T	P	C
		2	0	0	0
Nature of Course	Mandatory, Non Credit				
Pre requisites	Nil				

Course Objectives

The course is intended to

1. Understand the concept of eco system and environment.
2. Become conversant with ecological balance and values of biodiversity.
3. Know the role of human in prevention of pollution and making a clean environment.
4. Get knowledge about conservation of non-conventional energy resources.
5. Study about the nature and management of e-waste and solid waste.

Course Outcomes

On successful completion of the course the students will be able to

CO.No	Course Outcome	Bloom's Level
CO 1	Explain the knowledge about ecosystem and environment	Understand
CO 2	Interpret the ecological balance and preservation of bio diversity	Understand
CO 3	Demonstrate various types of pollution in order to control pollution	Apply
CO 4	Classify the energy sources for the conservation of non conventional energy sources	Understand
CO 5	Identify the nature and management of e-waste and solid waste	Apply

Course Contents

Module – I	ECOSYSTEM	6

Eco system - Food chains, Food webs and Ecological pyramids. Ecosystem (a) Forest eco system, (b) Aquatic eco system (pond ecosystem and marine ecosystem).

Module – II	BIODIVERSITY	6

Introduction to Bio diversity, Values of Bio diversity, Threads to Bio diversity, Endangered and Endemic species of India, Hotspots of biodiversity. Conservation of Biodiversity: In-Situ and Ex-Situ conservation of biodiversity.

Module – III	ENVIRONMENTAL POLLUTION	6

Definition, Causes, Effects and Control of (a) Air pollution (b) Water pollution (c) Soil pollution. Electrostatic Precipitator for controlling air pollution.

Module – IV	NON-CONVENTIONAL ENERGY RESOURCES	6

Introduction, Types, Working and Applications of: Solar Energy- Photovoltaic (PV) solar energy, Wind Energy-Onshore wind power- and Geo Thermal Energy-Geo thermal power plant.

Passed in Board of Studies Meeting on 28.12.2023   Passed in Academic Council Meeting on

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Module – V	ENVIRONMENTAL MANAGEMENT	6
	Sustainable Development, Waste Management: Types, sources and disposal of municipal, industrial solid Waste, Role of Information technology in Environment and Human. COVID-19 and JN-1 Virus.	
	Total : 30 Periods	

Activity Components

S.No	List of Experiments	CO Mapping	RBT
1	Field study of simple eco system: pond, river and hill slopes	CO1	Understand
2	Case study regarding environmental management	CO5	Apply

Text Books

1. AnubhaKaushik and C.P. Kaushik, "Environmental Science and Engineering, New Age International Publishers, New Delhi, 2nd Edition, 2019.
2. V. Kumar, "An Introduction to Green Chemistry" Vishal publishing Co. Reprint Edition, 2020.

Reference Books

1. Santosh Kumar Garg and Rajeshwari Garg "Ecological and Environmental Studies", Khanna Publishers, Nai Sarak, Delhi, 2nd Edition, 2019.
2. Masters, Gilbert M, "Introduction to Environmental Engineering and Science", Pearson Education, New Delhi, 2nd Edition, 2020.

Web References:

1. https://nptel.ac.in/courses/122103039/38
2. https://bch.cbd.int/cms/ui/collaboration/download/download.aspx?id=909
3. https://nptel.ac.in/courses/105102089/air%20pollution%20(Civil)/Module-3/3a.htm
4. www.vssut.ac.in/lecture_notes/lecture1428910296.pdf
5. nptel.ac.in/courses/120108004/module7/lecture8.pdf

Mapping of Course Outcomes (COs) with Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO 1		3					1					3		
CO 2		3					3					1		
CO 3		3					2					3		
CO 4		2					3					2		
CO 5		3					3					2		
	3-High			2-Medium				1-Low						

Bloom's Level	Summative Assessment				
	Continuous Assessment				
	IAE-I [20]	IAE-II [20]	IAE-III [20]	Attendance [20]	Activity [20]
Remember	20	20	15		
Understand	30	25	25		
Apply		5	10		
Analyze					
Evaluate					
Create					

Passed in Board of Studies Meeting on 28.12.2023   Passed in Academic Council Meeting on

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23MA301	TRANSFORMS AND BOUNDARY VALUE PROBLEMS (Common to Aero, Agri, Civil, ECE, EEE, FDT, Mech, PCT, S&F)	L	T	P	C
		3	0	2	4
Nature of Course	Basic Sciences				
Pre requisites	Foundations of Mathematics				

Course Objectives

The course is intended to

1. Learn about linear and non-linear partial differential equations and obtain their solutions using various techniques.
2. Gain familiarity with Fourier series.
3. Orient Fourier series techniques to solve one dimensional wave and heat equations.
4. Provide the concept of Fourier transforms and its inverse.
5. Introduce the concept of Z-transforms and difference equations.
6. Utilize advanced mathematical techniques to solve complex boundary value problems, reflecting mastery in mathematical transformations.

Course Outcomes

On successful completion of the course, students will be able to

CO. No.	Course Outcome	Bloom's Level
CO1	Identify linear and non-linear partial differential equations.	Apply
CO2	Construct the Fourier series of a given function and apply in the field of Engineering.	Apply
CO3	Interpret solutions of one dimensional wave and heat equations.	Apply
CO4	Implement Fourier transforms in engineering field .	Apply
CO5	Illustrate the Z-transforms and difference equations.	Apply
CO6	Develop mathematical techniques to solve the boundary value problems.	Apply

Course Contents:

Module – I	PARTIAL DIFFERENTIAL EQUATIONS	9

Solution of standard types of first order non-linear partial differential equations: (i) $f(p,q)=0$, (ii) Clairaut's type - Lagrange's linear equation - linear partial differential equations of second order with constant coefficients of homogeneous equations.

Module – II	FOURIER ANALYSIS	9

Dirichlet's Conditions - Fourier series for periodic functions - Expansion of periodic functions with period $(0, 2\pi)$ and period $(-\pi, \pi)$ – Half Range Series - Root mean square value - Parseval's identity – Harmonic Analysis.

Module – III	FOURIER TRANSFORMS	9

Statement of Fourier integral theorem – Fourier transforms pair: Fourier transforms and Inverse Fourier transforms – Fourier sine transforms -Fourier cosine transforms – Transforms of simple functions – Convolution Theorem - Parseval's identity.

Module – IV	Z - TRANSFORMS AND DIFFERENCE EQUATIONS	9

Z-transforms - Properties – Inverse Z-transform: Partial fraction method and Convolution theorem - Formation of difference equations –Solution of difference equations using Z – transform.

Module – V	APPLICATIONS TO PARTIAL DIFFERENTIAL EQUATIONS	9

Classification of second order Partial differential equations – Method of separation of variables – Solutions of one dimensional wave equation – Solutions of one dimensional heat equation – Application to Boundary value problems.

Total: 45 Periods

Text Books:

1. Veerarajan. T., "Transforms and Partial Differential Equations", Tata McGraw Hill Education Pvt. Ltd., 3rd edition, 2016.
2. Grewal B.S, "Higher Engineering Mathematics", Khanna Publishers, 44th Edition, 2021.
3. Narayanan.S., Manicavachagom Pillay.T.K and Ramanaiah.G "Advanced Mathematics for Engineering Students" Vol. II & III, S.Viswanathan Publishers Pvt Ltd. 2014.

Reference Books:

1. Bali N.P and Manish Goyal, "A Text book of Engineering Mathematics", Lakshmi Publications Pvt Ltd, 9th Edition, 2017.
2. Ramana.B.V,"Higher Engineering Mathematics", Tata Mc-Graw Hill Publishing Company Limited, 4th Edition, 2017.
3. Erwin Kreyszig, "Advanced Engineering Mathematics", Wiley India Publications, 10th Edition, 2023.

Additional References:

1. https://archive.nptel.ac.in/courses/111/101/111101153
2. https://www.youtube.com/watch?v=ygOjw0_Kh8k.
3. https://archive.nptel.ac.in/courses/111/106/111106111.

Laboratory Components using MATLAB:

S.No	List of Experiments	CO Mapping	RBT
1	Solutions of Clauirat's form	1	Apply
2	Solution of second order homogeneous differential equations with constant coefficients	1	Apply
3	Fourier Series in $(0, 2\pi)$	2	Apply
4	Harmonic Analysis in Fourier Series	2	Apply

5	Fourier Transform	3	Apply
6	Inverse Fourier Transform	3	Apply
7	Z - Transform	4	Apply
8	Inverse Z - Transform	4	Apply
9	One dimensional wave equation	5	Apply
10	One dimensional heat equation	5	Apply

Total: 30 Periods

Mapping of Course Outcomes (COs) with Programme Outcomes (POs) Programme Specific Outcomes (PSOs)

COs	Pos												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2	1										2		
CO2	3	2	2										2		
CO3	3	2	1										2		
CO4	3	2	1										1		
CO5	3	3	2										2		
CO6	3	2	2										2		
	3	High				2	Medium					1	Low		

Bloom's Level	Summative Assessment						
	Continuous Assessment						Final Examination (Theory) [50]
	Theory			Practical			
	IAE I (5)	IAE II (10)	IAE III (10)	Attendance [5]	Rubric based [10]	Model Exam [10]	
Remember	10	10	10				10
Understand	10	10	10		40	40	30
Apply	30	30	30		60	60	60
Analyze							
Evaluate							
Create							

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23UH001	UNIVERSAL HUMAN VALUES	L	T	P	C
	(Common to all B.E. / B.Tech Programme)	3	0	0	3
Nature of Course	Humanities and Sciences				
Pre requisites	Nil				

Course Objectives

The course is intended to

1. Encourage respect for the inherent dignity and worth of all individuals, regardless of differences in race, ethnicity, gender, religion, or socioeconomic status.
2. Cultivate empathy and compassion towards others, promoting understanding and solidarity across diverse communities.
3. Promote peaceful coexistence and harmony among individuals and communities.
4. Foster a sense of responsibility towards the environment and future generations, promoting sustainable practices and conservation efforts.
5. Hold and celebrate cultural diversity, recognizing the richness and value of different traditions, languages, and perspectives.
6. Contribute to the realization of universal human values and create a more just, compassionate, and sustainable world.

Course Outcomes

On successful completion of the course the students will be able to

CO.No	Course Outcome	Bloom's Level
CO 1	Embrace values such as empathy, tolerance, and respect can lead to decreased conflict and violence, both at interpersonal and societal levels.	Understand
CO 2	Support values like equality, justice, and human rights can lead to more equitable societies, where everyone has access to opportunities and resources	Understand
CO 3	Emphasize values such as empathy, compassion, and honesty fosters healthier and more meaningful relationships among individuals and groups.	Apply
CO 4	Grasp values of environmental stewardship and responsibility contributes to sustainable development practices that preserve natural resources.	Apply
CO 5	Celebrate cultural diversity and promoting values of inclusivity and acceptance enriches societies by fostering creativity, innovation, and mutual understanding	Understand
CO 6	Create a world that is more just, compassionate, and sustainable for all.	Apply

Course Contents

Module – I	NEED, BASIC GUIDELINES, CONTENT AND PROCESS FOR VALUE EDUCATION	9

Purpose and motivation for the course, recapitulation from Universal Human Values-I - Self-Exploration – what is it? – Its content and process; 'Natural Acceptance' and Experiential Validation- as the process for self-exploration – Continuous Happiness and Prosperity-A look at basic Human Aspirations - Right understanding, Relationship and Physical Facility - the basic requirements for fulfilment of aspirations of every human being with their correct priority – Understanding Happiness and Prosperity correctly -

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A critical appraisal of the current scenario – Method to fulfil the above human aspirations: understanding and living in harmony at various levels.

Module – II	UNDERSTANDING HARMONY IN THE HUMAN BEING - HARMONY IN MYSELF!	9

Understanding human being as a co-existence of the sentient 'I' and the material 'Body' – Understanding the needs of Self ('I') and 'Body'- happiness and physical facility – Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer) – Understanding the characteristics and activities of 'I' and harmony in 'I' – Understanding the harmony of I with the Body : Sanyam and Health; correct appraisal of Physical needs, meaning of Prosperity in detail Programs to ensure Sanyam and Health.

Module – III	UNDERSTANDING HARMONY IN THE FAMILY AND SOCIETY-HARMONY IN HUMAN- HUMAN RELATIONSHIP	9

Understanding values in human - human relationship; meaning of Justice (nine universal values in relationships) and program for its fulfilment to ensure mutual happiness; Trust and Respect as the foundational values of relationship – Understanding the meaning of Trust; Difference between intention and competence - Understanding the meaning of Respect, Difference between respect and differentiation; the other salient values in relationship – Understanding the harmony in the society (society being an extension of family): Resolution, Prosperity, fearlessness (trust) and co-existence as comprehensive Human Goals – Visualizing a universal harmonious order in society-Undivided Society, Universal Order- from family to world family.

Module – IV	UNDERSTANDING HARMONY IN THE NATURE AND EXISTENCE-WHOLE EXISTENCE AS COEXISTENCE	9

Understanding the harmony in the Nature – Interconnectedness and mutual fulfilment among the four orders of nature- recyclability and self regulation in nature – Understanding Existence as Co-existence of mutually interacting units in all- pervasive space Holistic perception of harmony at all levels of existence.

Module – V	IMPLICATIONS OF THE ABOVE HOLISTIC UNDERSTANDING OF HARMONY ON PROFESSIONAL ETHICS	9

Natural acceptance of human values – Definitiveness of Ethical Human Conduct – Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order - Competence in professional ethics – Case studies of typical holistic technologies, management models and production systems – Strategy for transition from the present state to Universal Human Order: a. At the level of individual: as socially and ecologically responsible engineers, technologists and managers b. At the level of society: as mutually enriching institutions and organizations

Total : 45 Periods

Text Books
1. Premvir Kapoor, Professional Ethics and Human Values, Khanna Book Publishing, New Delhi, 2022.
2. R R Gaur, R Asthana, G P Bagaria, 2019 (2nd Revised Edition), A Foundation Course in Human Values and Professional Ethics. ISBN 978-93-87034-47-1, Excel Books, New Delhi.
3. A N Tripathy, Human Values, New Age International Publishers, 2003.

Reference Books
1. Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak, 1999.
2. Subhas Palekar, 2000, How to practice Natural Farming, Pracheen (Vaidik) Krishi Tantra Shodh, Amravati.
3. Human Values, A. N. Tripathi, New Age Intl.Publishers, NewDelhi, 2004.

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Web References

1. https://www.studocu.com/in/document/i-k-gujral-punjab-technical-university/universal-human-values/uhv-complete-notes/46743542.
2. https://www.youtube.com/watch?v=NhFBzn5qKIM&list=PLWDeKF97v9SO8vvjC1Kyqte ziTbTjN1So
3. https://www.youtube.com/watch?v=Ff0LUTOCuLE&list=PLWDeKF97v9SO8vvjC1Kyqte ziTbTjN1So&index=16

Mapping of Course Outcomes (COs) with Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)

COs	Pos												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO 1									1	2	1		1	
CO 2									1	2	1		1	
CO 3									1	2	1		1	
CO 4									1	2	1		1	
CO 5									1	2	1		1	
	3-High				2-Medium				1-Low					

Formative assessment

Bloom's Level	Continuous Assessment (IAE)		Total marks
	Assessment component	Marks	
Remember	Online Quiz	5	
Understand	Tutorial class/Assignment	5	15
	Attendance	5	

Summative assessment

Bloom's Level	Continuous Assessment (IAE) Theory Marks			Final Examination [60 marks]
	IAE-I [5]	IAE-II [10]	IAE-III [10]	
Remember	20	10	10	10
Understand	30	20	20	20
Apply		20	20	20
Analyse				
Evaluate				
Create				

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23CE301	Mechanics of Solids I	L	T	P	C
		3	0	0	3

Nature of Course	Engineering Science
Pre requisites	Engineering Mechanics

Course Objectives:

The course is intended to

1. Learn the fundamental concepts of Stress, Strain and deformation of solids.
2. Know the mechanism of load transfer in beams.
3. Study the beam for determining slope and deflection of beams.
4. Understand the effect of torsion on shafts and springs.
5. Gain knowledge on the analysis of trusses.

Course Outcomes:

On successful completion of the course, students will be able to

CO. No.	Course Outcome	Bloom's Level
CO1	Explain the concepts of stress and strain, principal stresses and principal planes.	Understand
CO2	Determine Shear force and bending moment in simply supported beams and Cantilever Beams.	Apply
CO3	Assess the shear force and bending moment in over hanging beams	Apply
CO4	Calculate the slope and deflection of beams by various methods.	Apply
CO5	Apply theory of torsion in analysis of circular shafts and helical springs.	Apply
CO6	Analyze plane trusses.	Analyze

Module - I   Stress, Strain and Deformation of Solids   9

Simple Stresses and strains – Elastic constants - Relationship between elastic constants – Stress Strain Diagram – Ultimate Stress – Yield Stress – Deformation of axially loaded member - Composite Bars - Thermal Stresses.

Module - II   Shear Force and Bending Moment   9

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

Module - III   Deflection of Beams   9

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

Module - IV   Torsion   **9**

Theory of Torsion – Assumption and derivation of tensional equation - Stresses and Deformations in Solid and Hollow Circular Shafts – combined bending moment and torsion of shafts - Power transmitted to shaft – Shaft in series and parallel – Closed and Open Coiled helical springs - Leaf Springs – Disc springs – springs in series and parallel.

Module - V   Analysis of Trusses   **9**

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

Total: 45 Periods

Text Book:

1   Rajput.R.K. "Strength of Materials", S.Chand and Co, New Delhi, 2015.

2   Punmia.B.C., Ashok Kumar Jain and Arun Kumar Jain, SMTS –I Strength of materials, Laxmi publications. New Delhi, 2018

Reference Books:

1   Singh. D.K., "Strength of Materials", Ane Books Pvt. Ltd., New Delhi, 2016.

2   Bansal. R.K. "Strength of Materials", Laxmi Publications Pvt. Ltd., New Delhi, 2010

3   Gambhir. M.L., "Fundamentals of Solid Mechanics", PHI Learning Private Limited., New Delhi, 2009.

Additional References:

1   https://nptel.ac.in/courses/105/106/105106116/

2   https://nptel.ac.in/courses/112/102/112102284/

Mapping of Course Outcomes (COs) with Programme Outcomes (POs) Programme Specific Outcomes (PSOs)														
COs	**POs**												**PSOs**	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**
CO1	3	3	3									3	3	
CO2	3	3	3									3	3	
CO3	3	3	3									3	3	
CO4	3	3	3									3	3	
CO5	3	3	3									3	3	
CO6	3	3	3									3	3	
3 High					**2** Medium							**1** Low		

Formative assessment			
Bloom's Level	**Assessment Component**	**Marks**	**Total marks**
Remember	Classroom or Online Quiz	5	
Understand	Class Presentation/Power point presentation	5	15
	Attendance	5	

Summative Assessment				
Bloom's category	Continuous Assessment Tests			Final Examination (60)
	IAE 1 - (5)	IAE 2 - (10)	IAE 3 - (10)	
Remember	10	10	10	20
Understand	10	10	10	20
Apply	15	15	15	30
Analyse	15	15	15	30
Evaluate				
Create				

23CE302	Fluid Mechanics	L	T	P	C
		3	0	0	3

Nature of Course	Engineering Science
Pre requisites	Fundamentals of basic science

Course Objectives:

The course is intended to

1 Gain fundamental knowledge of fluids, its properties and behavior under various conditions.

2 Understand the concepts of Fluid statics, Buoyancy and floatation.

3 Impart knowledge on Fluid Kinematics and Dynamics.

4 Acquire knowledge about dimensional analysis and model studies.

5 Become knowledgeable on boundary layer flows.

Course Outcomes:

On successful completion of the course, students will be able to

CO. No.	Course Outcome	Bloom's Level
CO1	Demonstrate Fluid Properties, fluid pressure and its measurement.	Understand
CO2	Summarize the centre of pressure, buoyancy and meta centre.	Understand
CO3	Illustrate the types of flow in fluid kinematics.	Understand
CO4	Interpret the equation of motion in fluid dynamics.	Apply
CO5	Implement Rayleigh's method and Buckingham Pi theorem in dimensional analysis.	Apply
CO6	Compare laminar and turbulent boundary layer.	Understand

Module - I   Properties, Fluid pressure and its measurement   9

Dimensions and units - Fluid properties – Types of fluid – Hydrostatic law; Pascal's law – Atomspheric, Absolute, Gauge and Vacuum pressures – Measurement of pressure by various types of manometers and mechanical gauges.

Module - II   Fluid Statics, Buoyancy and Floatation   9

Total pressure on plane and curved surfaces - Centre of pressure for vertical and inclined, plane surfaces - Buoyancy and Meta centre - Determination of Meta centric height – Analytical and experimental methods - Conditions of equilibrium of submerged and floating bodies.

Module - III   Fluid Kinematics and Dynamics   9

Fluid Kinematics – Classification and types of flow - velocity field and acceleration - continuity equation (one and three dimensional differential forms)- stream line-streak line-path line- stream function - velocity potential function - flow net. Fluid dynamics - equations of motion -Euler's equation along a streamline - Bernoulli's equation – applications - venturimeter, orifice meter and Pitot tube- linear momentum equation and its application to pipe bend.

Module - IV   Dimensional Analysis and Model Studies   **9**

Fundamental dimensions - dimensional homogeneity - Rayleigh's method and Buckingham Pi- theorem · dimensionless parameters - similitude's and model studies - distorted models.

Module - V   Boundary Layer   **9**

Boundary layer – definition- boundary layer on a flat plate – laminar and turbulent boundary layer- displacement, energy and momentum thickness – Momentum integral equation-Boundary layer separation and control – drag on flat plate.

Total: 45 Periods

Text Book:

1   Jain.A.K.., "Fluid Mechanics" (Including Hydraulic Machines), Khanna Publishers, Twelfth Edition, 2016.
2   Rajput.R.K. "Fluid Mechanics and Hydraulics Machines", S.Chand and Co, New Delhi, 2016.

Reference Books:

1   Streeter, V.L., and Wylie, E.B., "Fluid Mechanics", McGraw Hill, 2004.

2   Modi P.N and Seth "Hydraulics and Fluid Mechanics including Hydraulic Machines", Standard Book House New Delhi, 2014.
3   Bansal.R.K., "Fluid Mechanics and Hydraulic Machines", Laxmi Publications Pvt. Ltd., New Delhi, 2013.

Additional References:

1   https://nptel.ac.in/courses/112/104/112104118/

2   https://nptel.ac.in/courses/105/103/105103192/

COs	\multicolumn{12}{c}{POs}	PSOs	
---	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	3	2	3								3		2
CO2	3	3	2	3								3		2
CO3	3	3	2	3								3		2
CO4	3	3	2	3								3		2
CO5	3	3	2	3								3		2
CO6	3	3	2	3								3		2

Mapping of Course Outcomes (COs) with Programme Outcomes (POs) Programme Specific Outcomes (PSOs)

3 High   2 Medium   1 Low

Formative assessment

Bloom's Level	Assessment Component	Marks	Total marks
Remember	Classroom or Online Quiz	5	
Understand	Class Presentation/Power point presentation	5	15
	Attendance	5	

Bloom's category	Summative Assessment			
	Continuous Assessment Tests			Final Examination (60)
	IAE 1 - (5)	IAE 2 - (10)	IAE 3 - (10)	
Remember	10	10	10	20
Understand	10	10	10	20
Apply	30	30	30	60
Analyse				
Evaluate				
Create				

23CE303	Surveying I	L	T	P	C
		3	0	2	4

Nature of Course	Professional core
Pre requisites	Basics of Mathematics

Course Objectives:

The course is intended to

1 Gain knowledge on the relative position of any objects or points of the earth.

2 Impart knowledge on measurement of the distance and angle between different objects.

3 Acquire knowledge on preparing a plan to represent an area on a horizontal plan.

4 Familiarize on various applications of leveling in the construction field.

5 Gain knowledge on Theodolite Surveying and its field applications.

Course Outcomes:

On successful completion of the course, students will be able to

CO. No.	Course Outcome	Bloom's Level
CO1	Implement the use of various surveying instruments and mapping.	Apply
CO2	Sketch the traverse by compass surveying.	Apply
CO3	Describe the height of instrument method in leveling.	Understand
CO4	Illustrate the rise and fall method in levelling.	Understand
CO5	Interpret the leveling application in various construction field works.	Apply
CO6	Identify the applications of theodolite surveying in construction site work.	Understand

Module - I   Fundamentals and Chain Surveying   **9**

Definition - Classifications - Basic principles - Equipment and accessories for ranging and chaining – Methods of ranging - Well conditioned triangles – Errors in linear measurement and their corrections - Obstacles - Traversing – Plotting – Laser instruments – Applications.

Module - II   Compass Surveying   **9**

Compass – Basic principles – Types - Bearing – Systems and conversions – Sources of errors
- Local attraction – Magnetic declination – Dip - Traversing – Plotting - Adjustment of closing error - applications.

Module - III   Levelling   **9**

Level line - Horizontal line - Datum - Bench marks - Levels and staves - temporary and permanent adjustments – Methods of leveling – Fly leveling – Check leveling – Procedure in leveling – Booking – Reduction – Curvature and refraction – Reciprocal leveling – Sources of Errors in leveling – Precise leveling – Types of instruments – Adjustments – Field procedure – Auto level and applications.

Module - IV   Levelling Applications   **9**

Longitudinal and Cross section – Plotting – Contouring – Methods – Characteristics and uses of contours – Plotting – Methods of interpolating contours – Computations of cross sectional areas and volumes – Earth work calculations – Capacity of reservoirs - Mass haul diagrams.

Module - V   Theodolite Surveying   **9**

Theodolite – Types – Description – Horizontal and vertical angles –Temporary and permanent adjustments – Heights and distances – Tangential and Stadia Tacheometry – Subtense method – Stadia constants – Anallactic lens.

                                                                                       Total: 45 Periods

Course Content:

S. No.	Name of the Experiment	CO Mapping	RBT
1	Study of chains and its accessories	CO1	Understand
2	Aligning, Ranging and Chaining	CO1	Apply
3	Chain Traversing	CO1	Apply
4	Compass Traversing	CO2	Apply
5	Study of levels and leveling staff	CO3	Understand
6	Fly leveling using Dumpy level	CO3	Apply
7	Check leveling	CO3	Apply
8	LS and CS	CO4	Apply
9	Contouring	CO5	Apply
10	Study of Theodolite	CO6	Understand

                                                                                       Total: 30 Periods

Text Book:
1 Punmia.B.C., Ashok K Jain and Arun K Jain , Surveying Vol. I & II, Lakshmi Publications Pvt Ltd, New Delhi, 2022
2 Bannister and S. Raymond, "Surveying", 9 th Edition, Longman 2021.

Reference Books:
1 James M. Anderson and Edward M. Mikhail, "Surveying, Theory and Practice", 7th Edition, McGraw Hill, 2021.
2 Arora K R. "Surveying Vol I & II", Standard Book house, 10th Edition 2023 standard book house Publication.

Additional References:
1 https://nptel.ac.in/courses/105/107/105107122/
2 https://nptel.ac.in/courses/105/104/105104101/

CHAIRMAN - BOARD OF STUDIES

Passed in Board of Studies Meeting   *Approved in Academic Council Meeting*

Mapping of Course Outcomes (COs) with Programme Outcomes (POs) Programme Specific Outcomes (PSOs)														
COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	3	3	3	3				3			3	3	2
CO2	3	3	3	3	3				3			3	3	2
CO3	3	3	3	3	3				3			3	3	2
CO4	3	3	3	3	3				3			3	3	2
CO5	3	3	3	3	3				3			3	3	2
CO6	3	3	3	3	3				3			3	3	2
3 High					2 Medium					1 Low				

Summative Assessment						
Bloom's category	Continuous Assessment Tests					Final Examination (50)
	Theory				Practical	
	IAE 1 - (5)	IAE 2 - (10)	IAE 3 - (10)	Attendance (5)	Rubric Based CIA (20)	
Remember	10	10	10		10	20
Understand	10	10	10		20	40
Apply	30	30	30		20	40
Analyse						
Evaluate						
Create						

CHAIRMAN - BOARD OF STUDIES

Passed in Board of Studies Meeting   *Approved in Academic Council Meeting*

23CE304	Construction Materials and Technology	L	T	P	C
		3	0	0	3

Nature of Course	Professional core
Pre requisites	Engineering Geology

Course Objectives:

The course is intended to

1. Understand basic concepts of Masonry materials.
2. Impart knowledge on mortar and aggregates.
3. Gain knowledge on the properties of ingredients of concrete.
4. Familiarize on timber and surface finishing materials.
5. Highlight the modern materials and application in construction.

Course Outcomes:

On successful completion of the course, students will be able to

CO. No.	Course Outcome	Bloom's Level
CO1	Implement the masonry materials for construction based on the properties of stones and bricks.	Apply
CO2	Interpret a suitable binder either lime or cement for mortar and utilize aggregates complying with test standards.	Apply
CO3	Recognize the quality of concrete based on the properties of fresh and hardened concrete.	Understand
CO4	Utilize various forms of timber, wood products and metals in construction.	Analyze
CO5	Select suitable surface finishing materials in construction.	Analyze
CO6	Identify modern construction materials for advanced construction.	Understand

Module - I   Stones–Bricks   9

Stone as building material – Criteria for selection – Tests on stones – Deterioration and Preservation of stone work - Types of stone masonry – Bricks – Classification – Manufacturing of clay bricks – Tests on bricks – Types of Brick masonry – Bricks for special use – Refractory bricks – Fly ash brick - Hollow bricks – Interlocking bricks.

Module - II   Lime–Cement-Mortar-– Aggregates   9

Lime – Lime mortar – Cement–Ingredients – Manufacturing process –Types and Grades – Properties of cement and Cement mortar – Hydration – Tests on cement – Aggregates – Properties - Types & Tests on fine and coarse aggregates.

Module - III   Concrete   9

Concrete – Ingredients – W/C Ratio – Admixtures – PCC – RCC - Grades – Manufacturing Process – Batching plants– Types of mixing –Types of transporting concrete - Types of compaction, Methods of curing, Ready Mix Concrete - Concrete blocks – Light weight concrete blocks.

Module - IV   Timber and Other Materials   9

Timber – Market forms – Industrial timber– Plywood – Veneer – Ever wood – Thermacole – Panels of laminates – Steel – Aluminum and Other Metallic Materials – Composition – Aluminium composite panel – Uses Marketforms – Mechanical treatment – Paints – Varnishes – Distempers – Bitumens.

Module - V   Modern Materials   9

Glass – Ceramics– Sealants for joints – UPVC - Fibre glass reinforced plastic– Ever wood WPC Clay products – Refractories – Composite materials –Types – Applications of laminar composites – Fibretextiles.

Total: 45 Periods

Course Content:

S. No.	Name of the Experiment	CO Mapping	RBT
1	**Test on Bricks and Blocks:** i) Determination of compressive strength of bricks and blocks. ii) Determination water absorption of bricks and blocks. iii) Determination of Efflorescence of bricks.	CO1	Apply
2	**Test on Fine Aggregate:** i) Sieve analysis of fine aggregate. ii) Determination of specific gravity and bulk density. iii) Determination of Bulking of sand.	CO2	Apply
3	**Test on Coarse Aggregate:** i) Determination of impact value ii) Determination of elongation index iii) Determination of flakiness index iv) Determination of aggregate crushing value	CO2	Apply
4	**Test on Fresh Concrete:** i) Determination of workability by conducting slump test ii) Determination of workability by conducting compaction factor test iii) Determination of workability by conducting flow test iv) Determination of workability by conducting Vee-Bee consistency test.	CO3	Apply
5	**Test on Hardened Concrete:** i) Determination of compressive strength of cube and cylinder ii) Determination of flexural strength	CO4	Apply
6	**Study on timber and other materials:** i)Study on properties by using models of various types of wood, plywood, veneer, thermacole ii) Study on properties by using models of various types of steel, aluminum, copper, brass	CO5	Apply
7	**Study on Modern materials:** Study on properties by using models of ceramic tiles, clay tiles	CO6	Apply

Total: 30 Periods

Text Book:

1   Shetty.M.S., "Concrete Technology (Theory and Practice)", S. Chand and Company Ltd., 2018.

2   Duggal.S.K., "Building Materials", 4th Edition, New Age International, 2019.

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Reference Books:

1   Jagadish.K.S, "Alternative Building Materials Technology", New Age International, 2017.
2   Gambhir. M.L., & Neha Jamwal., "Building Materials, products, properties and systems", Tata McGraw Hill Educations Pvt. Ltd, New Delhi, 2017.
3   IS383–1970: Indian Standard specification for coarse and fine aggregate from natural Sources for concrete, 2011

Additional References:

1   IS456 – 2000: Indian Standard specification for plain and reinforced concrete, 2011.
2   IS4926–2003 : Indian Standard specification for ready–mixed concrete, 2012.
3   IS1542–1992: Indian standard specification for sand for plaster, 2009.
4   https://nptel.ac.in/courses/105/106/105106053/
5   https://nptel.ac.in/courses/105/102/105102088/

<table>
<tr><td colspan="15">Mapping of Course Outcomes (COs) with Programme Outcomes (POs) Programme Specific Outcomes (PSOs)</td></tr>
<tr><td rowspan="2">COs</td><td colspan="12">POs</td><td colspan="2">PSOs</td></tr>
<tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td><td>10</td><td>11</td><td>12</td><td>1</td><td>2</td></tr>
<tr><td>CO1</td><td>3</td><td>3</td><td>3</td><td></td><td>3</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>2</td></tr>
<tr><td>CO2</td><td>3</td><td>3</td><td>3</td><td></td><td>3</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>2</td></tr>
<tr><td>CO3</td><td>3</td><td>3</td><td>3</td><td></td><td>3</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>2</td></tr>
<tr><td>CO4</td><td>3</td><td>3</td><td>3</td><td></td><td>3</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>2</td></tr>
<tr><td>CO5</td><td>3</td><td>3</td><td>3</td><td></td><td>3</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>2</td></tr>
<tr><td>CO6</td><td>3</td><td>3</td><td>3</td><td></td><td>3</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>2</td></tr>
<tr><td colspan="5">3 High</td><td colspan="5">2 Medium</td><td colspan="5">1 Low</td></tr>
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<table>
<tr><td colspan="7">Summative Assessment</td></tr>
<tr><td rowspan="3">Bloom's category</td><td colspan="5">Continuous Assessment Tests</td><td rowspan="3">Final Examination (50)</td></tr>
<tr><td colspan="4">Theory</td><td>Practical</td></tr>
<tr><td>IAE 1 - (5)</td><td>IAE 2 - (10)</td><td>IAE 3 - (10)</td><td>Attendance (5)</td><td>Rubric Based CIA (20)</td></tr>
<tr><td>Remember</td><td>10</td><td>10</td><td>10</td><td></td><td>10</td><td>20</td></tr>
<tr><td>Understand</td><td>10</td><td>10</td><td>10</td><td></td><td>20</td><td>40</td></tr>
<tr><td>Apply</td><td>30</td><td>30</td><td>30</td><td></td><td>20</td><td>40</td></tr>
<tr><td>Analyse</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Evaluate</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Create</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
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23MC003	INTERPERSONAL SKILLS (Common to all B.E. / B.Tech Programme)	L	T	P	C
		0	0	2	0
Nature of Course	Mandatory – Non Credit				
Pre requisites	Nil				

Course Objectives

The course is intended to

1. Evaluate current relationships and their communication style.
2. Identify ways for improving important relationships.
3. Explore how the Bible correlates with principles from the chapter.
4. Describe how the communication processes impacts our ability to effectively communicate.
5. Identify challenges that may arise from interpersonal communication.

Course Outcomes

On successful completion of the course the students will be able to

CO.No	Course Outcome	Bloom's Level
CO 1	Practice interpersonal communication skills to influence and build good relationships.	Remember
CO 2	Identify and pursue personal learning goals.	Understand
CO 3	Give evident feedback.	Apply
CO 4	Reveal group dynamics and amiable behaviour.	Apply
CO 5	Emphasis the communication process.	Understand

Course Contents

Module – I	FUNDAMENTALS OF INTERPERSONAL COMMUICATION	6
Facts of communication and Interpersonal communication - culture and gender - Communication and Self disclosure - Presentation of Interpersonal perception - Learning goals - Feeling and feedback.		
Module – II	INTERPERSONAL COMMUNICATION IN ACTION	6
Nature of language - language and culture - usage and abuse of language -Positive communication -Non verbal communication - Listening strategies - Barriers of listening.		
Module – III	EMOTIONAL INTELLIGENCE	6
Influence of emotional experience and expressions - Accepting the responsibilities and changes - Negotiation tactics - Dealing with criticism and appreciation - Collaborative Problem Solving - Resilience Building.		
Module – IV	TRANSACTIONS	6
Different types of transactions - Building Positive Relationship - Managing Conflict - Connecting across Difference -Factors hampering Interpersonal interactions - Assertiveness in communication.		

Module – V	ESSENTIAL INTERPERSONAL COMPETENCIES	6
	Behaviour - understanding limiting behaviour - Interpersonal and small and lateral thinking-Win -Win attitude - Positive thinking - Stress feedback - Personal Evaluation of Interpersonal Relationship Skills group behavior - Critical management - Assertive	

Total : 30 Periods

Text Books

1. Bozeman, Jeanine C and Argile Smith, "Interpersonal Relationship Skills for Ministers" Gretna, LA: Pelican Publishing Company, 1st Edition, 2004.
2. Floyd, Kory, "Interpersonal Communication", 2d. Boston: Mccraw-Hill, 2nd Edition, 2011.

Reference Books

1. Augsburger, David, "Caring Enough to Confront How to Understand and Express Your Deepest Feelings Towards Others", updated ed Ventura, CA: Regal Books, 2nd Edition 2009.

2. Vohs, Kathleen D., and Eli J., Finkel, eds, "Self and Relationships: Connecting Intrapersonal and interpersonal Processes". New York Guilford Press, 1st Edition, 2006.

Web References:

1. https://nptel.ac.in/courses/111104031
2. https://nptel.ac.in/courses/111106139
3. https://nptel.ac.in/courses/111105134

Laboratory Components:

S.No	List of Experiments	CO Mapping	RBT
1	Presentation of Interpersonal perception	1	Remember
2	Non-Verbal Communication	2	Understand
3	Negotiation tactics	3	Apply
4	Managing Conflict	4	Apply
5	Stress Management	5	Understand

Mapping of Course Outcomes (COs) with Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO 1										3	2	1	2	
CO 2										3	2	1	2	
CO 3										3	2	1	2	
CO 4										3	2	1	2	
CO 5										3	2	1	2	
	3-High			2-Medium			1-Low							

Bloom's Level	Summative Assessment (Internal Mode)	
	Assessment 1 (50 Marks)	Assessment 2 (50 Marks)
Remember	20	20
Understand	10	10
Apply	20	20
Analyse		
Evaluate		
Create		

23MA402	STATISTICAL AND NUMERICAL METHODS	L	T	P	C
	(Common to Aero, Agri, Civil, Food, Mech, PCT & S&F)	3	0	2	4

Nature of Course	Basic Sciences
Pre requisites	Foundations of Mathematics

Course Objectives

The course is intended to

1. Acquaint with the knowledge of testing of hypothesis for small and large samples
2. Familiarize with the basic concept on types of design of experiments used in the field of engineering
3. Introduce the basic concepts of algebraic and transcendental equations.
4. Acquire the concept of numerical techniques of differentiation and integration.
5. Study the numerical techniques in solving ordinary differential equations.
6. Equip student with the ability to analyze data and solve mathematical problems using Statistical techniques and numerical algorithm.

Course Outcomes

On successful completion of the course, students will be able to

CO1	Interpret the testing of hypothesis for small and large samples.	Apply
CO2	Explain the basic concepts of classifications of design of experiments in the field of engineering.	Apply
CO3	Demonstrate the algebraic and transcendental equations.	Apply
CO4	Apply the numerical techniques of interpolation and error approximations in various intervals in real life situations.	Apply
CO5	Execute the numerical techniques for solving first and second order ordinary differential equations.	Apply
CO6	Create new statistical techniques and numerical algorithms for data analysis and problem solving.	Apply

Course Contents:

Module – I	TESTING OF HYPOTHESIS	9

Sampling distributions – Estimation of parameters – Statistical hypothesis – Large sample tests based on Normal distribution for single mean and difference of means - Tests based on t for single mean and difference of means, Chi-square - Contingency table (test for independent) -Goodness of fit.

Module – II	DESIGN OF EXPERIMENTS	9

One way and two way classifications – completely randomized design – Randomized block design – Latin square design.

Module – III	SOLUTION OF EQUATIONS AND EIGEN VALUE PROBLEMS	9

Solution of linear system of equations – Gauss elimination method – Gauss Jordan method - Iterative methods of Gauss Jacobi method and Gauss Seidel method– Eigen values of a matrix by Power method

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Module – IV	INTERPOLATION AND NUMERICAL INTEGRATION	9
Lagrange's interpolations - Newton's divided difference interpolations – Newton's forward difference and backward difference formulae – Numerical integration using Trapezoidal and Simpson's 1/3 rules.		
Module – V	NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS	9
Single step methods: Euler's method – Modified Euler's method – Fourth order Runge-Kutta method for solving first order equations – Multi step methods: Milne's predictor corrector methods for solving first order equations.		

Total: 60 Periods

Text Books:

1. Gupta S.C and Kapoor V.K., Fundamentals of Mathematical Statistics", Sultan chand & sons, New Delhi, 12th Edition, 2020
2. Grewal B.S, and Grewal J.S " Numerical methods in engineering and science "Khanna Publishers, 10th Edition, 2015.
3. Johnson, R.A., Miller, I and Freund J., "Miller and Freund's Probability and Statistics for Engineers", Pearson Education, Asia, 8th Edition, 2015.

Reference Books:

1. Sankara Rao. K., "Numerical Methods for Scientists and Engineers", Prentice Hall of India Pvt. Ltd, New Delhi, 3rd Edition, 2017
2. Burden, R.L and Faires, J.D, "Numerical Analysis", Cengage Learning, 9th Edition, 2016.
3. Walpole. R.E., Myers. R.H., Myers. S.L. and Ye. K., "Probability and Statistics for Engineers and Scientists", Pearson Education, 8th Edition, 2016.

Additional References:

1. https://pvpsitrealm.blogspot.com/2016/09/higher-engineering-mathematics-by-bs.html
2. https://reference.wolfram.com/language/tutorial/Numerical methods.html
3. https://www.researchgate.net/publication/349657530_Statistics_and_Numerical_Methods

Laboratory Components using MATLAB:

S.No	List of Experiments	CO Mapping	RBT
1	Student's t - test	1	Apply
2	Chi – Square test	1	Apply
3	One way classification	2	Apply
4	Two way classification	2	Apply
5	Gauss Elimination Method	3	Apply
6	Gauss Seidel Method	3	Apply

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7	Lagrange's Interpolation Formula	4	Apply
8	Simpson's 1/3 rd rule	4	Apply
9	Euler's Method	5	Apply
10	Runge – Kutta Method	5	Apply

Total: 30 Periods

Mapping of Course Outcomes (COs) with Programme Outcomes (POs) Programme Specific Outcomes (PSOs)

COs	Pos												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	2	-	-	-	-	-	-	-	-	-	2		
CO2	3	2	2	-	-	-	-	-	-	-	-	-	2		
CO3	3	3	1	-	-	-	-	-	-	-	-	-	1		
CO4	2	2	2	-	-	-	-	-	-	-	-	-	2		
CO5	3	3	2	-	-	-	-	-	-	-	-	-	2		.
CO6	3	2	3	-	-	-	-	-	-	-	-	-	2		
	3	High			2		Medium			1	Low				

Bloom's Level	Summative Assessment						
	Continuous Assessment						Final Examination (Theory) [50]
	Theory			Practical			
	IAE I (5)	IAE II (10)	IAE III (10)	Attendance [5]	Rubric based [10]	Model Exam [10]	
Remember	10	10	10				10
Understand	10	10	10		40	40	30
Apply	30	30	30		60	60	60
Analyze							
Evaluate							
Create							

CHAIRMAN-BOARD OF STUDIES

23CE401	Concrete Technology	L	T	P	C
		3	0	0	3

Nature of Course	Professional core
Pre requisites	Knowledge on ingredients of concrete

Course Objectives:

The course is intended to

1 Understand basic properties on constituent materials of concrete.

2 Impart knowledge on chemical and mineral admixtures.

3 Gain knowledge on the mix proportioning of concrete.

4 Understand the properties and tests on fresh and hardened concrete.

5 Be aware of the various special concrete and its applications.

Course Outcomes:

On successful completion of the course, students will be able to

CO. No.	Course Outcome	Bloom's Level
CO1	Interpret the properties of Fresh and Hardened Concrete.	Apply
CO2	Recognize the effect of chemical admixtures on properties of concrete.	Understand
CO3	Implement the concept and procedure of mix design as per IS guidelines.	Apply
CO4	Select the various special concretes with respect to its performance and wide applications in modern construction.	Understand
CO5	Assess the strength of concrete by conducting Non Destructive tests.	Apply
CO6	Illustrate the durability aspects of concrete.	Understand

Module - I   Fresh and Hardened Properties of Concrete   9

Workability – Tests for workability of concrete – Segregation and Bleeding – Determination of strength Properties of Hardened concrete – Compressive strength – Split tensile strength – Flexural strength – Stress – strain curve for concrete – Modulus of elasticity.

Module - II   Chemical and Mineral Admixtures   9

Accelerators – Retarders – Plasticizers – Super plasticizers – Water proofers – Mineral Admixtures like Fly Ash, Silica Fume, Ground Granulated Blast Furnace Slag and Metakaoline – Effects on concrete properties.

Module - 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.

Module - IV   Special Concretes   **9**

Light weight concretes – foam concrete – self compacting concrete – vacuum concrete – High strength concrete – Fiber reinforced concrete – Ferro cement – Ready mix concrete – SIFCON – Shotcrete – Polymer concrete – High performance concrete – Geopolymer Concrete.

Module - V   Non-Destructive Test and Durability of Concrete   **9**

Non – destructive tests: Rebound hammer-Ultra sonic pulse velocity test – Pullout test – Durability of concrete – Mechanism of corrosion – Causes and effects – Permeability of concrete – Shrinkage – Acid resistance – Chloride attack- Remedial measures.

Total: 45 Periods

Text Book:

1   Shetty M.S, "Concrete Technology", S.Chand and Company Ltd, New Delhi, 2018.

2   Gambhir, M.L; "Concrete Technology", 5th Edition, Tata McGraw Hill Publishing Co Ltd, New Delhi, 2019

Reference Books:

1   Job Thomas, "ConcreteTechnology", Cengage Learning India Pvt. Ltd., Delhi, 2019

2   IS383–1970: Indian Standard specification for coarse and fine aggregate from natural Sources for concrete, 2011

3   Kumar P Mehta., Paulo J M Monterio., "Concrete – Microstructure, Properties and Materials", Mc Graw Hill Education (India) Private Limited, New Delhi, 2022

Additional Reference Book:

1   IS456–2000: Indian Standard specification for plain and reinforced concrete, 2000

2   IS4926–2003: Indian Standard specification for ready–mixed concrete, 2003

3   IS1542-1992 : Indian standard specification for sand for plaster, 1992

4   https://nptel.ac.in/courses/105/102/105102012/

Mapping of Course Outcomes (COs) with Programme Outcomes (POs) Programme Specific Outcomes (PSOs)														
COs	**POs**												**PSOs**	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**
CO1	3	3	3	3	3									2
CO2	3	3	3	3	3									2
CO3	3	3	3	3	3									2
CO4	3	3	3	3	3									2
CO5	3	3	3	3	3									2
CO6	3	3	3	3	3									2
	3 High				**2** Medium						**1** Low			

Formative assessment			
Bloom's Level	**Assessment Component**	**Marks**	**Total marks**
Remember	Classroom or Online Quiz	5	
Understand	Class Presentation/Power point presentation	5	15
	Attendance	5	

Passed in Board of Studies Meeting   CHAIRMAN - BOARD OF STUDIES   *Approved in Academic Council Meeting*

Summative Assessment				
Bloom's category	**Continuous Assessment Tests**			**Final Examination (60)**
	IAE 1 - (5)	**IAE 2 - (10)**	**IAE 3 - (10)**	
Remember	10	10	10	20
Understand	10	10	10	20
Apply	30	30	30	60
Analyse				
Evaluate				
Create				

23CE402	Geotechnical Engineering I	L	T	P	C
		3	0	0	3

Nature of Course	Professional core
Pre requisites	Engineering Geology

Course Objectives:

The course is intended to

1. Understand basic concepts of soils and its properties.
2. Study about stress development in the soil.
3. Know about the stress distribution and settlement.
4. Recognize the necessity for shear strength of soil.
5. Evaluate the stability of slope.

Course Outcomes:

On successful completion of the course, students will be able to

CO. No.	Course Outcome	Bloom's Level
CO1	Classify the soil and assess the engineering properties based on index properties.	Apply
CO2	Analyze the stress concepts in soils.	Understand
CO3	Assess the stress distribution in soil.	Apply
CO4	Identify the settlement in soils.	Apply
CO5	Determine the shear strength of soil.	Apply
CO6	Analyze the stability of slopes.	Understand

Module - I   Soil Classification and Compaction   9

Nature of soil – phase relationships – Soil description and classification for engineering purposes – their significance – Index properties of soils – BIS Classification system; Soil compaction: Theory – comparison of laboratory and field compaction methods – Compaction – Proctor's test – Moisture – density relations-Factors influencing compaction behavior of soils.

Module - II   Effective Stress and Permeability   9

Soil – water – Static pressure in water – Effective stress concepts in soils – Capillary phenomena –Permeability – Darcy's law – Determination of Permeability – 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 – Simple problems.

Module - III   Stress Distribution and Settlement   9

Stress distribution in homogeneous and isotropic medium – Boussines of theory – (Point load, Line load and UDL) Use of Newmarks influence chart – Components of settlement – Immediate and consolidation settlement – Factors influencing settlement – Terzaghi's one dimensional consolidation theory – Computation of rate of settlement. – $\sqrt{t}$ and log t methods. E-log p relationship consolidation settlement N-C clays – O.C clays – Computation.

Module - IV   Shear Strength   9

Shear strength of cohesive and cohesionless soils – Mohr – Coulomb failure theory – shear strength - Direct shear, Tri axial compression, UCC and Vane shear tests – Pore pressure parameters – Factors influences shear strength of soil, Cyclic mobility – Liquefaction.

Module - V   Slope Stability   9

Slope failure mechanisms – Infinite slopes and finite slopes - Total stress analysis for saturated clay – Fellenius method, Friction circle method – Use of stability number —- Slope protection measures.

Total: 45 Periods

Text Book:

1   Gopal Ranjan, "Basic and Applied Soil Mechanics" New Age International, New Delhi, 2022

2   Punmia,B.C.,"Soil Mechanic sand Foundations", Laxmi Publications Pvt. Ltd. New Delhi, 16th Edition, 2017.

Reference Books:

1   Mc Carthy, D.F., "Essentials of Soil Mechanics and Foundations : Basic Geotechnics". Prentice – Hall, 2014
2   PurushothamaRaj.P.,"Soil Mechanics and Foundations Engineering", 2nd Edition, Pearson Education, 2013.
3   Venkatramaiah. C., "Geotechnical Engineering", New Age International Pvt. Ltd., New Delhi, 2018

Additional Reference Book:

1   https://nptel.ac.in/courses/105/105/105105168/

2   https://nptel.ac.in/courses/105/101/105101084/

Mapping of Course Outcomes (COs) with Programme Outcomes (POs) Programme Specific Outcomes (PSOs)														
COs	**POs**												**PSOs**	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**
CO1	3	3	3	3			2					3		2
CO2	3	3	3	3			2					3		2
CO3	3	3	3	3			2					3		2
CO4	3	3	3	3			2					3		2
CO5	3	3	3	3			2					3		2
CO6	3	3	3	3			2					3		2
	3	High			2	Medium					1	Low		

Formative assessment			
Bloom's Level	**Assessment Component**	**Marks**	**Total marks**
Remember	Classroom or Online Quiz	5	
Understand	Class Presentation/Power point presentation	5	15
	Attendance	5	

Summative Assessment				
Bloom's category	**Continuous Assessment Tests**			**Final Examination (60)**
	IAE 1 - (5)	**IAE 2 - (10)**	**IAE 3 - (10)**	
Remember	10	10	10	20
Understand	10	10	10	20
Apply	30	30	30	60
Analyse				
Evaluate				
Create				

23CE403	Mechanics of Solids II	L	T	P	C
		3	0	0	3

Nature of Course	Professional Core
Pre requisites	Knowledge on Mechanics of Solids

Course Objectives:

The course is intended to

1. Gain knowledge on energy principles.
2. Impart knowledge on analysis of indeterminate beams.
3. Understand the Euler's column theory and types of cylinders.
4. Become knowledgeable on the state of stress in three dimensions.
5. Familiarize on unsymmetrical bending of beams.

Course Outcomes:

On successful completion of the course, students will be able to

CO. No.	Course Outcome	Bloom's Level
CO1	Determine the strain energy and compute the deflection of determinate beams, frames and trusses using energy principles.	Understand
CO2	Analyze propped cantilever, fixed beams and continuous beams using theorem of three moment equation for external loadings and support settlements.	Apply
CO3	Assess the load carrying capacity of columns.	Apply
CO4	Measure stresses induced in cylindrical and Spherical shells.	Apply
CO5	Determine principal stresses and planes for an element in three dimensional state of stress and study various theories of failure	Apply
CO6	Determine the stresses due to Unsymmetrical bending of beams, locate the shear center, and find the stresses in curved beams	Analyze

Module - I   Energy Principles   9

Strain energy and strain energy density – strain energy due to axial load (gradual, sudden and impact loadings), shear, flexure and torsion – Castigliano's theorems – Maxwell's reciprocal theorem - Principle of virtual work – unit load method - Application of energy theorems for computing deflections in determinate beams, plane frames and plane trusses.

Module - II   Indeterminate Beams   9

Concept of Analysis - Propped cantilever and fixed beams - fixed end moments and reactions
– sinking and rotation of supports - Theorem of three moments – analysis of continuous beams – shear force and bending moment diagrams.

Module - III   Columns and Cylinders   9

Euler's column theory – critical load for prismatic columns with different end conditions – Effective length – limitations – Rankine - Gordon formula - Eccentrically loaded columns – middle third rule - core of a section – Thin cylindrical and spherical shells – stresses and change in dimensions - Thick cylinders – Compound cylinders – shrinking on stresses.

Module - IV   State of Stress in Three Dimensions   **9**

Stress tensor at a point – Stress invariants - Determination of principal stresses and principal planes - Volumetric strain. Theories of failure: Maximum Principal stress theory – Maximum Principal strain theory – Maximum shear stress theory – Total Strain energy theory – Maximum distortion energy theory – Application problems.

Module - V   Advanced Topics   **9**

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

Total: 45 Periods

Text Book:

1   Punmia B.C., Ashok Kumar Jain and Arun Kumar Jain"SMTS –I Strength of Materials", 12th Edition,Lakshmi publications. New Delhi,2022.

2   Rajput R.K. "Strength of Materials (Mechanics of Solids)", S.Chand & company Ltd., New Delhi, 2015.

Reference Books:

1   Punmia B.C., Ashok Kumar Jain and Arun Kumar Jain,"Theory of Structures" (SMTS) Vol - II, Laxmi Publishing Pvt Ltd, New Delhi 2021.

2   Rattan.S.S., "Strength of Materials", Tata McGraw Hill Education Pvt. Ltd., New Delhi, 2019.

3   Basavarajiah and Mahadevapa, Strength of Materials, University press, Hyderabad, 2019.

Additional Reference Book:

1   https://nptel.ac.in/courses/105/105/105105108/

2   https://nptel.ac.in/courses/112/107/112107146/

Mapping of Course Outcomes (COs) with Programme Outcomes (POs) Programme Specific Outcomes (PSOs)														
COs	**POs**												**PSOs**	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**
CO1	3	3	3	3	3								3	
CO2	3	3	3	3	3								3	
CO3	3	3	3	3	3								3	
CO4	3	3	3	3	3								3	
CO5	3	3	3	3	3								3	
CO6	3	3	3	3	3								3	
3 High				**2 Medium**						**1 Low**				

Formative assessment			
Bloom's Level	**Assessment Component**	**Marks**	**Total marks**
Remember	Classroom or Online Quiz	5	
Understand	Class Presentation/Power point presentation	5	15
	Attendance	5	

Summative Assessment			
Bloom's category	**Continuous Assessment Tests**		**Final Examination (60)**
	IAE 1 - (5)	**IAE 2 - (10)**	**IAE 3 - (10)**	
Remember	10	10	10	20
Understand	10	10	10	20
Apply	15	15	15	30
Analyse	15	15	15	30
Evaluate				
Create				

23CE404	Surveying II	L	T	P	C
		3	0	2	4

Nature of Course	Professional Core
Pre requisites	Knowledge on fundamentals of survey

Course Objectives:

The course is intended to

1. Gain knowledge on control surveying.
2. Impart knowledge on survey adjustment.
3. Understand the principles of total station survey.
4. Give an exposure to basic concepts of GPS surveying.
5. Familiarize on setting out curves.

Course Outcomes:

On successful completion of the course, students will be able to

CO. No.	Course Outcome	Bloom's Level
CO1	Select the methods of control surveying.	Understand
CO2	Identify the survey adjustment required in survey works.	Apply
CO3	Execute the precise survey by using Total station.	Apply
CO4	Recognize the basic concepts of GPS surveying.	Understand
CO5	Set out Simple, Compound and Reverse curves.	Apply
CO6	Implement Hydrographic surveying.	Apply

Module - I   Control Surveying   9

Horizontal and vertical control – Methods – specifications – triangulation – base line – instruments and accessories – corrections – satellite stations – reduction to centre – trigonometrical leveling Single and reciprocal observations – traversing – Gale's table.

Module - II   Survey Adjustment   9

Errors Sources - precautions and corrections – classification of errors – true and most probable values - weighed observations – method of equal shifts – principle of least squares – normal equation – correlates – level nets – adjustment of simple triangulation networks.

Module - III   Total Station Surveying   9

Basic Principle – Classifications – Electro – optical system: Measuring principle, Working principle, Sources of Error, Infrared and Laser Total Station instruments. Microwave system: Measuring principle, working principle, Sources of Error, Microwave Total Station instruments. Comparison between Electro – optical and Microwave system. Care and maintenance of Total Station instruments. Modern positioning systems – Traversing and Trilateration.

Module - IV   GPS Surveying   **9**

Basic Concepts – Different segments - space, control and user segments – satellite configuration
- Signal structure – Orbit determination and representation –Anti Spoofing and Selective Availability -
Task of control segment – Hand Held and Geodetic receivers – data processing – Traversing and
triangulation.DGPS survey.

Module - V   Advanced Surveying   **9**

Route surveys for highways, railways and waterways -Simple, Compound, Reverse,Transition and
Vertical curves – Setting out Methods – Hydrographic surveying – Tides - MSL- Sounding methods –
Drone Surveying – Laser applications – Lidar survey.

Total: 45 Periods

Course Content:

S. No.	Name of the Experiment	CO Mapping	RBT
1	Measurement of horizontal angles by reiteration and repetition vertical angles.	CO1	Apply
2	Theodolite survey traverse.	CO1	Apply
3	Height and distance measurment.	CO2	Apply
4	Triangulation and single plane methods.	CO2	Apply
5	Filed work using total station.	CO3	Apply
6	Tangential system – Stadia system	CO3	Apply
7	Subtense system.	CO3	Apply
8	Setting out works - Circular Curve.	CO4	Apply
9	Setting out works - Transition curve.	CO5	Apply
10	Setting out works – Foundation marking.	CO6	Apply

Total: 30 Periods

Text Book:

1   James M. Anderson and Edward M. Mikhail, "Surveying, Theory and Practice", 7thEdition,
    McGraw Hill, 2022.

2   Bannister and S.Raymond, "Surveying", 7th Edition, Longman 2019.

Reference Books:

1   Alfred Leick, "GPS satellite surveying", John Wiley & SonsInc, 2018.

2   Guocheng Xu, "GPS Theory, Algorithms and Applications", Springer - Berlin, 2022.

3   Satheesh Gopi, rasathish kumar, N. madhu, "Advanced Surveying, Total Station GPS and
    Remote Sensing" Pearson education, 2021

Additional Reference Book:

1   https://nptel.ac.in/courses/105/104/105104100/

2   https://nptel.ac.in/courses/105/107/105107157/

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Mapping of Course Outcomes (COs) with Programme Outcomes (POs) Programme Specific Outcomes (PSOs)														
COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	3	3	3	3				3				3	
CO2	3	3	3	3	3				3				3	
CO3	3	3	3	3	3				3				3	
CO4	3	3	3	3	3				3				3	
CO5	3	3	3	3	3				3				3	
CO6	3	3	3	3	3				3				3	
	3 High					2 Medium					1 Low			

Summative Assessment						
Bloom's category	Continuous Assessment Tests					Final Examination (50)
	Theory				Practical	
	IAE 1 - (5)	IAE 2 - (10)	IAE 3 - (10)	Attendance (5)	Rubric Based CIA (20)	
Remember	10	10	10		10	20
Understand	10	10	10		20	40
Apply	30	30	30		20	40
Analyse						
Evaluate						
Create						

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Passed in Board of Studies Meeting   *Approved in Academic Council Meeting*

23CE405	Applied Hydraulics Engineering	L	T	P	C
		3	0	2	4
Nature of Course	Engineering science				
Pre requisites	Fundamentals of Basic science				

Course Objectives:

The course is intended to

1. Learn the basics of open channel flow relationship by applying the fluid property.
2. Gain knowledge on gradually varied flow.
3. Impart knowledge on rapidly varied flow and application of momentum application.
4. Familiarize on turbines and its various types.
5. Get an exposure to understand the various types of pumps.

Course Outcomes:

On successful completion of the course, students will be able to

CO. No.	Course Outcome	Bloom's Level
CO1	Interpret the Flow measurement in hydraulic sections.	Apply
CO2	Identify the Flow though pipe sections.	Understand
CO3	Illustrate flow in open channels, hydraulic jump and backwater curve.	Apply
CO4	Explain the performance of reaction turbines.	Understand
CO5	Express the performance characteristics of radial flow turbines.	Understand
CO6	Recognize the operating characteristics of pumps.	Understand

Module - I   Flow Measurement   9

Velocity measurement – Pitot tube- Current meter – Discharge measurement – Orifices – mouthpieces – notches and weirs – Rectangular-triangular – Cippletti weir – submerges weir – Time of emptying reservoir through orifices.

Module - II   Flow through Pipes   9

Energy losses in pipes – Darchy Weisbach's formula – flow through pipes in series – flow through parallel pipes – flow through branched pipes-equivalent pipe – Water hammer in pipes – Laminar flow through circular pipes – Hagen Poiseuilles equation – turbulent flow through circular pipes –Velocity distribution.

Module - III   Flow in open channels   9

Types of flow in channels – velocity distribution – Chezy's formula – Manning's flormula; Most economical channel section. Computation in uniform flow – specific energy and critical depth – hydraulic jump and backwater curves.

Module - IV   Impact of Jets and Turbines   **9**

Impact of Jet on vanes – Turbines – Classification – Reaction   turbines – Francis turbine, Radial flow turbines, draft tube and cavitation – Propeller and Kaplan turbines – Impulse turbine – Performance of turbine – Specific speed – Runaway speed – Similarity laws.

Module - V   Pumps   **9**

Classification of Pumps – Centrifugal pumps – Minimum speed to start the pump – NPSH – Cavitations in pumps – Operating characteristics – Multistage pumps – Reciprocating pumps – Negative slip – Flow separation conditions – Air vessels, indicator diagrams and its variations – Savings in work done – Rotary pumps: Gear pump.

Total: 45 Periods

Laboratory Components:

S. No.	Name of the Experiment	CO Mapping	RBT
1	**Flow Measurement:** i) Calibration of Rotameter ii) Calibration of Venturimeter / Orificemeter iii) Flow through variable duct area - Bernoulli's Experiment iv) Flow through Rectangular Notch v) Flow through Triangular Notch	CO1	Apply
2	i) Determination of friction factor in pipes ii) Determination of minor losses	CO2	Apply
3	**Determination of Meta centric Height**	CO3	Apply
4	**Impulse and Reaction turbines:** i) Characteristics of Pelton wheel turbine ii)Characteristics of Francis turbine	CO4	Apply
5	**Axial Flow Turbines:** i) Characteristics of Kaplan turbine	CO5	Apply
6	**Pumps:** i) Characteristics of Centrifugal pumps ii) Characteristics of Submersible pump iii) Characteristics of Reciprocating pump	CO6	Apply

Total: 30 Periods

Text Book:

1   Modi P.N and Seth.S.M "Hydraulics and Fluid Mechanics including Hydraulic Machines", Standard Book House New Delhi, 2014.
2   Chandramouli P.N.,"Applied Hydraulic Engineering", Yes Dee Publishing Pvt. Ltd., 2017.

Reference Books:

1   Ven Te Chow, "Open Channel Hydraulics", McGraw Hill, New York, 2009.

2   Subramanya.K ,"Flow in open channels", Tata McGraw Hill, New Delhi, 2019.

3   Bansal, "Fluid Mechanics and Hydraulic Machines", Laxmi Publications, New Delhi, 2018.

Additional Reference Book:

1   https://nptel.ac.in/courses/105/105/105105203/
2   https://nptel.ac.in/courses/105/103/105103096/

Mapping of Course Outcomes (COs) with Programme Outcomes (POs) Programme Specific Outcomes (PSOs)															
COs	**POs**													**PSOs**	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**
CO1	3	3		3			2				3	2		2
CO2	3	3		3			2				3	2		2
CO3	3	3		3			2				3	2		2
CO4	3	3		3			2				3	2		2
CO5	3	3		3			2				3	2		2
CO6	3	3		3			2				3	2		2
3 High				**2** Medium						**1** Low				

Summative Assessment						
Bloom's category	**Continuous Assessment Tests**					**Final Examination (50)**
	Theory				**Practical**	
	IAE 1 - (5)	**IAE 2 - (10)**	**IAE 3 - (10)**	**Attendance (5)**	**Rubric Based CIA (20)**	
Remember	10	10	10		10	20
Understand	10	10	10		20	40
Apply	30	30	30		20	40
Analyse						
Evaluate						
Create						

23CE406	Strength of Materials Laboratory	L	T	P	C
		0	0	2	1

Nature of Course:	Professional core.
Pre requisites:	Knowledge on construction materials.

Course Objectives:

The course is intended to

1. Gain knowledge on strength of steel intension, shear and deflection.
2. Impart knowledge on compressive strength of wood.
3. Understand the effects of torsion in steel.
4. Familiarize on the hardness and impact strength of steel.
5. Become knowledgeable in understanding the deflection behavior of spring.

Course Outcomes:

On successful completion of the course, students will be able to

CO. No.	Course Outcome	Bloom's Level
CO1	Evaluate the tensile, shear strength and deflection behavior of steel.	Apply
CO2	Identify the compressive resistance of wood.	Apply
CO3	Evaluate the torsional resistance of steel.	Apply
CO4	Identify the quality of steel by conducting impact tests.	Apply
CO5	Select the metals by conducting hardness tests.	Apply
CO6	Recognize the deflection behavior of springs.	Understand

S. No.	Name of the Experiment	CO Mapping	RBT
1	Tension test on steel rod	CO1	Apply
2	Double shear test on metal	CO1	Apply
3	Deflection test on metal beam	CO1	Apply
4	Compression test on wood	CO2	Apply
5	Torsion test on mild steel rod	CO3	Apply
6	Impact test on metal specimen (Izod and Charpy)	CO4	Apply
7	Hardness test on metals (Rock well and Brinell Hardness Tests)	CO5	Apply

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Passed in Board of Studies Meeting   *Approved in Academic Council Meeting*

8	Compression test on Helical spring	CO6	Understand
9	Tension Test on Helical Spring	CO6	Understand

Total: 45 Periods

Reference Books:

1   Strength of Materials Laboratory Manual, Anna University, Chennai – 600 025.

2   IS1786-2008, Specification for cold worked steel high strength deformed bars for concrete reinforcement, 2008.

Additional Reference Book:

1   https://nptel.ac.in/courses/112/106/112106141/

2   https://nptel.ac.in/courses/112/107/112107147/

Mapping of Course Outcomes (COs) with Programme Outcomes (POs) Programme Specific Outcomes (PSOs)														
COs	**POs**												**PSOs**	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**
CO1	3	3	3	3	3								3	
CO2	3	3	3	3	3								3	
CO3	3	3	3	3	3								3	
CO4	3	3	3	3	3								3	
CO5	3	3	3	3	3								3	
CO6	3	3	3	3	3								3	
3 High					**2 Medium**							**1 Low**		

Bloom's Level	Summative Assessment Based on continuous and End Semester Examination	
	Rubrics Based continuous Assessment (60 Marks)	**End Semester Examination (40 Marks)**
Remember		
Understand		
Apply	60	40
Analyze		
Evaluate		

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Passed in Board of Studies Meeting   *Approved in Academic Council Meeting*

23MC005	YOGA AND VALUES FOR HOLISTIC DEVELOPMENT (Common to all B.E. / B.Tech Programme)	L	T	P	C
		0	0	2	0
Nature of Course	Mandatory Course				
Pre requisites	Fundamentals of Yoga				

Course Objectives
The course is intended to
1. Know the various types of yoga and their benefits.
2. Practice essential yoga postures and techniques.
3. Give mental clarity and focus through the practice of pranayama.
4. Incorporate relaxation technique into their daily routine works.
5. Use meditation to reduce stress and anxiety.
6. Promote positive health, prevention of stress related health problems and rehabilitation through Yoga.

Course Outcomes
On successful completion of the course the students will be able to

CO.No	Course Outcome	Bloom's Level
CO 1	Balance their full potential and confidence.	Understand
CO 2	Understand the knowledge of fundamental yoga postures.	Understand
CO 3	Realize the enhanced the functions of inner organs.	Understand
CO 4	Achieve a deep state of relaxation and release physical and mental tension.	Understand
CO 5	Cultivate a sense of calm and well-being.	Understand
CO 6	Experience enhanced flexibility, strength and balance as well as reduced stress.	Understand

Course Contents

Module – I	INTRODUCTION TO YOGA	6

Foundations of Yoga - History and Development of Yoga - Etymology and Definitions, Misconceptions, Aim and Objectives of Yoga, True Nature and Principles of Yoga - Introduction to Vedas – Upanishads - Prasthanatrayee - Purushartha Chatushtaya.

Module – II	POSTURES (ASANA)	6

Trikonasana - Ardha-Kati – Chakrasana – Tadasana - Vrikshasana - Padmasana, Simhasana - Paschimottanasana, Uttanpadasana – Salabhasana - Shavasana Pawanmuktasana - Anti-Rheumatic Series - Digestive / Abdominal Group - Energy Bock Series - Back Strengthening Exercises - Sun Salutation (Surya Namaskar) - Classical Sequence.

Module – III	BREATHING	6

The Foundations - Abdominal Breathing - Thoracic (mid-chest) breathing - Clavicular (upper chest breathing) - The Complete Yoga Breath. Pranayama Techniques - Breathing Ratios - Nadi Shodhana (Alternate Nostril Breathing) - Ujjayi (the 'whispering breath' or the 'psychic breath') - Bhramari (Humming Bee breath).

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Module – IV	RELAXATION	6
Quick Relaxation techniques - Tense & Relax - Short Yoga Nidra (Power Nap) - Extended Shavasana - Yoga Nidra – Sankalpa.		
Module – V	MEDITATION	6
Develop a good, comfortable sitting posture - Kaya Sthairyam (Body Stillness) - Om Chanting - Trataka (Concentrated Gazing).		
	Total : 30 Periods	

Text Books

1. Stephen Sturges, The Yoga Book. Motilal Banarsidass, Delhi, 2004.
2. Singh S.P & Yogi, Foundation of Yoga, Standard Publication, New Mukesh Delhi, 2010.
3. Sahay G.S. HathaYoga Pradeepika of Svatmarama, MDNIY Publication, 2013.

Reference Books

1. Bhat, Krishna K. The Power of Yoga: SuYoga Publications Mangalore,2006.
2. Fenerstein, George, The Yoga Tradition: It's History, Literature, Philosophy practice, Bhavana Books and Prints, 2002.
3. Tiwari, O.P, Asana Why and How? Kaivalyadhama, Lonavla, 2011.

Web References:

1. https://www.india.gov.in/sites/upload_files/npi/files/coi_part_full.pdf.
2. https://edukemy.com/blog/upsc-ncert-notes-indian-polity-state-legislature/#Organization _and_Composition_of_State_Legislature
3. https://blog.ipleaders.in/dpsp-and-fundamental-rights/

Bloom's Level	Summative Assessment (Internal Mode)	
	Assessment 1 (50 Marks)	Assessment 2 (50 Marks)
Remember	10	10
Understand	10	10
Apply	30	30
Analyze		
Evaluate		
Create		

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