NANDHA ENGINEERING COLLEGE

(An Autonomous Institution affiliated to Anna University Chennai and approved by AICTE, New Delhi)
Erode-638 052, Tamilnadu, India, Phone: 04294 – 225585

Curriculum and Syllabi

for

B.E – Civil Engineering [R22]

[CHOICE BASED CREDIT SYSTEM]

(This Curriculum and Syllabi are applicable to Students admitted from the academic year (2022-23) onwards)

August 2022

INSTITUTE VISION AND MISSION	
VISION	• To be an Institute of excellence providing quality Engineering, Technology and Management education to meet the ever changing needs of the society.
MISSION	• To provide quality education to produce ethical and competent professionals with social Responsibility • To excel in the thrust areas of Engineering, Technology and Entrepreneurship by solving real- world problems. • To create a learner centric environment and improve continually to meet the changing global needs.

B.E – CIVIL ENGINEERING	
VISION	• To foster academic excellence by imparting knowledge in civil engineering and allied disciplines to meet the ever growing needs of the society.
MISSION	• To impart quality education to produce professionals with social responsibility. • To excel in the thrust areas of civil and allied engineering to solve real world problems. • To create a learner centric environment with continual progress to meet the global engineering needs.
PROGRAMME EDUCATIONAL OBJECTIVES (PEO)	The graduates of civil engineering will be **PEO1: Core Competency:** Successful professionals with core competency and inter-disciplinary skills to satisfy the industrial needs. **PEO2: Research, Innovation and Life-long Learning:** Capable of identifying technological requirements for the society and providing innovative ideas for real time problems. **PEO3: Ethics, Human values and Entrepreneurship:** Able to demonstrate ethical practices and managerial skills through continuous learning.
PROGRAMME SPECIFIC OUTCOMES (PSO)	The students of civil engineering will be able to • Plan, analyze, design and prepare technical reports for civil engineering structures • Apply advanced techniques and management skills for the execution of civil engineering projects.

PROGRAM OUTCOMES:

At the end of this programme the students will be able to

a-l	GRADUATE ATTRIBUTES	PO No.	PROGRAMME OUTCOMES
a	Engineering Knowledge	PO1	Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
B	Problem Analysis	PO2	Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
C	Design and Development of Solutions	PO3	Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
D	Conduct Investigation of Complex Problems	PO4	Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
E	Modern Tool Usage	PO5	Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
F	The Engineer and Society	PO6	Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
G	Environment and Sustainability	PO7	Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
H	Ethics	PO8	Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
I	Individual and Team Work.	PO9	Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
J	Communication	PO10	Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
K	Project Management and Finance	PO11	Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
L	Lifelong Learning	PO12	Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

MAPPING OF PROGRAMME EDUCATIONAL OBJECTIVES WITH PROGRAMME OUTCOMES

A broad relation between the programme educational objectives and the programme outcomes is given in the following table

PROGRAMME EDUCATIONAL OBJECTIVES	PROGRAMME OUTCOMES											
	A	B	C	D	E	F	G	H	I	J	K	L
1	3	1	3	3	3	2	3	3	2	3	2	3
2	3	2	3	3	3	2	3	2	2	3	2	3
3	2	2	3	2	3	3	2	3	3	3	3	3

MAPPING OF PROGRAM SPECIFIC OUTCOMES WITH PROGRAMME OUTCOMES

A broad relation between the program specific outcomes and the programme outcomes is given in the following table

PROGRAM SPECIFIC OUTCOMES	PROGRAMME OUTCOMES											
	A	B	C	D	E	F	G	H	I	J	K	L
1	2	1	3	2	3	2	2	3	3	3	3	3
2	1	1	2	2	3	2	2	3	3	3	3	3

Contribution 1: Reasonable 2: Significant 3: Strong

NANDHA ENGINEERING COLLEGE (AUTONOMOUS), ERODE – 638 052

REGULATIONS – 2022 CHOICE BASED CREDIT SYSTEM

B.E. CIVIL ENGINEERING

SEMESTER: I									
S. NO.	**COURSE CODE**	**COURSE TITLE**	**CATEGORY**	**PRE REQUISITE**	**CONTACT PERIODS**	**L**	**T**	**P**	**C**
1	22MAN01	Induction Programme	MC	-	0	0	0	0	0
THEORY									
2	22EYA01	Professional Communication - I	HSMC	-	4	2	0	2	3
3	22MYB01	Calculus and Linear Algebra*	BSC	-	4	3	1	0	4
4	22CYB02	Chemistry for Engineers	BSC	-	3	3	0	0	3
5	22EEC01	Basic Electrical and Electronics Engineering	ESC	-	3	3	0	0	3
6	22MEC01	Engineering Graphics	ESC	-	4	2	0	2	3
7	22GYA01	தமிழர் மரபு / Heritage of Tamils	HSMC	-	1	1	0	0	1
PRACTICAL									
8	22GEP01	Engineering Practices Laboratory	ESC	-	4	0	0	4	2
9	22CYP01	Chemistry Laboratory*	BSC	-	2	0	0	2	1
Mandatory Non Credit Courses									
10	22MAN02	Soft/Analytical Skills - I	MC	-	3	1	0	2	0
11	22MAN03	Yoga - I*	MC	-	1	0	0	1	0
				TOTAL	**29**	**15**	**1**	**13**	**20**

*Ratified by Eleventh Academic Council

SEMESTER: II									
S. NO.	**COURSE CODE**	**COURSE TITLE**	**CATEGORY**	**PRE REQUISITE**	**CONTACT PERIODS**	**L**	**T**	**P**	**C**
THEORY									
1	22EYA02	Professional Communication- II	HSMC	22EYA01	4	2	0	2	3
2	22MYB02	Partial Differential Equations and Transform Techniques*	BSC	-	4	3	1	0	4
3	22PYB02	Advanced Materials and Nanotechnology	BSC	-	3	3	0	0	3
4	22CSC01	Problem Solving and C Programming*	ESC	-	3	3	0	0	3
5	22CEC01	Fundamentals of Engineering Mechanics	ESC	-	3	2	1	0	3
6	22CYB08	Environment and Sustainability*	BSC	-	2	2	0	0	2
7	22GYA02	தமிழரும் தொழில்நுட்பமும் / Tamils and Technology	HSMC	-	1	1	0	0	1
PRACTICAL									
6	22PYP01	Physics Laboratory*	BSC	-	2	0	0	2	1
7	22CSP01	Problem Solving and C Programming Laboratory*	ESC	-	4	0	0	4	2
Mandatory Non Credit Courses									
8	22MAN04	Soft/Analytical Skills - II	MC	22MAN02	3	1	0	2	0
9	22MAN05	Yoga - II*	MC	-	1	0	0	1	0
				TOTAL	**30**	**17**	**2**	**11**	**22**

*Ratified by Eleventh Academic Council

SEMESTER: III									
S. NO.	**COURSE CODE**	**COURSE TITLE**	**CATEGORY**	**PRE REQUISITE**	**CONTACT PERIODS**	**L**	**T**	**P**	**C**
THEORY									
1	22MYB03	Statistics and Numerical Methods	BSC	-	4	3	1	0	4
2	22CEC02	Mechanics of Materials	ESC	22CEC01	3	3	0	0	3
3	22CEC03	Highway and Railway Engineering	PCC	-	3	3	0	0	3
4	22CEC04	Surveying	PCC	-	3	3	0	0	3
5	22CEC05	Construction Materials and Practices	PCC	-	5	3	0	2	4
6	22CEC06	Fluid Mechanics and Hydraulics Engineering	PCC	-	5	3	0	2	4
PRACTICAL									
7	22CEP01	Surveying Laboratory	PCC	-	4	0	0	4	2
8	22CEP02	Computer Aided Building Drawing - I	PCC	-	4	0	0	4	2
Mandatory Non Credit Courses									
9	22MAN07	Soft / Analytical Skills - III	MC	-	3	1	0	2	0
				TOTAL	**34**	**19**	**1**	**14**	**25**

SEMESTER: IV									
S. NO.	**COURSE CODE**	**COURSE TITLE**	**CATEGORY**	**PRE REQUI SITE**	**CONTACT PERIODS**	**L**	**T**	**P**	**C**
THEORY									
1	22CEC07	Structural Analysis	PCC	-	4	3	1	0	4
2	22CEC08	Water Resources and Irrigation Engineering	PCC	-	3	3	0	0	3
3	22CEC09	Soil Mechanics	PCC	-	5	3	0	2	4
4	22CEC10	Design of Reinforced Concrete Elements	PCC	-	3	3	0	0	3
5	22CEC11	Concrete Technology	PCC	22CEC05	3	3	0	0	3
6	22CEC12	Environmental Engineering	PCC	-	5	3	0	2	4
PRACTICAL									
7	22CEP03	Computer Aided Building Drawing –II	PCC	-	4	0	0	4	2
Mandatory Non Credit Courses									
8	22MAN08	Soft/Analytical Skills –IV	MC		3	1	0	2	0
9	22MAN09	Indian Constitution	MC	-	1	1	0	0	0
10	22GED01	Personality and Character Development	EEC	-	0	0	0	1	0
				TOTAL	**31**	**20**	**1**	**11**	**23**

SEMESTER: V									
S. NO.	**COURSE CODE**	**COURSE TITLE**	**CATEGORY**	**PRE REQUISITE**	**CONTACT PERIODS**	**L**	**T**	**P**	**C**
THEORY									
1	22CEC13	Design of Reinforced Concrete Structures	PCC	-	3	3	0	0	3
2	22CEC14	Foundation Engineering	PCC	22CEC09	3	3	0	0	3
3	22CEC15	Design of Steel Structures	PCC	-	3	3	0	0	3
4	E1	Elective (PEC)	PEC	-	3	3	0	0	3
5	E2	Elective (PEC)	PEC	-	3	3	0	0	3
6	E3	Elective (PEC)	PEC	-	3	3	0	0	3
PRACTICAL									
7	22CEP04	Concrete Technology Laboratory	PCC	-	4	0	0	4	2
8	22CEP05	Design and Drawing Laboratory	PCC	-	4	0	0	4	2
Mandatory Non Credit Courses									
9	22MAN10	Soft/Analytical Skills - V	MC	-	3	1	0	2	0
10	22MAN11	Certification Course - I	MC	-	1	0	0	1	0
				TOTAL	**30**	**19**	**0**	**11**	**22**

SEMESTER: VI									
S. NO.	**COURSE CODE**	**COURSE TITLE**	**CATEGORY**	**PRE REQUI SITE**	**CONTACT PERIODS**	**L**	**T**	**P**	**C**
THEORY									
1	22CEC16	Estimating and Costing	PCC	-	5	3	0	2	4
2	22CEC17	Pre Engineering Buildings	PCC	-	3	3	0	0	3
3	E4	Elective (PEC)	PEC	-	3	3	0	0	3
4	E5	Elective (PEC)	PEC	-	3	3	0	0	3
5	E6	Elective (PEC / OEC)	PEC / OEC	-	3	3	0	0	3
6	E7	Elective (OEC)	OEC	-	3	3	0	0	3
PRACTICAL									
7	22CEP06	Computer Aided Structural Design Laboratory	PCC	-	4	0	0	4	2
8	22CEP07	Survey Camp	PCC	-	2	0	0	2	1
Mandatory Non Credit Courses									
9	22MAN12	Soft/Analytical Skills - VI	MC	-	3	1	0	2	0
10	22MAN13	Certification Course - II	MC	-	1	0	0	1	0
				TOTAL	**30**	**19**	**0**	**11**	**22**

SEMESTER: VII									
S. NO.	**COURSE CODE**	**COURSE TITLE**	**CATEGORY**	**PRE REQUISITE**	**CONTACT PERIODS**	**L**	**T**	**P**	**C**
THEORY									
1	22GEA01	Universal Human Values	HSMC	-	2	2	0	0	2
2	EM1	Elective (Management)	HSMC	-	3	3	0	0	3
3	E8	Elective (PEC)	PEC	-	3	3	0	0	3
4	E9	Elective (PEC / OEC)	PEC / OEC	-	3	3	0	0	3
5	E10	Elective (OEC)	OEC	-	3	3	0	0	3
PRACTICAL									
6	22CED01	Design Project	EEC	-	4	0	0	4	2
7	22GED02	Internship / Industrial Training	EEC	-	-	0	0	0	2
				TOTAL	**18**	**14**	**0**	**4**	**18**

SEMESTER: VIII									
S. NO.	**COURSE CODE**	**COURSE TITLE**	**CATEGORY**	**PRE REQUISITE**	**CONTACT PERIODS**	**L**	**T**	**P**	**C**
PRACTICAL									
1	22CED02	Project Work	EEC	-	20	0	0	20	10
				TOTAL	**20**	**0**	**0**	**20**	**10**

(A) HSMC, BSC and ESC

(a) Humanities and Social Sciences including Management Courses (HSMC)

S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PRE REQUISITE	CONTACT PERIODS	L	T	P	C
1.	22EYA01	Professional Communication - I	HSMC	-	4	2	0	2	3
2.	22GYA01	தமிழர் மரபு / Heritage of Tamils	HSMC	-	1	1	0	0	1
3.	22EYA02	Professional Communication- II	HSMC	22EYA01	4	2	0	2	3
4.	22GYA02	தமிழரும் தொழில்நுட்பமும் / Tamils and Technology	HSMC	-	1	1	0	0	1
5.	22GEA01	Universal Human Values	HSMC	-	2	2	0	0	2

(b) Basic Science Courses (BSC)

S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PRE REQUISITE	CONTACT PERIODS	L	T	P	C
1.	22MYB01	Calculus and Linear Algebra	BSC	-	4	3	1	0	4
2.	22CYB02	Chemistry for Engineers	BSC	-	3	3	0	0	3
3.	22CYP01	Chemistry Laboratory	BSC	-	2	0	0	2	1
4.	22MYB02	Partial Differential Equations and Transform Techniques	BSC	-	4	3	1	0	4
5.	22PYB02	Advanced Materials and Nanotechnology	BSC	-	3	3	0	0	3
6.	22CYB08	Environment and Sustainability	BSC	-	2	2	0	0	2
7.	22PYP01	Physics Laboratory	BSC	-	2	0	0	2	1
8.	22MYB03	Statistics and Numerical Methods	BSC	-	4	3	1	0	4

(c) Engineering Science Courses (ESC)									
S. NO.	**COURSE CODE**	**COURSE TITLE**	**CATEGORY**	**PRE REQUI SITE**	**CONTACT PERIODS**	**L**	**T**	**P**	**C**
1.	22EEC01	Basic Electrical and Electronics Engineering	ESC	-	3	3	0	0	3
2.	22MEC01	Engineering Graphics	ESC	-	4	2	0	2	3
3.	22GEP01	Engineering Practices Laboratory	ESC	-	4	0	0	4	2
4.	22CSC01	Problem Solving and C Programming	ESC	-	3	3	0	0	3
5.	22CEC01	Fundamentals of Engineering Mechanics	ESC	-	3	2	1	0	3
6.	22CSP01	Problem Solving and C Programming Laboratory	ESC	-	4	0	0	4	2
7.	22CEC02	Mechanics of Materials	ESC	22CEC01	3	3	0	0	3

(B) Program Core Courses (PCC)									
S. NO.	**COURSE CODE**	**COURSE TITLE**	**CATEGORY**	**PRE REQUI SITE**	**CONTACT PERIODS**	**L**	**T**	**P**	**C**
1.	22CEC03	Highway and Railway Engineering	PCC	-	3	3	0	0	3
2.	22CEC04	Surveying	PCC	-	3	3	0	0	3
3.	22CEC05	Construction Materials and Practices#	PCC	-	5	3	0	2	4
4.	22CEC06	Fluid Mechanics and Hydraulics Engineering#	PCC	-	5	3	0	2	4
5.	22CEP01	Surveying Laboratory	PCC	-	4	0	0	4	2
6.	22CEP02	Computer Aided Building Drawing - I	PCC	-	4	0	0	4	2
7.	22CEC07	Structural Analysis	PCC	-	4	3	1	0	4

8.	22CEC08	Water Resources and Irrigation Engineering	PCC	-	3	3	0	0	3
9.	22CEC09	Soil Mechanics[#]	PCC	-	5	3	0	2	4
10.	22CEC10	Design of Reinforced Concrete Elements	PCC	-	3	3	0	0	3
11.	22CEC11	Concrete Technology	PCC	22CEC05	3	3	0	0	3
12.	22CEC12	Environmental Engineering[#]	PCC	-	5	3	0	2	4
13.	22CEC13	Design of Reinforced Concrete Structures	PCC	-	3	3	0	0	3
14.	22CEC14	Foundation Engineering	PCC	22CEC09	3	3	0	0	3
15.	22CEC15	Design of Steel Structures	PCC	-	3	3	0	0	3
16.	22CEP04	Concrete Technology Laboratory	PCC	-	4	0	0	4	2
17.	22CEP05	Design and Drawing Laboratory	PCC	-	4	0	0	4	2
18.	22CEC16	Estimating and Costing[#]	PCC	-	5	3	0	2	4
19.	22CEC17	Pre Engineering Buildings	PCC	-	3	3	0	0	3
20.	22CEP06	Computer Aided Structural Design Laboratory	PCC	-	4	0	0	4	2
21.	22CEP07	Survey Camp	PCC	-	2	0	0	2	1

(C) EEC & MC									
(a) Employability Enhancement Courses (EEC)									
S. NO.	**COURSE CODE**	**COURSE TITLE**	**CATEGORY**	**PRE REQUISITE**	**CONTACT PERIODS**	**L**	**T**	**P**	**C**
1.	22CED01	Design Project	EEC	-	4	0	0	4	2
2.	22GED02	Internship / Industrial Training	EEC	-	-	0	0	0	2
3.	22CED02	Project Work	EEC	-	20	0	0	20	10
(b) Mandatory Courses (MC)									
1.	22MAN01	Induction Programme	MC	-	0	0	0	0	0
2.	22MAN02	Soft/Analytical Skills - I	MC	-	3	1	0	2	0
3.	22MAN03	Yoga - I	MC	-	1	0	0	1	0
4.	22MAN04	Soft/Analytical Skills - II	MC	22MAN02	3	1	0	2	0
5.	22MAN05	Yoga - II	MC	-	1	0	0	1	0
6.	22MAN07	Soft / Analytical Skills - III	MC	-	3	1	0	2	0
7.	22MAN08	Soft/Analytical Skills -IV	MC		3	1	0	2	0
8.	22MAN09	Indian Constitution	MC	-	1	1	0	0	0
9.	22GED01	Personality and Character Development	MC	-	0	0	0	1	0
10.	22MAN10	Soft/Analytical Skills - V	MC	-	3	1	0	2	0
11.	22MAN11	Certification Course - I	MC	-	1	0	0	1	0
12.	22MAN12	Soft/Analytical Skills - VI	MC	-	3	1	0	2	0
13.	22MAN13	Certification Course - II	MC	-	1	0	0	1	0

Semester/Category	HSMC	BSC	PCC	ESC	EEC	PEC	OEC	Total
1	4	8		8				**20**
2	4	10		8				**22**
3		4	18	3				**25**
4			23					**23**
5			13			9		**22**
6			10			9	3	**22**
7	5				4	6	3	**18**
8					10			**10**
Total	13	22	64	19	14	24	6	**162**
%	**8.0**	**13.6**	**39.5**	**11.7**	**8.6**	**14.8**	**3.7**	**100**
AICTE Credits Recommended	12	26	47	29	12	23	11	**160**
	7%	**16%**	**29%**	**18%**	**7%**	**14%**	**7%**	

22EYA01 - PROFESSIONAL COMMUNICATION - I *(Common to All Branches)*					
		L	**T**	**P**	**C**
		2	**0**	**2**	**3**
PREREQUISITE : NIL					
Course Objectives		**Course Outcomes**			
1.0	To build essential English skills to address the challenges of communication in today's work environment.	**1.1**	The students will be able to apply knowledge of communication and language processes occur in various work environment.		
2.0	To comprehend the various dimensions of communication by employing LSRW skills.	**2.1**	The students will be able to involve in diverse discourse forms utilizing LSRW skills.		
3.0	To deploy students in contextual initiatives by assisting them in developing communication abilities.	**3.1**	The students will be able to participate actively in communication activities that enhance their creative skill.		
4.0	To facilitate students in comprehending the intent, target audience and environments of various forms of communication.	**4.1**	The students will be able to associate with the target audience and contexts using varied types of communication.		
5.0	To enhance coherence, cohesion, and proficiency in both verbal and nonverbal communication in the workplace environment.	**5.1**	The students will be able to convey the idea distinctly both in verbal and non verbal communication in work culture.		

UNIT I - INTRODUCTORY SKILLS	**(6+6)**
Grammar - Parts of Speech - Verb (Auxiliaries - Primary & Modal, Main Verb) - **Listening** - Listening to Short Conversations or Monologues - Listening to Experiences - Listening to Descriptions - **Speaking** - Introducing Oneself - Exchanging Personal information -Talking about food and culture - **Reading** - Reading for Interrogation - Reading Newspaper, Advertisements and Interpreting - **Writing** - Seeking Permission for Industrial Visit & In-plant Training	
UNIT II - LANGUAGE ACUMEN	**(6+6)**
Grammar - Word Formation - Tenses (Present Tense) - Synonyms & Antonyms - **Listening** - Listening to Announcements - Listening to Interviews - Listening and Note-taking - **Speaking** - Talking about Holidays & Vacations - Narrating Unforgettable Anecdotes - **Reading** - Skimming - Scanning (Short Texts and Longer Passages) - Critical Reading - **Writing** - Instruction - Process Description	
UNIT III - COMMUNICATION ROOTERS	**(6+6)**
Grammar - Cause and Effect -Tenses (Past Tense) - Discourse Markers - **Listening** - Listening to Telephonic Conversations - Listening to Podcasts - **Speaking** - Talking about neoteric Technologies - Eliciting information to fill a form - **Reading** - Book Reading(Motivational) - Practicing Speed Reading (reading newspaper reports & biographies) - **Writing** - Checklist - Circular, Agenda & Minutes of the Meeting	
UNIT IV - DISCOURSE FORTE	**(6+6)**

Grammar - Tenses (Future Tense) - Yes/No & WH type questions - Negatives - **Listening** - Listening to TED/ Ink talks -**Speaking** - Participating in Short Conversations - **Reading** - Reading Comprehension (Multiple Choice / Short / Open Ended Questions) - **Writing** - E-Mail Writing
UNIT V - LINGUISTIC COMPETENCIES **(6+6)**
Grammar - Articles - Homophones & Homonyms - Single line Definition - Phrasal Verb - **Listening** - Intensive listening to fill in the gapped text - **Speaking** - Expressing opinions through Situations & Role play **Reading** - Cloze Texts - **Writing** - Paragraph Writing
LIST OF SKILLS ASSESSED IN THE LABORATORY 1. Grammar 2. Listening Skills 3. Speaking Skills 4. Reading Skills 5. Writing Skills
TOTAL (L:30, P:30) = 60 PERIODS

TEXT BOOK:
1. Shoba K N., Deepa Mary Francis, "English for Engineers and Technologists", Volume 1, 3rd Edition, Orient Black Swan Pvt. Ltd, Telangana, 2022.
REFERENCES:
1. Koneru, Aruna, "English Language Skills", Tata McGraw Hill Education (India) Private Limited, Chennai, 2006. 2. Hewings M, "Advanced English Grammar", Cambridge University Press, Chennai, 2000. 3. Jack C Richards, Jonathan Hull and Susan Proctor, "Interchange", Cambridge University Press, New Delhi, 2015 (Reprint 2021).

Mapping of COs with POs / PSOs

Cos	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1									3	3		2	2	
2									3	3		2	2	
3									3	3		2	2	
4									3	3		2	2	
5									3	3		2	2	
CO (W.A)									**3**	**3**		**2**	**2**	

22MYB01- CALCULUS AND LINEAR ALGEBRA

(Common to All Branches)

L	T	P	C
3	1	0	4

PRE REQUISITE : NIL

Course Objectives		Course Outcomes	
1.0	To develop the use of matrix algebra techniques needed by engineers for practical applications.	**1.1**	The students will be able to apply the concept of orthogonal reduction to diagonalise a given matrix.
2.0	To use the techniques, skills and engineering tools necessary for engineering practice, with geometric concepts.	**2.1**	The students will be able to identify the geometric aspects of plane, straight line and sphere.
3.0	To improve the ability of the students in solving geometrical applications of differential calculus problems.	**3.1**	The students will be able to evaluate the radius of curvature, circle of curvature and centre of curvature for a given curve.
4.0	To learn the important role of mathematical concepts in engineering applications with the functions of several variables.	**4.1**	The students will be able to calculate the maxima and minima for a given function with several variables by finding the stationary points.
5.0	To acquaint the student with mathematical tools needed in evaluating multiple integrals and their applications.	**5.1**	The students will be able to evaluate the area and volume by double and triple integrals.

UNIT I - MATRICES	**(9+3)**
Characteristic Equation - Eigen values and Eigen vectors of a matrix - Cayley Hamilton Theorem (excluding proof) and its applications - Quadratic form-Reduction of a Quadratic form to canonical form by orthogonal transformation.	
UNIT II - ANALYTICAL GEOMETRY OF THREE DIMENSIONS	**(9+3)**
Equation of plane - Angle between two planes - Equation of straight lines - Coplanar lines - Equation of sphere - Orthogonal spheres.	
UNIT III - GEOMETRICAL APPLICATIONS OF DIFFERENTIAL CALCULUS	**(9+3)**
Curvature - Curvature in Cartesian co-ordinates - Centre and Radius of curvature - Circle of curvature - Evolutes and Involutes.	
UNIT IV - FUNCTIONS OF SEVERAL VARIABLES	**(9+3)**
Partial derivatives - Euler's theorem on homogeneous function - Jacobian - Maxima and Minima of functions of two variables - Constrained Maxima and Minima by Lagrange's multiplier method.	
UNIT V - MULTIPLE INTEGRALS	**(9+3)**
Double integration in Cartesian Co-ordinates - Change of order of integration - Area as double integral - Triple integration in Cartesian Co-ordinates - Volume as triple integrals.	
TOTAL (L:45+T:15) :60 PERIODS	

LIST OF PROGRAMS USING MATLAB (Assignment/Online Test**):**

1. Introduction to MATLAB
2. Matrix operations - Addition, Multiplication, Transpose and Inverse
3. Characteristic equation of a Matrix
4. Eigen values and Eigen vectors of Higher order Matrices.
5. Curve Tracing
6. Determining Maxima and Minima of a function of one variable.
7. Determining Maxima and Minima of a function of two variables.
8. Evaluating double integrals
9. Evaluating triple integrals
10. Finding area between two curves.

TEXT BOOKS:

1. Dr.B.S.Grewal, "Higher Engineering Mathematics", 42nd Edition, Khanna publications, 2012.
2. Erwin Kreyszig , "Advanced Engineering Mathematics , 9th Edition, John Wiley & sons, 2013
3. Veerarajan.T, "Engineering Mathematics of Semester I & II", 3rd Edition, Tata McGraw Hill., 2016

REFERENCES:

1. N.P.Bali, Manish Goyal, "A Text book of Engineering Mathematics -Sem-II", 6th Edition, Laxmi Publications, 2014.
2. Kandasamy.P, Thilagavathy.K, Gunavathy .K, "Engineering Mathematics for first year", 9th Rev.Edition, S.Chand & Co Ltd, 2013.
3. Glyn James, "Advanced Engineering Mathematics", 7th Edition, Wiley India, 2007.

Mapping of COs with POs / PSOs

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	3	2	2		1				1		2	2	2	1
2	3	2	2		1	1			1			2	2	
3	3	2	2		1							2	2	
4	3	2	2	1	1				1			2	2	
5	3	2	2	1	1				1		1	2	2	1
CO (W.A)	3	2	2	1	1	1			1		1.5	2	2	1

*Approved by Eleventh Academic Council

22CYB02 - CHEMISTRY FOR ENGINEERS

(Common to CIVIL and MECH Branches)

L	T	P	C
3	0	0	3

PRE REQUISITE : NIL

	Course Objectives		Course Outcomes
1.0	To recognize the basic concepts of electrochemistry and understand electrochemical processes.	**1.1**	The student will be able to evaluate fundamentals of electrochemistry, electrodes, cells and electrode potentials.
2.0	To facilitate the students to achieve a clear conceptual understanding of technical and commercial aspects of energy sources and storage devices.	**2.1**	The student will be able to impart knowledge on renewable energy sources like nuclear, solar, wind energy and also on storage devices.
3.0	To make the students conversant with water treatment, boiler feed water techniques	**3.1**	The student will be able to identify the various water treatment techniques for domestic and industrial purpose.
4.0	To elucidate the mechanism of corrosion and their control measures.	**4.1**	The student will be able to explore the type of corrosion and depict the methods of corrosion control.
5.0	To impart knowledge on the basic principles, types of fuels, their preparation, properties and combustion characteristics.	**5.1**	The student will be able to recommend suitable fuels for engineering processes and applications.

UNIT I – ELECTROCHEMISTRY	**(9)**
Electrode potential - Nernst equation - derivation and problems - reference electrodes - standard hydrogen electrode - calomel electrode - electrochemical series - significance - Types of cell - electrolytic and electrochemical cells - reversible and irreversible cells - potentiometric titrations (redox) - conductometric titrations (acid-base).	
UNIT II - ENERGY SOURCES AND STORAGE DEVICES	**(9)**
Nuclear energy - nuclear fission - nuclear fusion - light water nuclear power plants - breeder reactor - solar energy conversion - solar cells - solar water heater - Recent developments in solar cell materials - wind energy - batteries - types of batteries - lead acid storage battery - lithium-ion battery, Electric vehicles - working principles.	
UNIT III - WATER TECHNOLOGY AND NANO MATERIALS	**(9)**
Municipal water treatment - disinfection methods (uv, ozonation, chlorination) - desalination of brackish water - reverse osmosis - boiler troubles (scale, sludge , priming, foaming and caustic embrittlement) - treatment of boiler feed water - internal treatment (carbonate, phosphate and calgon conditioning) - external treatment - demineralization process. Nanomaterials - synthesis (laser ablation, and chemical vapour deposition method) and applications of nanomaterials.	
UNIT IV - CORROSION AND ITS CONTROL	**(9)**
Corrosion - types - chemical corrosion - pilling bedworth rule - electrochemical corrosion - mechanism-galvanic corrosion - differential aeration corrosion - factors influencing corrosion - corrosion control - sacrificial anode and impressed cathodic current methods - corrosion inhibitors - protective coatings - paints - constituents and their functions	

UNIT V - FUELS AND COMBUSTION	(9)
Fuels: Introduction: Classification of fuels: Coal and coke: Analysis of coal (Proximate) - Carbonization - Manufacture of metallurgical coke (Otto Hoffmann method). Petroleum and Diesel: Manufacture of synthetic petrol (Bergius process) - Knocking - octane number - diesel oil - cetane number: Power alcohol and biodiesel. Combustion of fuels: Introduction: Calorific value - higher and lower calorific values, Flue gas analysis - ORSAT method. CO2 emission and carbon foot print.	
TOTAL (L:45) : 45 PERIODS	

TEXT BOOKS:

1. Dr.Ravikrishnan, A,"Engineering Chemistry I & Engineering Chemistry II", Sri Krishna Hitech Publishing chem., Co. Pvt Ltd., 13th Edition, Chennai, 2020.
2. S.S. Dara," A Text book of Engineering Chemistry", S.Chand & Co.Ltd. New Delhi, 2019.

REFERENCES:

1. P.C.Jain and Monica Jain, "Engineering Chemistry", Vol I &II, Dhanpat Rai Pub, Co, New Delhi, 15th Edition, 2018.
2. B.Sivasankar, "Engineering Chemistry", Tata McGraw- Hill Pub.Co.Ltd., New Delhi, 2018

Mapping of COs with POs / PSOs

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	2	1	3			1			1			2		
2	2	1	3			1	1		1			2	1	
3	2		3			1			2			2		
4	2	2	3			1	2					2	1	
5	2	2	3			1						2		
CO (W.A)	**2**	**2**	**3**			**1**	**1.5**		**1.33**			**2**	**1**	

22EEC01 - BASIC ELECTRICAL AND ELECTRONICS ENGINEERING *(Common to AGRI, CHEMICAL and CIVIL Branches)*					
		L	**T**	**P**	**C**
		3	**0**	**0**	**3**
PREREQUISITE : NIL					
Course Objectives		**Course Outcomes**			
1.0	To impart knowledge on the concepts of circuit elements, circuit laws and measuring instruments	**1.1**	The student will be able to interpret fundamental principles, laws, and their practical applications by analytical instruments.		
2.0	To Gain information on the basic principles of DC electrical machines and their performance.	**2.1**	The student will be able to identify DC electrical components and explore the characteristics of DC electrical machines.		
3.0	To Gain information on the basic principles of AC electrical machines and their performance	**3.1**	The student will be able to identify AC electrical components and explore the characteristics of AC electrical machines.		
4.0	To Identify basic theoretical principles behind the working of modern electronic gadgets..	**4.1**	The student will be able to identify & apply schematic symbols and understand the working principles of electronic devices & instruments.		
5.0	To Demonstrate digital electronic circuits and assemble simple devices.	**5.1**	The student will be able to design analog & digital circuits using basic concepts to solve problems.		

UNIT I - ELECTRICAL CIRCUITS AND MEASURMENTS	**(9)**
Introduction to DC circuits - Ohm's Law - Kirchhoff's Laws - Resistive circuits - Resistors in Series and parallel - Introduction to AC circuits - Power and Power factor - Classification of measuring instruments - Dynamometer type wattmeter - Induction type energy meter	
UNIT II - DC MACHINES	**(9)**
DC Generator: Construction, Types, Principle of operation, EMF equation, Characteristics. DC Motor: Principle of operation, Types, Torque equation, Characteristics and Applications.	
UNIT III - AC MACHINES	**(9)**
Single phase induction motor: Construction, Types, working principle - Three phase induction motor: Construction, Types, Torque - Slip Characteristics - Synchronous motor: Construction, working principle.	
UNIT IV - SEMICONDUCTOR DEVICES AND ITS APPLICATIONS	**(9)**
Introduction - Characteristics of PN junction diode and Zener diode - Half wave rectifier - Bipolar junction transistor: CB, CE, CC configurations and characteristics.	
UNIT V - DIGITAL SYSTEMS	**(9)**
Number System - Binary, Decimal, Octal, Hexadecimal - Binary arithmetic - Boolean Algebra - Logic Gates - Applications: Half Adder.	
	TOTAL (L:45) : 45 PERIODS

TEXT BOOKS:

1. D P Kothari and I.J Nagarath, "Basic Electrical Engineering", McGraw Hill Education (India) Private Limited, 4th Edition, Third Reprint, 2019.
2. R Muthusubramaian, S.Salivahanan and K.A.Muraleedharan, "Basic Electrical, Electronics and Computer Engineering", 2nd Edition, Tata McGraw Hill publishers, New Delhi, 2012

REFERENCES:

3. Jr.,William H. Hayt,Kemmerly, Jack E.Phillips, Jamie D.Durbin, Steven M. "Engineering Circuits Analysis," 9th Edition, Tata McGraw Hill publishers, New Delhi, 2020
4. S.K.Bhattacharya, "Basic Electrical and Electronics Engineering", 2nd Edition, Pearson India, New Delhi, 2017.

Mapping of COs with POs / PSOs

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	2	2	-	2	1	2	-	1	2	1	2	2	-	1
2	2	1	-	1	-	-	1	-	-	-	1	1	-	1
3	2	1	-	1	-	-	1	-	-	-	1	1	-	1
4	-	1	-	-	1	-	-	1	-	-	-	-	-	-
5	1	-	-	-	1	2	2	-	-	1	2	-	-	-
CO (W.A)	**1.4**	**1.25**	-	**0.8**	**1**	**2**	**1.33**	**1**	**2**	**1**	**1.5**	**1.33**	-	**1**

22MEC01 - ENGINEERING GRAPHICS
(Common to AGRI, CIVIL, CHEMICAL and EEE Branches)

L	T	P	C
2	0	2	3

PRE REQUISITE : NIL

Course Objectives		Course Outcomes	
1.0	To Construct various plane curves	**1.1**	The students will be able to construct various plane curves.
2.0	To Construct the concept of projection of points, lines and plane	**2.1**	The students will be able to create the projection of points, lines and planes.
3.0	To Develop the projection of solids	**3.1**	The students will be able to develop projection of solids.
4.0	To Solve problems in sectioning of solids and developing the surfaces	**4.1**	The students will be able to solve problems in sections of solids and development of surfaces.
5.0	To Apply the concepts of orthographic and isometric	**5.1**	The students will be able to apply the concepts of isometric in engineering practice.

CONCEPTS AND CONVENTIONS (Not for Examination)

Importance of graphics in engineering applications - use of drafting instruments - BIS conventions and specifications - size, layout and folding of drawing sheets - lettering and dimensioning - scales.

UNIT I - PLANE CURVES **(6+6)**

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 - theory of projection - principle of multi-view orthographic projection - profile plane and side views - multiple views - representation of three dimensional objects - layout of views.

UNIT II - PROJECTION OF POINTS, LINES AND PLANES **(6+6)**

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.

UNIT III - PROJECTION OF SOLIDS **(6+6)**

Projection of simple solids like prisms, pyramids, cylinder and cone when the axis is inclined to anyone of the principal plane and parallel to another by rotating object method.

UNIT IV - SECTION OF SOLIDS AND DEVELOPMENT OF SURFACES **(6+6)**

Sectioning of solids (prism, cube, pyramid, cylinder and cone) 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 cylinder and cone.

UNIT V - ISOMETRIC AND ORTHOGRAPHIC PROJECTIONS **(6+6)**

Principles of isometric projection - isometric scale - isometric projections of lines, plane figures, simple solids and truncated solids - prisms, pyramids, cylinders, cones – free hand sketching of orthographic views from isometric views of objects.

TOTAL (L:30+P:30) : 60 PERIODS

TEXT BOOKS:

1. K.Venugopal and V.Prabhu Raja, "Engineering Graphics", New Age International (P) Limited, 2022.
2. N.S Parthasarathy and Vela Murali, "Engineering Drawing", Oxford University Press, 2015.

REFERENCES:

1. N.D.Bhatt and V.M.Panchal, "Engineering Drawing", Charotar Publishing House, 53rd Edition, 2014.
2. K.R.Gopalakrishna, "Computer Aided Engineering Drawing" (Vol I and II combined) Subhas Stores, Bangalore, 2017.
3. K. V.Natarajan, "A text book of Engineering Graphics", Dhanalakshmi Publishers, Chennai, 2018.
4. Luzzader, Warren.J, and Duff, John M, "Fundamentals of Engineering Drawing with an introduction to Interactive Computer Graphics for Design and Production", Eastern Economy Edition, Prentice Hall of India Pvt Ltd, New Delhi, 2005.
5. M.B.Shah and B.C.Rana, "Engineering Drawing", Pearson, 2nd Edition, 2009.

Mapping of COs with POs / PSOs

COs	**POs**												**PSOs**	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	3	2	1	-	-	1	-	-	-	2	-	3	2	1
2	3	2	1	-	-	1	-	-	-	2	-	3	2	2
3	3	2	1	-	-	1	-	-	-	2	-	3	3	1
4	3	2	1	-	-	1	-	-	-	2	-	3	2	1
5	3	3	1	-	-	1	-	-	-	2	-	3	3	2
CO (W.A)	**3**	**2.2**	**1**	**-**	**-**	**1**	**-**	**-**	**-**	**2**	**-**	**3**	**2.2**	**1.6**

22GEP01 - ENGINEERING PRACTICES LABORATORY
(Common to AGRI, BME, CHEM, CIVIL, ECE, EEE and MECH Branches)

L	T	P	C
0	0	4	2

PRE REQUISITE : NIL

	Course Objectives		Course Outcomes
1.0	To provide hands on training on various basic engineering practices in Civil Engineering	1.1	The students will be able to make various joints/ connections in civil engineering practices like plumbing and carpentry.
2.0	To provide hands on training on welding in Mechanical Engineering	2.1	The students will be able to make various shapes using welding processes.
3.0	To provide hands on training on various basic engineering practices in Mechanical Engineering	3.1	The students will be able to make various shapes using manufacturing processes like machining and sheet metal work.
4.0	To understand the basic working principle of electric components	4.1	The students will be able to do residential house wiring and measure electric quantities-Voltage, Current and Power in R Circuit
5.0	To understand the basic working principle of electronic components	5.1	The students will be able to perform the assembling and testing of the PCB based electronic circuits.

GROUP-A (MECHANICAL AND CIVIL ENGINEERING)

I - CIVIL ENGINEERING PRACTICE **(15)**

Buildings:

a. Study of plumbing and carpentry components of residential and industrial buildings, Safety aspects

Plumbing:

a. Study of tools and operations
b. Hands-on-exercise: External thread cutting and joining of pipes

Carpentry:

a. Study of tools and operations
b. Hands-on-exercise: "L" joint and "T" joint

II - MECHANICAL ENGINEERING PRACTICE **(15)**

Welding:

a. Study of arc welding, gas welding tools and equipments
b. Arc welding- Butt joints, Lap joints and Tee joints
c. Practicing gas welding

Basic Machining:

a. Study of lathe and drilling machine
b. Facing and turning
c. Drilling and Tapping

Sheet Metal Work:

a. Study of tools and operations
b. Rectangular tray
c. Cone

GROUP - B (ELECTRICAL AND ELECTRONICS)

I - ELECTRICAL ENGINEERING PRACTICE	(15)

a. Residential house wiring using Switches ,fuse, indicator and lamp
b. Fluorescent lamp wiring
c. Stair Case Wiring
d. Measurement of electrical quantities - Voltage, current ,power in R Circuit
e. Study of Electrical apparatus-Iron box & water heater
f. Study of Electrical Measuring instruments - Megger

II - ELECTRONICS ENGINEERING PRACTICE	(15)

a. Study of Electronic components and various use of multi meter.
b. Measurement of AC signal parameter (peak-peak, RMS period, frequency) using CRO.
c. Study of logic gates AND, OR, XOR and NOT.
d. Study of Clock Signal.
e. Soldering practice -Components Devices and Circuits - Using general purpose PCB.
f. Study of Half Wave Rectifier (HWR) and Full Wave Rectifier (FWR).
g. Study of Telephone, FM Radio and Cell Phone.

TOTAL (P: 60) = 60 PERIODS

Mapping of COs with POs / PSOs

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	3	3	2	-	-	-	-	1	1	1	-	2	1	-
2	3	3	2	-	-	-	-	1	1	1	-	2	1	-
3	3	2	2	-	-	-	-	1	1	1	-	2	1	-
4	3	2	-	-	-	-	-	1	1	1	-	2	1	-
5	3	2	-	-	-	-	-	1	1	1	-	2	1	-
CO (W.A)	**3**	**2.4**	**2**	-	**-**	**-**	**-**	**1**	**1**	**1**	**-**	**2**	**1**	**-**

22CYP01- CHEMISTRY LABORATORY *(Common to AGRI,BME,CHEM,CIVIL,ECE,EEE and MECH Branches)*					
		L	**T**	**P**	**C**
		0	**0**	**2**	**1**
PRE REQUISITE : NIL					
Course Objectives		**Course Outcomes**			
1.0	To explain the origin of hardness, alkalinity, and chloride and dissolved oxygen in water.	**1.1**	The students will be able to acquire practical skills in the determination of water quality parameters through volumetric analysis		
2.0	To determine the copper in brass in the given solution.	**2.1**	The students will be able to evaluate the amount of copper in the given analyze by titration method.		
3.0	Enable the students to acquire knowledge of conductometric titrations and their calculations.	**3.1**	The students will be able to gain the knowledge about conductance of ions.		
4.0	To perform a potentiometric titration and pH of an acidic solution of known Normality.	**4.1**	The students will be able to analyze and gain experimental skill about activity of hydrogen ions and measures the voltage		
5.0	To know about pH of the solution and how to measure pH using pH meter.	**5.1**	The students will be able to utilize the fundamental laboratory techniques for analyses such as pH of acidic, basic and neutral solution.		

LIST OF EXPERIMENTS (Any Five)

1. Determination of total, temporary & permanent hardness of water by EDTA method.
2. Determination of alkalinity in water sample.
3. Determination of chloride content of water sample by Argentometric method.
4. Determination of DO content of water sample by Winkler's method.
5. Estimation of copper in brass by EDTA.
6. Conductometric titration of strong acid Vs strong base.
7. Estimation of iron content of the given solution using potentiometer.
8. Determination of strength of given hydrochloric acid using pH meter.

Total (P:30) = 30 periods

Mapping of COs with POs / PSOs														
COs	**POs**												**PSOs**	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	2	1		1	1	1					1	1	1	
2	2	1		1		1	2				1	1		
3	2			1		1	2				1	1		
4	2			1	2	1	2				1	1	1	
5	2	2		1		1	2					1		
CO (W.A)	**2**	**1**		**1**	**2**	**1**	**2**				**1**	**1**	**1**	

- Approved by Eleventh Academic Council

22MAN01 - INDUCTION PROGRAMME
(For Common To All Branches)

L	T	P	C
0	0	0	0

PRE REQUISITE : NIL

	Course Objectives		Course Outcomes
1.0	To help the student see the need for developing a holistic perspective of life	**1.1**	Students will be able to analyze the significance of value inputs provided in formal education along with skills and develop a broader perspective about life and education.
2.0	To sensitize the student about the scope of life – individual, family (inter-personal relationship), society and nature/existence.	**2.1**	Formulate their aspirations and concerns at different levels of living, and the way to fulfill them in a sustainable manner.
3.0	To strengthen self-reflection.	**3.1**	Evaluate their current state of understanding and living, and model a healthy lifestyle.
4.0	To develop more confidence and commitment to understand, learn and act accordingly.	**4.1**	Examine the issues of home sickness, interactions with seniors on the campus, peer pressure with better understanding and feel grateful towards parents, teachers and others.
5.0	To educate student the need of holistic development across all the fields.	**5.1**	Develop more confidence and commitment for value-based living in family, society and nature.

UNIT I - ASPIRATION AND CONCERNS

Getting to know each other - Individual academic, career - Expectations of family, peers, society, and nation - Fixing one's goals.

UNIT II - SELF MANAGEMENT AND HEALTH

Self-confidence, peer pressure, time management, anger, stress - Personality development, self- improvement – Health issues – healthy diet – healthy lifestyle – hostel life.

UNIT III - RELATIONSHIP AND SOCIETY

Home sickness - gratitude towards parents, teachers and others - Ragging and interaction Competition and cooperation - Peer pressure - Participation in society.

UNIT IV - NATURAL ENVIRONMENT

Participation in nature.

UNIT V - EDUCATION – HOLISTIC PERSPECTIVE

Review role of education Need for a holistic perspective.

REFERENCES:

AICTE model curriculum.

Mapping of COs with POs / PSOs														
COs	**POs**												**PSOs**	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1			2			2	2	3	1	2		3		
2			2			2	2	3	1	2		3		
3			2			2	2	3	1	2		3		
4			2			2	2	3	1	2		3		
5			2			2	2	3	1	2		3		
CO (W.A)			**2**			**2**	**2**	**3**	1	**2**		**3**		

22MAN02 - SOFT/ANALYTICAL SKILLS - I *(Common to All Branches)*				
	L	**T**	**P**	**C**
	1	**0**	**2**	**0**

PREREQUISITE : NIL

	Course Objectives		Course Outcomes
1.0	To understand the basic concepts of grammar and apply them in a structured manner.	**1.1**	The students will be able to intensify their awareness on correct usage of grammar in writing and speaking
2.0	To evaluate various real-life situations by resorting to an analysis of key issues and factors.	**2.1**	The students will be able to solve the real-time problems for performing job functions easily.
3.0	To solve mathematical problems and thereby reducing the time taken for performing job functions.	**3.1**	The students will be able to enhance their aptitude round clearing ability in interview process.

UNIT I - VERBAL ABILITY	**(5+10)**
Tenses - One word substitution - Articles - Preposition - Conjunction	
UNIT II - BASIC APTITUDE	**(5+10)**
Percentage - Ratio and Proportion - Blood Relations - Analogy	
UNIT III - LOGICAL REASONING	**(5+10)**
Probability - Profit and Loss - Syllogism - Statement Assumptions.	
TOTAL (L:15, P: 30) :45 PERIODS	

REFERENCES:

1. Dr. R.S. Aggarwal, "A Modern Approach to Verbal & Non-Verbal Reasoning", S Chand and Company Limited, New Delhi, 2014.
2. Ashish Aggarwal, "Quick Arithmetic", S Chand and Company Limited, New Delhi, 2014.
3. Raymond Murphy, "English grammar in use", 4th Edition, Cambridge University 2012.

Mapping of COs with POs / PSOs

Cos	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1									3	3		2	1	
2		3	2	2			1		2			3	1	
3		3	2	2			1		2			3	1	
CO (W.A)		**3**	**2**	**2**			**1**		**2.3**	**1**		**2.7**	**1**	

22MAN03 YOGA - I *(For Common To All Branches)*				
	L	**T**	**P**	**C**
	0	**0**	**I**	**0**

PRE REQUISITE : NIL

	Course Objectives		Course Outcomes
1.0	To make the students understand the importance of sound health and fitness principles as they relate to better health.	**1.1**	Students will able to Practice Physical activities and Hatha Yoga focusing on yoga for strength, flexibility, and relaxation.
2.0	To expose the students to a variety of physical and yogic activities aimed at stimulating their continued inquiry about Yoga, physical education, health and fitness.	**2.1**	Students will able to Learn breathing exercises and healthy fitness activities
3.0	To expose the students to a variety of physical and yogic activities aimed at stimulating their continued inquiry about Yoga, physical education, health and fitness.	**3.1**	Students will able to Identify opportunities for participation in yoga and sports activities
4.0	To develop among students an appreciation of physical activity as a lifetime pursuit and a means to better health.	**4.1**	Students will able to Develop understanding of health-related fitness components: cardio respiratory endurance, flexibility and body composition.
5.0	To Learn different types of Asanas	**5.1**	Students will able to Improve personal fitness through participation in yogic activities.

UNIT I - INTROUDCTION TO PHYSICAL EDUCATION	**(3)**
Meaning & definition of Physical Education - Aims & Objectives of Physical Education - Changing trends in Physical Education.	
UNIT II- PHYSICAL FITNESS, WELLNESS AND LIFESTYLE	**(3)**
Meaning & Importance of Physical Fitness & Wellness - Components of Physical fitness - Components of Health related fitness - Components of wellness - Preventing Health Threats through Lifestyle Change - Concept of Positive Lifestyle.	
UNIT III - INTROUDCTION TO YOGA	**(3)**
Meaning & Importance of Yoga - Elements of Yoga - Introduction - Asanas, Pranayama, Meditation & Yogic Kriyas - Yoga for concentration & related Asanas (Sukhasana; Tadasana; Padmasana & Shashankasana) - Relaxation Techniques for improving concentration - Yog-nidra.	
UNIT IV - YOGA AND LIFE STYLE	**(3)**
Asanas as Preventive measures - Hypertension:Tadasana, Vajrasana, Pavan Muktasana, Ardha Chakrasana, Bhujangasana, Sharasana - Obesity: Procedure, Beneits & contraindications fr Vajrasana, Hastasana, Trikonasana, Ardh Matsyendrasana - Back Pain: Tadasana, Ardh Matsyendrasana, Vakrasana, Shalabhasana, Bhujangasana - Diabetes: Procedure, Benefits & contraindications for Bhujangasana, Paschimottasana, Pavan Muktasana, Ardh Matsyendrasana - Asthema: Procedure, Benfits & contraindications of for Sukhasana, Chakrasana, Gomukhasana, Parvatasana, Bhujangasana, Paschimottasana, Matsyasana.	

UNIT V - PHYSICAL EXERCISES AND ASANAS	(3)
Hand Exercises - Leg Exercises - Eye Exercises - Asanas - Sun salutation - Tadasana - Yegapadhasana - Chakrasana - Udkaddasana - Thirikosana - Thandasana - Pjjimothasanam – Ustrasana – Vakrasana – Tolangulasana - Komugasana - Padmasana - Vajrasana - Sukhasana - Siddhasana - Parvatasana - Janushirasana - Mandukasana - Yogamudra - mahamudra.	
TOTAL (P:15) : 15 PERIODS	

TEXT BOOKS/REFERENCES:

1. Modern Trends and Physical Education by Prof. Ajmer Singh.
2. Light on Yoga by B.K.S. Iyengar.
3. Health and Physical Education – NCERT (11th and 12th Classes).

Mapping of COs with POs / PSOs

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1						2	2	3	2	2		3		
2						2	2	3	2	2		3		
3						2	2	3	2	2		3		
4						2	2	3	2	2		3		
5						2	2	3	2	2		3		
CO (W.A)						2	2	3	2	2		3		

- Approved by Eleventh Academic Council

22EYA02 - PROFESSIONAL COMMUNICATION - II *(Common to All Branches)*					
		L	**T**	**P**	**C**
		2	**0**	**2**	**3**
PREREQUISITE : 22EYA01					

Course Objectives		**Course Outcomes**	
1.0	To familiarize the students with the basic structures of English and to train them to use these elements correctly in speaking and writing	**1.1**	The students will be able to frame sentences both in written and spoken forms with accuracy and fluency.
2.0	To acquire proficiency in LSRW skills on par with the expectations of the industry.	**2.1**	The students will be able to attain and enhance competence in the four modes of literacy: Listening, Speaking, Reading and Writing.
3.0	To enable students to adopt strategies for enhancing vocabulary, language and fluency and to deliver professional presentations.	**3.1**	The students will be able to gain essential competency to express one's thoughts orally and in writing in a meaningful way.
4.0	To communicate effectively in an academic setting using the language skills as tools.	**4.1**	The students will be able to use linguistic structures to read and understand well-structured texts encountered in academic or social contexts.
5.0	To acquire necessary language skills to follow and comprehend discourse such as lectures conversations, interviews, and discussions.	**5.1**	The students will be able to perform various tasks, such as role plays, debates, group discussions apart from the use of correct spelling and punctuation.

UNIT I - LANGUAGE RUDIMENTS	**(6+6)**
Grammar - Active and Passive Voice – Impersonal Passive Voice - Numerical Expressions - **Listening** - Listening for Specific Information and Match / Choose / Fill in the texts - **Speaking** - Describing a Person - Making Plans -**Reading** - Intensive Reading -**Writing** - Job Application with Resume	
UNIT II - RHETORIC ENHANCERS	**(6+6)**
Grammar – Reported Speech – Infinitive and Gerund - **Listening** – Listening to Iconic Speeches and making notes - Listening news / documentaries - **Speaking** –Talking over Phone – Narrating Incidents - **Reading** – Extensive Reading (Motivational Books) - **Writing** – Recommendation	
UNIT III -TECHNICAL CORRESPONDENCE	**(6+6)**
Grammar – If Conditionals – Blended Words - **Listening** – Listening to business conversation on audio and video of Short Films, News, Biographies - **Speaking** – Synchronous communication and Asynchronous communication - Opportunities and threats in using digital platform- **Reading** - Finding key information in a given text - **Writing** –Netiquettes- Inviting Dignitaries - Accepting & Declining Invitation	
UNIT IV - CORPORATE COMMUNICATION	**(6+6)**
Grammar – Concord – Compound Words - **Listening** – Listening to Roles and Responsibilities in Corporate - Listening to technical videos - **Speaking** – Introduction to Technical Presentation - Story Telling - **Reading** – Reading and Understanding Technical Articles - **Writing** – Report Writing (Accident, Survey and feasibility)	
UNIT V - LANGUAGE BOOSTERS	**(6+6)**
Grammar - Idiomatic Expressions – Relative Clauses – Confusable words - **Listening** – Listening to different kinds of Interviews - Listening to Group Discussion - **Speaking** – Group Discussion - **Reading** – Reading and Interpreting Visual Materials - **Writing** – Analytical Paragraph Writing	

LIST OF SKILLS ASSESSED IN THE LABORATORY

1. Grammar
2. Listening Skills
3. Speaking Skills
4. Reading Skills
5. Writing Skills

TOTAL (L:30 , P:30) = 60 PERIODS

TEXT BOOK:

1. Sudharshana, N.P and Saveetha.C, "English for Technical Communication", Cambridge University Press, New Delhi, 2016 (Reprint 2017).

REFERENCES:

1. Rizvi, M Ashraf, "Effective Technical Communication", 2nd Edition, McGraw Hill Education India Pvt Ltd, 2017.
2. Rodney Huddleston, Geoffrey K. Pullum and Brett Reynolds, "A Student's Introduction to English Grammar", 2nd Edition, Cambridge University Press, New Delhi, 2022

WEB REFERENCE:

1. http://youtu.be/URtdGiutVew

Mapping of COs with POs / PSOs

Cos	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1									3	3		2	2	
2									3	3		2	2	
3									3	3		2	2	
4									3	3		2	2	
5									3	3		2	2	
CO (W.A)									**3**	**3**		**2**	**2**	

22MYB02 - PARTIAL DIFFERENTIAL EQUATIONS AND TRANSFORM TECHNIQUES *(Common to AGRI,CIVIL.CHEM, MECH Branches)*					
		L	**T**	**P**	**C**
		3	**1**	**0**	**4**
PRE REQUISITE : NIL					

Course Objectives		**Course Outcomes**	
1.0	To understand the concept of Fourier series and enhance the problem solving skills.	**1.1**	The students will be able to analysis the Fourier series problem
2.0	To acquire knowledge of Partial Differential Equations.	**2.1**	The students will be able to know the formation of partial differential equations and types of solutions.
3.0	To solve different forms of wave and heat equations	**3.1**	The students will be able to apply the partial differential equations to solve boundary value problems.
4.0	To gain the concept of Fourier transforms techniques used in wide variety of situations.	**4.1**	The students will be able to solve the problems using Fourier transforms and convolution theorem technique.
5.0	To apply the concepts of Laplace transforms & its applications to various problems related to Engineering	**5.1**	The students will be able to simplify calculations in system modeling

UNIT I - FOURIER SERIES	**(9+3)**
Dirichlet's condition - Fourier series: Half range sine series - Half range cosine series - Parseval's identity for half range series - Root mean square value of a function - Harmonic analysis.	
UNIT II - PARTIAL DIFFERENTIAL EQUATIONS	**(9+3)**
Formulation of partial differential equations by eliminating arbitrary constants and functions - Solution of standard types first order partial differential equations of the type f(p,q)=0,Clairaut's form - Lagrange's linear equations - Linear partial differential equation of second and higher order with constant coefficient of homogeneous types.	
UNIT III - APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS	**(9+3)**
Classification of second order quasi linear partial differential equations - Solution of one dimensional wave equation (Zero and non-zero velocity) - One dimensional heat equation (Temperature reduced to zero and non zero boundary conditions) - Steady state solution of two dimensional heat equation(Finite and infinite plate).	
UNIT IV - FOURIER TRANSFORM	**(9+3)**
Fourier integral theorem(Statement only) - Fourier transform pair - Sine and Cosine transforms - Properties -Transforms of simple functions - Convolution theorem - Parseval's identity(Excluding proof).	
UNIT V - LAPLACE TRANSFORM	**(9+3)**
Condition for existence - Transforms of Elementary functions - Basic Properties - First & Second Shifting Theorems (Statement only) - Initial and Final value Theorems. Inverse Laplace transforms - Convolution theorem (Excluding proof) - Solution of linear second order ordinary differential equations with constant coefficients using Laplace transform.	
TOTAL (L:45+T:15) :60 PERIODS	

TEXT BOOKS:

1. Veerajan.T,"Engineering Mathematics (for semester III), 3rd ed., Tata Mc Graw Hill, New Delhi.
2. Kandasamy.P, Thilagavathy.K, and Gunavathy.K., "Engineering Mathematics; Volume III", S.Chand& Co Ltd., 2008.
3. Grewal B.S, "Higher Engineering Mathematics", 42nd ed., Khanna publishers, New Delhi, 2012.

REFERENCES:

1. Goyal Manish and Bali.N.P,"A Text book of Engineering mathematics", 6th ed.,Laxmi Publication (P) Ltd,New Delhi, 2012.
2. Kreyszig, Erwin,"Advanced Engineering Mathematics", 9th ed., Wiley Publications, New Delhi, 2006.
3. Singaravelu.A,"Transforms and Partial Differential Equations", Reprint Edition 2013, Meenakshi Publications, Tamilnadu.

WEB REFERENCES:

1. https://youtu.be/HCHnXuQ2oME
2. https://www.youtube.com/watch?v=LYsIBqjQTdI&list=PLF6061160B55B0203&index=1
3. https://www.youtube.com/watch?v=9DgiyiRNw1g
4. https://youtu.be/IkAvgVUvYvY
5. https://www.youtube.com/watch?v=8oE1shAX96U&list=PLnVYEpTNGNtVH5YLVJsA2WxWXk6bAps-D&index=1

Mapping of COs with POs / PSOs

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	3	2	1	1					1			2		
2	3	2	1	1					1			2		
3	3	2	1	1					1			2		
4	3	2	1	1					1			2		
5	3	2	1	1					1			2		
CO (W.A)	3	2	1	1					1			2		

* Approved by Eleventh Academic Council

22PYB02 - ADVANCED MATERIALS AND NANO TECHNOLOGY *(Common to AGRI, CIVIL and CHEM Branches)*					
		L	**T**	**P**	**C**
		3	**0**	**0**	**3**
PREREQUISITE : NIL					

Course Objectives		**Course Outcomes**	
1.0	To gain adequate information about the properties of matter.	1.1	The students will be able to understand the fundamental concepts of properties of matter
2.0	To obtain the knowledge regarding the basics of thermal physics.	2.1	The students will be able to acquire knowledge about the basics of thermal physics.
3.0	To gain knowledge about the synthesis and properties of nanostructures.	3.1	The students will be able to explore the knowledge of synthesising methods and properties of nanostructures.
4.0	To expose the concepts of Photonics and fiber optics.	4.1	The students will be able to get adequate information about Photonics and fiber optics in the field of electrical and communication.
5.0	To update the recent development in Advanced new engineering materials	5.1	The students will be able to acquire knowledge about recent developments in Advanced new engineering materials

UNIT I - PROPERTIES OF MATTER	**(9)**
Elasticity - Hooke's law Stress-strain diagram and its uses - factors affecting elastic modulus and tensile strength - torsional stress and deformations - twisting couple - torsion pendulum: theory and experiment - bending of beams - bending moment - cantilever: theory and experiment - uniform and non-uniform bending: theory and experiment - I-shaped girders - stress due to bending in beams.	
UNIT II - THERMAL PHYSICS	**(9)**
Mode of heat transfer-thermal conductivity - Newton's law of cooling - thermal conduction through compound media (bodies in series and parallel) - thermal conductivity of a good conductor - Forbe's method - thermal conductivity of bad conductor - Lee's disc - Hazards - Seismology and Seismic waves Cyclone and flood hazards - Fire hazards and fire protection, fire - proofing of materials, fire safety regulations and firefighting equipment. Prevention and safety measures.	
UNIT III - SYNTHESIS AND PROPERTIES OF NANOSTRUCTURES	**(9)**
Introduction to Nanoscience -Types of nanostructure and properties of Nanomaterials - Synthesis and preparation of Nanomaterials - Nanosensors - Biosensors - Nanoscience and Environment.	
UNIT IV - PHOTONICS AND FIBER OPTICS	**(9)**
Photonics: Population of energy levels – Einstein's A and B coefficients derivation - Resonant cavity - Types of lasers - solid state laser (Neodymium) - gas laser (CO_2) Applications of lasers in science - Engineering - Medicine. **Fibre optics:** Principle, numerical aperture and acceptance angle - Types of optical fibres (Material, refractive index and mode) - Losses in optical fibre - Fibre optic communication Fibre optic sensors (pressure and displacement).	

UNIT V - ADVANCED NEW ENGINEERING MATERIALS	(9)
Ceramics - types and applications - composites: classification, role of matrix and reinforcement, processing of fiber reinforced plastics - metallic glasses: types, glass forming ability of alloys, melt spinning process, applications - shape memory alloys: phases, shape memory effect, pseudoelastic effect, NiTi alloy, application - Bio material - applications.	
TOTAL (L: 45) = 45 PERIODS	

TEXT BOOKS:

1. Dattuprasad, Ramanlal Joshi, "Engineering Physics" Tata McGraw hill education, 2019.
2. V.Rajendran," Engineering Physics", Tata McGraw-Hill. New Delhi.2017.
3. Marikani, "Materials Science", PHI Learning Private Limited, Eastern Economy Edition, 2018.

REFERENCES:

1. Subrahmanyam N, Brijlal, "A Text Book of Optics" S.Chand & Co. Ltd, New Delhi, 2017.
2. Kongbamchandramanisingh, "Basic Physics", PHI, 2018.
3. M.N.Avathanalu, P.G.Kshirsagar "A text book of engineering physics" S.Chand & company Ltd, 2017.

WEB LINKS

1. https://bayanbox.ir/view/7764531208313247331/Kleppner-D.-Kolenkow-R.J.-Introduction-to-Mechanics-2014.pdf.
2. https://physicaeducator.files.wordpress.com/2017/11/electricity_and_magnetism-by-purcell-3ed-ed.pdf.
3. https://rajeshvcet.home.blog/regulation-2021/ph3151-engineering-physics-study-materials/
4. https://zenodo.org/record/243407#.ZEgPZXZBzIU
5. https://farside.ph.utexas.edu/teaching/qmech/qmech.pdf.
   https://web.pdx.edu/~pmoeck/phy381/workbook%20nanoscience.pdf

Mapping of COs with POs / PSOs

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	3	3	3	-	-	-	-	-	1	1	-	2	-	-
2	3	2	3	-	-	-	-	-	1	1	-	1	-	-
3	3	2	3	-	-	-	-	-	1	1	-	1	-	-
4	2	2	2	-	-	-	-	-	-	-	-	1	-	-
5	2	1	2	-	-	-	-	-	1	1	-	2	-	-
CO (W.A)	2.6	2.0	2.6	-	-	-	-	-	1.0	1.0	0.0	1.0	-	-

22CSC01 - PROBLEM SOLVING AND C PROGRAMMING *(Common to All Branches)*				
L	**T**	**P**	**C**
3	**0**	**0**	**3**

PREREQUISITE : NIL

Course Objectives		Course Outcomes	
1.0	To understand problem solving, problem solving aspects, programming and to know about various program design tools.	**1.1**	The students will be able to identify the appropriate problem solving techniques to drive the solution for the given problem.
2.0	To learn basic structure and Control Statements in C programming.	**2.1**	The students will be able to implement the appropriate looping and control statements in C for developing applications.
3.0	To learn the manipulation of arrays and strings	**3.1**	The students will be able to develop programs on arrays of different dimensions of arrays and strings concepts.
4.0	To understand the concept of modular programming using user defined functions.	**4.1**	The students will be able to implement programs using user defined functions.
5.0	To acquaint with the use and benefits of Memory Allocation and file handling.	**5.1**	The students will be able to use dynamic memory allocation functions for assigning memory space during execution.

UNIT I - PROBLEM SOLVING AND C PROGRAMMING BASICS	**(9)**
General Problem Solving: Algorithms, Flowcharts and Pseudo-codes, implementation of algorithms **Basics of C Programming** : Introduction to C - Structure of C program - Programming Rules – Compilation – Errors - C Declarations: Tokens - keywords - identifiers - constants - data types - variable declaration and initialization - type conversion - constant and volatile variables - operators and expressions.	
UNIT II - DECISION CONTROL STATEMENTS	**(9)**
Managing Input and Output operations, Decision Control Statements: Decision control statements, Selection/conditional branching Statements: if, if-else, nested if, if-elif-else statements. Basic loop Structures/Iterative statements: while loop, for loop, selecting appropriate loop. Nested loops break and continue statements.	
UNIT III - ARRAYS AND STRINGS	**(9)**
Introduction to Array - Definition - Array initialization - Characteristics - One Dimensional Array - Array operations -Two dimensional arrays -Strings and String handling functions.	
UNIT IV - FUNCTIONS	**(9)**
Functions: Basics - definition - Elements of User defined Functions - return statement, Function types, Parameter Passing Techniques, Function returning more values - Passing Array to Functions - Recursion - Storage classes.	
UNIT V - POINTERS AND FILE MANAGEMENT	**(9)**
Pointer concepts - Pointers & Arrays, Structure concepts - Defining, Declaring, Accessing Member Variables, Structure within Structure - Union - File Management in C- Dynamic Memory Allocation	
TOTAL (L:45) :45 PERIODS	

TEXT BOOKS:

1. Ashok N. Kamthane, "Programming in C", 2nd Edition, Pearson Education, 2013.
2. Sumitabha Das, "Computer Fundamentals and C Programming", 1st Edition, McGraw Hill, 2018.

REFERENCES:

1. R. G. Dromey, "How to Solve it by Computer", Pearson Education India; 1st Edition, ISBN10: 8131705625, ISBN-13: 978-8131705629
2. Maureen Spankle, "Problem Solving and Programming Concepts", Pearson; 9th Edition, India, ISBN-10: 9780132492645, ISBN-13: 978- 0132492645
3. Yashavant Kanetkar, "Let us C", 16th Edition, BPB Publications, 2018.
4. ReemaThareja., "Programming in C ", 2nd Edition, Oxford University Press, New Delhi, 2018.
5. Balagurusamy E., "Programming in ANSI C", 7th Edition, Mc Graw Hill Education, 2017.

Mapping of COs with POs / PSOs

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	3	2	2	-	-	-	-	-	-	-	-	3	3	3
2	3	2	3	-	-	-	-	-	-	-	-	3	3	3
3	3	2	3	-	-	-	-	-	-	-	3	3	3	3
4	3	2	3	-	-	-	-	-	3	-	3	3	3	3
5	3	2	3	-	-	-	-	-	-	-	3	3	3	3
CO (W.A)	3	2	3	-	-	-	-	-	3	-	3	3	3	3

- Approved by Eleventh Academic Council

22CEC01 - FUNDAMENTALS OF ENGINEERING MECHANICS					
		L	T	P	C
		2	1	0	3
PREREQUISITE : NIL					
Course Objectives		**Course Outcomes**			
1.0	To learn the scalar and vector representation of forces and moments.	**1.1**	The students will be able to compute the resultant force for various force systems using laws of mechanics.		
2.0	To introduce the equilibrium of rigid bodies	**2.1**	The students will be able to calculate the moment produced by various force systems and conclude the static equilibrium equations for rigid body system		
3.0	To study and understand the meaning of distributed forces	**3.1**	The students will be able to evaluate the sectional properties of surfaces and solids		
4.0	To introduces the phenomenon of friction and its effects.	**4.1**	The students will be able to apply the concepts of frictional forces at the contact surfaces of various engineering systems.		
5.0	To Apply the various methods of evaluating kinetic and kinematic parameters of the rigid bodies subjected to concurrent coplanar	**5.1**	The students will be able to apply the different principles to study the motion of a body and analyse their constitutive equations .		

UNIT I - BASICS AND STATICS OF PARTICLES	**(6+3)**
Introduction - Units and Dimensions - Laws of Mechanics - Lame's theorem, Parallelogram and triangular Law of forces - Principle of Transmissibility - Coplanar Forces - Resolution and Composition of forces - Equilibrium of a particle - Forces in space - Equilibrium of a particle in space - Equivalent systems of forces.	
UNIT II - EQUILIBRIUM OF RIGID BODIES	**(6+3)**
Free body diagram - Types of supports and their reactions - requirements of stable equilibrium - Moments - Moment of a force about a point and about an axis - Varignon's theorem - Equilibrium of Rigid bodies in two dimensions.	
UNIT III - PROPERTIES OF SURFACES AND SOLIDS	**(6+3)**
Determination of Areas and Volumes - Centre of Gravity - First moment of area, Second moment of area and Centroid of sections - Rectangle, circle, triangle from integration - T section, I section, Angle section, Hollow section by using standard formula - Parallel axis theorem and perpendicular axis theorem - Principal moments of inertia of plane areas - Principal axes of inertia.	
UNIT IV - FRICTION	**(6+3)**
Surface Friction - Frictional force - Laws of Coulomb friction - Angle of friction - cone of friction - Simple contact friction - Ladder friction - Rolling Resistance - Problems involving the equilibrium of rigid bodies with frictional forces.	
UNIT V - DYNAMICS OF PARTICLES	**(6+3)**
Kinematics - Relative motion - Curvilinear motion, Kinetics - Displacements, Velocity and acceleration, their relationship - Newton's laws of motion - Work Energy Equation.	
TOTAL (L:30+T:15) = 45 PERIODS	

TEXTBOOKS:

1. N. Koteeswaran, "Engineering Mechanics", Sri Balaji Publications, 2017.
2. R. K. Bansal, "A Textbook of Engineering Mechanics", Laxmi Publications (P) Ltd, New Delhi, 6th Edition, 2015

REFERENCES:

1. Beer Ferdinand P., Russel Johnston Jr., David F. Mazure, Philip J. Cornwell, Sanjeev Sanghi, "Vector Mechanics for Engineers: Statics and Dynamics", 12th Edition, McGraw Hill Education, Chennai, 2019.
2. Irving H. Shames, " Engineering Mechanics - Statics and Dynamics", 4th Edition, Pearson Education Asia Pvt. Ltd., 2005
3. M. S. Palanisamy and S. Nagan, "Engineering Mechanics - Statics & Dynamics", TMH Publishing Company, 2005

Mapping of COs with POs / PSOs

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	3	3	2	2			3	2	2	3	2	2	1	3
2	3	3	2	2	3	2	3	2		1		2	2	2
3	3	3	2	2	2		2	2	2	3	3	3	2	3
4	3	3	2	2	2	2	3	2		3	2	3	1	2
5	3	2	2	1	2	2	2	2	1	2		2	2	2
CO (W.A)	**3.0**	**2.8**	**2**	**1.8**	**2.25**	**2**	**2.6**	**2**	**1.67**	**2.4**	**2.33**	**2.4**	**1.6**	**2.4**

22CYB08 - ENVIRONMENT AND SUSTAINABILITY

L	T	P	C
2	0	0	2

PRE REQUISITE : NIL

	Course Objectives		Course Outcomes
1.0	To recognize the basic concepts of environment, ecosystems and biodiversity.	**1.1**	The students will be able to know the importance of environment and functions ecosystems and biodiversity
2.0	To impart knowledge on the causes, effects and control measures of environmental pollution.	**2.1**	The students will be able to identify the causes, effects of environmental pollution and contribute the preventive measures to the society.
3.0	To make the students conversant with the global and Indian scenario of renewable resources, causes of their degradation and measures to preserve them.	**3.1**	The students will be able to identify and understand the renewable and non-renewable resources and contribute to the sustainable measures to preserve them for future generations.
4.0	To familiarize the concept of sustainable development goals, recognize and analyze climate changes, concept of carbon credit and the challenges of environmental management.	**4.1**	The students will be able to recognize the different goals of sustainable development and apply them for suitable technological advancement and societal development.
5.0	To inculcate and embrace sustainability practices and develop a broader understanding on green materials, energy cycles and analyzes the role of sustainable urbanization.	**5.1**	The students will be able to demonstrate the sustainability practices and identify green materials, energy cycles.

UNIT I - ENVIRONMENT AND BIODIVERSITY	**(6)**
Environment - scope and importance - Eco-system: Structure and function of an ecosystem - types of biodiversity - genetic - species and ecosystem diversity - values of biodiversity - hot-spots of biodiversity – conservation of biodiversity: In-situ and ex-situ.	
UNIT II - ENVIRONMENTAL POLLUTION	**(6)**
Pollution - Causes - Effects and Preventive measures of Water, Air and noise pollution - Solid waste management: methods of disposal of solid waste - Environmental protection act: Air act - Water act.	
UNIT III - RENEWABLE SOURCES OF ENERGY	**(6)**
Energy management and conservation - New Energy Sources: Different types of new energy sources - Solar energy - wind energy - Applications of Hydrogen energy, Ocean energy resources, Tidal energy conversion.	
UNIT IV - SUSTAINABILITY AND MANAGEMENT	**(6)**
Development - Factors affecting development - advantages - disadvantages - GDP - Sustainability - needs - concept - concept of carbon credit - carbon footprint - Environmental management.	
UNIT V - SUSTAINABILITY PRACTICES	**(6)**
Zero waste and R concept - ISO 14000 Series - Environmental Impact Assessment - Sustainable energy: Energy Cycles- carbon cycle and carbon emission - Green Engineering: Sustainable urbanization.	
TOTAL (L:30) : 30 PERIODS	

TEXT BOOKS:

1. Dr. A.Ravikrishan, "Envrionmental Science and Engineering", Sri Krishna Hitech Publishing co. Pvt.Ltd., Chennai,15th Edition, 2023.
2. Anubha Kaushik and C. P. Kaushik's "Perspectives in Environmental Studies", 6th Edition, New Age International Publishers, 2018.

REFERENCES:

1. Rajagopalan, R, "Environmental Studies-From Crisis to Cure", Oxford University Press, Third Edition, 2015.
2. Erach Bharucha, "Textbook of Environmental Studies for Undergraduate Courses" Orient Blackswan Pvt. Ltd. 2013.

WEBLINK:

1. http://www.jnkvv.org/PDF/08042020215128Amit1.pdf
2. https://www.conserve-energy-future.com/types-of-renewable-sources-of-energy.php
3. https://ugreen.io/sustainability-engineering-addressing-environmental-social-and-economic-issues/

Mapping of COs with POs / PSOs

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	2	2	2			3	3	2	1			2		
2	2	2	2			3	3	2	1			2		
3	2	2	2			3	3	2	1			2		
4	2	2	2			3	3	2	1			2		
5	2	2	2			3	3	2	1			2		
CO (W.A)	**2**	**2**	**2**			**3**	**3**	**2**	**1**			**2**		

- Approved by Eleventh Academic Council

22PYP01 - PHYSICS LABORATORY (Common to All Branches)					
		L	**T**	**P**	**C**
		0	**0**	**2**	**1**
PRE REQUISITE : NIL					
Course Objectives		**Course Outcomes**			
1.0	To provide the basic practical exposure to all the engineering and technological streams in the field of physics.	1.1	Students will be able to apply the concept of stress, strain and elastic limit for a given sample to find their properties		
2.0	To infer the practical knowledge by applying the experimental methods to correlate with the Physics theory.	2.1	Students will be able to gain the basic knowledge about handling the laser light and Identify the basic parameters of an optical fibre		
3.0	To enable the students to correlate the theoretical principles with application oriented studies.	3.1	Students will be able to analyze the properties of matter with sound waves		
4.0	To introduce different experiments to test basic understanding of physics concepts applied in optics and electronics	4.1	Students will be able to recall the knowledge of properties of light through spectrometer grating and fiber optic cable		
5.0	To analyze the behavior and characteristics of solar cells and LED	5.1	Students will be able to acquire the knowledge in semiconducting devices such as solar cells and LED		

Physics Laboratory

1. Determination of Young's modulus by non-uniform bending method
2. Determination of (a) wavelength and (b) particle size using Laser.
3. Determination of thermal conductivity of a bad conductor – Lee's Disc method.
4. Determination of wavelength of mercury spectrum – spectrometer grating
5. Determination of band gap of a semiconductor.
6. Determination of thickness of a thin wire – Air wedge method.
7. Determination of V-I characteristics of solar cell.

TOTAL (P:30) : 30 PERIODS

Mapping of COs with POs / PSOs														
COs	**POs**												**PSOs**	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**
1	3	3	3	-	-	-	-	-	-	1	-	2	1	-
2	3	3	2	-	-	-	-	-	-	-	-	1	1	-
3	3	3	2	-	-	-	-	-	1	-	-	1	-	-
4	3	2	3	-	-	-	-	-	-	-	-	2	-	-
5	3	2	2	-	-	-	-	-	-	1	-	1	-	-
CO (W.A)	**3.0**	**2.0**	**2.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**1.0**	**1.0**	**0.0**	**1.0**	**1.0**	**0.0**

- Approved by Eleventh Academic Council

22CSP01 - PROBLEM SOLVING AND C PROGRAMMING LABORATORY *(Common to All Branches)*					
		L	**T**	**P**	**C**
		0	**0**	**4**	**2**
PREREQUISITE : NIL					
Course Objectives		**Course Outcomes**			
1.0	To study, analyze and understand logical structure of a computer program, and different construct to develop a program in 'C' language.	**1.1**	The students will be able to identify the appropriate programming construct to develop programs for all types of problems.		
2.0	To study, analyze and implement the concepts of arrays and strings in C programming.	**2.1**	The students will be able to implement programs on arrays of different dimensions and string concepts.		
3.0	To learn the importance user defined functions and pointers.	**3.1**	The students will be able to develop programs using user defined functions and pointers.		
4.0	To gain knowledge in user defined data types and file handling functions in C programming	**4.1**	The students will be able to design programs using user defined data types and various file handling functions.		
5.0	To acquire skill in dynamic memory allocation	**5.1**	The students will be able to use dynamic memory allocation functions for assigning memory space during execution.		

C - Programming:

1. Draw the flowchart for the following using Raptor tool.
    a) Simple interest calculation
    b) Greatest among three numbers
    c) Find the sum of digits of a number
2. Programs for demonstrating the use of different types of operators like arithmetic, logical, relational and ternary operators (Sequential and Selection structures)
3. Programs for demonstrating repetitive control statements like 'for', 'while' and 'do-while' (Iterative structures)
4. Programs for demonstrating one-dimensional and two-dimensional numeric array
5. Programs to demonstrate modular programming concepts using functions
6. Programs to implement various character and string operations with and without built-in library functions.
7. Programs to demonstrate the use of pointers
8. Programs to illustrate the use of user-defined data types
9. Programs to implement various file management.
10. Program Using Dynamic memory allocation functions

HARDWARE / SOFTWARE REQUIRED FOR A BATCH OF 30 STUDENTS:
Hardware: • LAN System with 33 nodes (OR) Standalone PCs – 33 Nos. • Printers – 3 Nos. **Software:** • RAPTOR Tool • Compiler – C
TOTAL (P:60) : 60 PERIODS

Mapping of COs with POs / PSOs														
COs	**POs**												**PSOs**	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	3	2	2	-	-	-	-	-	-	-	-	3	3	3
2	3	2	3	-	-	-	-	-	-	-	-	3	3	3
3	3	2	3	-	-	-	-	-	-	-	3	3	3	3
4	3	2	3	-	-	-	-	-	3	-	3	3	3	3
5	3	2	3	-	-	-	-	-	-	-	3	3	3	3
CO (W.A)	3	2	2	-	-	-	-	-	3	-	3	3	3	3

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22MAN04 - SOFT/ANALYTICAL SKILLS - II *(Common to All Branches)*				
	L	**T**	**P**	**C**
	1	**0**	**2**	**0**

PREREQUISITE : 22MAN02

Course Objectives		Course Outcomes	
1.0	To acquire satisfactory competency in use of verbal reasoning.	**1.1**	The students will be able to enhance their vocabulary which in turn will be helpful in developing their speaking skills.
2.0	To develop skill to meet the competitive examinations for better job opportunity.	**2.1**	The students will be able to solve the problems easily by using Short-cut method with time management.
3.0	To enrich their knowledge and to develop their logical reasoning thinking ability.	**3.1**	The students will be able to analyze the problems logically and approach the problems in a different manner.

UNIT I - VERBAL COMPETENCY	**(5+10)**
Voice - Modal Verbs - Synonyms & Antonyms - Confusable Words	
UNIT II - NUMERICAL REPRESENTATION	**(5+10)**
Average - Data Interpretation - Simple Interest and Compound Interest - Venn Diagram.	
UNIT III - RESOLUTION TENDENCY	**(5+10)**
Time and Work - Pipes and Cistern - Number Series and Odd man Out - Cube Problems.	
TOTAL (L :15,P:30) : 45 PERIODS	

REFERENCES:

1. Ashish Aggarwal, "Quick Arithmetic", S Chand and Company Limited, New Delhi, 2014.
2. Dr. R.S. Aggarwal, "A Modern Approach to Verbal & Non-Verbal Reasoning", S Chand and Company Limited, New Delhi, 2014.
3. Raymond Murphy, "English grammar in use", 4th Edition, Cambridge University 2012.

Mapping of COs with POs / PSOs

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1									3	3		2	1	
2		3	2	2					2			3	1	
3		3	2	2					2			3	1	
CO (W.A)		**2**	**1.3**	**1.3**					**2.3**	**1**		**2.6**	**1**	

22MAN05 YOGA – II *(Common to All Branches)*				
	L	**T**	**P**	**C**
	0	**0**	**I**	**0**

PRE REQUISITE : NIL

	Course Objectives		Course Outcomes
1.0	To strengthen the body through physical exercises.	**1.1**	The Students will be able to perform physical exercises like spine exercises, massage and acupressure.
2.0	To understand the importance of value system and ethics.	**2.1**	The Students will be able to learn the human values, ethics, time management and the importance of introspection.
3.0	To know the life philosophy of yogis and maharishis.	**3.1**	The Students will be able to analyze various life philosophies of yogi's and rishi's.
4.0	To understand the nature laws, cause and effect theory.	**4.1**	The Students will be able to understand life lessons and nature laws.
5.0	To inculcate knowledge about different types of Asanas and their benefits.	**5.1**	The Students will be able to demonstrate different types of yoga Asanas and improve their personal fitness.

UNIT I - PHYSICAL EXCERCISES (PART-II)	**(3)**
Breathing Exercises - Kapalapathi - Maharasanam (Spine Exerices) - Massage and Acupressure.	
UNIT II - HUMAN VALUE	**(3)**
Divine power - Life force (Bio magnetism) - Importance of Introspection - Time management - Punctuality - self confidence - mind control.	
UNIT III - PHILOSOPHY OF LIFE	**(3)**
Basic needs for life - Hunger and thirst - climatic/weather changes - Body wastes - pressure of excretory organs - safety measures - protection from natural disaster - protection from enmity - protection from accidents - ethics - morality - duty - charity - Wisdom of perfection stages - faith - understanding - realization.	
UNIT IV - NATURE'S LAW OF CAUSE AND EFFECT	**(3)**
Food transformation into seven minerals - Natural actions - pattern - precision - regularity - Required skills - planned work - awareness - introspection.	
UNIT V - ASANAS (PART-II)	**(3)**
Ustrasana - Vakrasana - Komugasana - Padmasana - Vajrasana - Sukhasana - Yogamudra - Mahamudra.	
TOTAL (P:15) : 15 PERIODS	

TEXT BOOK/REFERENCES:

Light On Yoga by B.K.S. Iyengar.

Mapping of COs with POs / PSOs														
COs	**POs**												**PSOs**	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1						1	2	3	3	2	1	3		
2						1	2	3	3	2	1	3		
3						1	2	3	3	2	1	3		
4						1	2	3	3	2	1	3		
5						1	2	3	3	2	1	3		
CO (W.A)						1	**2**	**3**	**3**	**2**	1	**3**		

- Approved by Eleventh Academic Council

22MYB03 - STATISTICS AND NUMERICAL METHODS
(Common to Mechanical, Civil, Agriculture, Chemical Branches)

L	T	P	C
3	1	0	4

PRE REQUISITE : NIL

	Course Objectives		Course Outcomes
1.0	To acquaint the knowledge of testing of hypothesis for small and large samples which plays an important role in real life problems.	**1.1**	The students will be able to select a hypothesis testing method for the given numerical set of data to analyze the significance.
2.0	To understand the knowledge of design of experiments	**2.1**	The students will be able to apply analysis of Variance for the data set of selected number factors for analyzing the significance.
3.0	To introduce the basic concepts of solving algebraic and transcendental equations.	**3.1**	The students will be able to solve an algebraic or transcendental equation using an appropriate numerical method.
4.0	To introduce the numerical techniques of interpolation in various intervals and numerical techniques of differentiation and integration which plays an important role in Engineering and technology disciplines.	**4.1**	The students will be able to appreciate the numerical techniques of interpolation in various intervals and apply the numerical techniques of differentiation and integration for Engineering problems.
5.0	To acquaint the knowledge of various techniques and methods of solving ordinary differential equations.	**5.1**	The students will be able to solve the partial and ordinary differential equations with initial and boundary conditions by using certain techniques with Engineering applications.

UNIT I - TESTING OF HYPOTHESIS	**(9+3)**
Sampling Distributions-Tests for single mean, difference of means (Large and Small samples) Using z, t - distribution, F - distribution- Chi-square - Test for independence of attributes and Goodness of fit.	
UNIT II - DESIGN OF EXPERIMENTS	**(9+3)**
Analysis of variance - Completely randomized design - Randomized block design - Latin square design.	
UNIT III - SOLUTION OF EQUATIONS AND EIGEN VALUE PROBLEMS	**(9+3)**
Solution of algebraic and transcendental equations - Fixed point iteration method - Newton Raphson method- Solution of linear system of equations Gauss elimination method – Iterative methods of Gauss Jacobi and Gauss Seidel Methods- Eigen values of a matrix by Power method.	
UNIT IV - INTERPOLATION AND APPROXIMATION	**(9+3)**
Lagrange's and Newton's divided difference interpolations - Newton's forward and backward difference interpolation - Numerical single and double integrations using Trapezoidal and Simpson's 1/3 rules - Romberg's Methods.	
UNIT V - NUMERICAL DIFFERENTIATION AND INTEGRATION	**(9+3)**
Single step methods: Taylor's series method - Euler's method - Modified Euler's method - Fourth order Runge - Kutta method for solving first order differential equations - Multi step methods: Milne's and Adams - Bash forth predictor corrector methods for solving first order differential equations.	
TOTAL (L:45+T:15) : 60 PERIODS	

TEXT BOOKS:

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

REFERENCES:

1. Burden, R.L and Faires, J.D, "Numerical Analysis", 9th Edition, Cengage Learning, 2016.
2. Devore. J.L., "Probability and Statistics for Engineering and the Sciences", Cengage Learning, New Delhi, 8th Edition, 2014.
3. Gerald. C.F. and Wheatley. P.O. "Applied Numerical Analysis" Pearson Education, Asia, New Delhi, 7th Edition, 2007.

WEB REFERENCES:

1. https://youtu.be/zmyh7nCjmsg
2. https://youtu.be/NmgbFJ4UwPs
3. https://youtu.be/RgKy7URFx1c
4. https://archive.nptel.ac.in/courses/111/107/111107105/

Mapping of COs with POs / PSOs

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	3	3	1	1	1				1			2		
2	3	3	1	1	1				1			2		
3	3	2	1	1	1				1			2		
4	3	3	1	1	1				1			2		
5	3	2	1	1	1				1			2		
CO (W.A)	**3**	**3**	**1**	**1**	**1**				**1**			**2**		

22CEC02 - MECHANICS OF MATERIALS				
	L	T	P	C
	3	0	0	3
PREREQUISITE : 22CEC01				

	Course Objectives		Course Outcomes
1.0	To learn the fundamental concepts of Stress in simple and complex states	**1.1**	The students will be able to determine the stress and strain, principal stresses and principal planes.
2.0	To know induced stresses due to simple bending	**2.1**	The students will be able to determine Shear force and bending moment in beams and understand concept of theory of simple
3.0	To determine the deformation in determinate beams	**3.1**	The students will be able to calculate the deflection of beams by different methods and selection of method for determining slope or
4.0	To know the basic concepts of analysis of indeterminate beams.	**4.1**	The students will be able to analyze propped cantilever, fixed beams and continuous beams for external loadings and support settlements.
5.0	To know the mechanism of load transfer in beams and the induced stresses due to simple bending and unsymmetrical bending	**5.1**	The students will be able to determine the stresses due to unsymmetrical bending of beams.

UNIT I - SIMPLE AND COMPOUND STRESSES	**(9)**
Stresses in simple and compound bars - Elastic constants - Thin cylindrical and spherical shells - Biaxial state of stress - Principal stresses and principal planes - Torsion on circular shafts.	
UNIT II - BENDING OF BEAMS	**(9)**
Types of beams and transverse loadings - Shear force and bending moment for simply supported, cantilever and over-hanging beams - Theory of simple bending - Bending stress distribution - Shear stress distribution.	
UNIT III - DEFLECTION OF BEAMS	**(9)**
Double Integration method - Macaulay's method - Area moment method - Conjugate beam method - Strain energy method for determinate beams	
UNIT IV - INDETERMINATE BEAMS	**(9)**
Propped Cantilever and Fixed Beams - Fixed end moments reactions, slope and deflection for standard cases of loading - Continuous beams - support reactions and moments - Theorem of three moments - Shear Force and Bending Moment Diagrams.	
UNIT V - ADVANCED TOPICS	**(9)**
Bending stress in beams subjected to Unsymmetrical bending - Curved beams - Winkler Bach Theory - Rectangular, Circular, Trapezoidal sections - Thick cylinders - Compound cylinders.	
TOTAL (L:45) = 45 PERIODS	

TEXTBOOKS:

3. Rajput R.K. "Strength of Materials (Mechanics of Solids)", S.Chand & company Ltd., New Delhi, 2018.
4. Punmia B.C., Ashok Kumar Jain and Arun Kumar Jain, "Theory of Structures (SMTS) Vol - II", Laxmi Publishing Pvt Ltd, New Delhi 2017.
5. Vazirani.V.N, Ratwani.M.M, Duggal .S.K, "Analysis of Structures: Analysis, Design and Detailing of Structures-Vol.1", Khanna Publishers, New Delhi 2014.

REFERENCES:

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

Mapping of COs with POs / PSOs

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	3	3	1	-	-	2	-	-	-	-	-	1	2	2
2	3	3	2	-	-	2	-	-	-	-	-	2	3	3
3	3	3	2	-	-	2	-	-	-	-	-	2	2	2
4	3	3	2	-	-	2	-	-	-	-	-	1	2	3
5	3	3	2	-	-	2	-	-	-	-	-	1	2	2
CO (W.A)	3	2.8	1.8	-	-	2	-	-	-	-	-	1.4	2.2	2.4

22CEC03 - HIGHWAY AND RAILWAY ENGINEERING					
			L	T	P	C
			3	0	0	3
PREREQUISITE : NIL					
Course Objectives		**Course Outcomes**			
1.0	To give an idea on the highway engineering with respect to, planning, design, construction	**1.1**	The students will be able to identify the methods to plan a highways according to the principles and standards adopted in various institutions in India.		
2.0	To study the geometric design elements of highway	**2.1**	The students will be able to design the geometric features of road network and components of pavement.		
3.0	To study the concepts in highway planning and testing of materials	**3.1**	The students will be able to evaluate the properties of highway materials and know its properties and able to perform pavement evaluation and management.		
4.0	To give an overview about the railway engineering with respect to, planning, design, construction	**4.1**	The students will be able to analyse the methods of route alignment and design elements in railway planning and constructions.		
5.0	To study the railway track construction methods	**5.1**	The students will be able to apply the construction techniques and maintenance of track laying and railway stations.		

UNIT I - HIGHWAY ENGINEERING	**(9)**
Classification of highways - Institutions for Highway planning, design and construction at different levels - factors influencing highway alignment - Typical cross sections of Urban and Rural roads - Engineering surveys for alignment - Conventional and Modern method	
UNIT II - DESIGN OF HIGHWAY ELEMENTS	**(9)**
Cross sectional elements - Horizontal curves, super elevation, transition curves, widening of curves - Sight distances - Vertical curves, gradients - pavement components and their role - Design practice for flexible and rigid pavements (IRC methods only).	
UNIT III - HIGHWAY CONSTRUCTION AND MAINTENANCE	**(9)**
Bitumen, material testing and properties - Construction practice of flexible and concrete pavement - Highway drainage - Evaluation and Maintenance of pavements.	
UNIT IV - RAILWAY PLANNING AND CONSTRUCTION	**(9)**
Elements of permanent way - Rails, Sleepers, Ballast, rail fixtures and fastenings, Selection of gauges - Track Stress, coning of wheels, creep in rails, defects in rails - Route alignment surveys, conventional and modern methods - Geometric design of railway, gradient, super elevation, widening of gauge on curves (Problems) - Railway drainage.	
UNIT V - RAILWAY TRACK CONSTRUCTION MAINTENANCE AND OPERATION	**(9)**
Points and Crossings - Design of Turnouts, Working Principle -Track Circuiting - Construction and Maintenance - Conventional, Modern methods and Materials, Lay outs of Railway Stations and Yards, Rolling Stock, Tractive Power, Track Resistance - Role of Indian Railways in National Development - Railways for Urban Transportation - LRT & MRTS Feasibility study, Planning and construction.	
TOTAL (L:45) = 45 PERIODS	

TEXTBOOKS:

1. Khanna.S. K., Justo.C.E.G and Veeraragavan A. "Highway Engineering", Nemchand Publishers, 2014.
2. Subramanian K.P., "Highways, Railways, Airport and Harbour Engineering", SciTech Publications (India), Chennai,2010
3. Kadiyali.L.R. "Principles and Practice of Highway Engineering", Khanna Technical Publications, 6th Edition Delhi, 2015.
4. C. Venkatramaiah., "Transportation Engineering - Vol.2 Railways, Airports, Docks and Harbours, Bridges and Tunnels", Universities Press (India) Private Limited, Hyderabad, 2015.

REFERENCES:

1. Yang H. Huang, "Pavement Analysis and Design", Pearson Education Inc, Nineth Impression, South Asia,2012
2. Ian D. Walsh, "ICE manual of highway design and management", ICE Publishers, Ist Edition, USA,2011
3. Garber and Hoel, "Principles of Traffic and Highway Engineering", CENGAGE Learning, New Delhi,2010
4. IRC 37 - 2012,"The Indian roads Congress, Guidelines for the Design of Flexible Pavements", New Delhi
5. IRC 58 -2012, "The Indian Road Congress, Guidelines for the Design of Rigid Pavements for Highways", New Delhi
6. Saxena Subhash, C. and Satyapal Arora, "A Course in Railway Engineering", Dhanapat Rai and Sons, Delhi, 1998.

Mapping of COs with POs / PSOs

Cos	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	2	2	2	-	-	-	2	-	-	-	-	1	2	-
2	3	3	3	-	-	-	2	3	-	2	-	3	3	2
3	2	-	2	-	-	-	-	2	-	-	-	2	2	2
4	2	2	-	-	-	-	2	-	-	-	-	2	3	3
5	-	2	2	-	-	-		2	-	2	-	3	3	2
CO (W.A)	2.3	2.3	2.3	-	-	-	2	2.3	-	2	-	2.2	2.6	2.3

22CEC04 - SURVEYING					
		L	T	P	C
		3	0	0	3
PREREQUISITE : NIL					
Course Objectives		**Course Outcomes**			
1.0	To study the basic concepts of fundamental surveying	**1.1**	The students will be able to apply the concepts of chain and compass surveying principles.		
2.0	To impart knowledge on the leveling and contouring	**2.1**	The students will be able to compute the levels and to calculate the area and volume.		
3.0	To learn the various methods of plane and geodetic surveying to solve the real world problems.	**3.1**	The students will be able to predict the adjustments of theodolite for errors and tachometric surveying.		
4.0	To introduce the concepts of Control Surveying.	**4.1**	The students will be able to execute the hydrographic survey.		
5.0	To know the principles, concepts and applications of modern / digital surveying	**5.1**	The students will be able to apply the principles, concepts and applications of digital surveying.		

UNIT I - CHAIN AND COMPASS SURVEYING	**(9)**
Definition- Classifications - Plane and Geodetic Surveying - Basic principles - Equipment and accessories for ranging and chaining - Methods of ranging - well conditioned triangles - Compass - Types - Bearing - System and conversions - Sources of errors and Local attraction - Magnetic declination- Dip - Compass traversing and plotting - Closing error adjustment.	
UNIT II - LEVELING AND CONTOURING	**(9)**
Level line - Horizontal line - Datum - Bench marks - temporary and permanent adjustments - Methods of levelling - Fly levelling - Check levelling - Contouring - Methods - Characteristics and uses of contours. - Problems by using height of collimation and rise and fall method.	
UNIT III - THEODOLITE AND TACHEOMETRIC SURVEYING	**(9)**
Theodolite - Types - Horizontal and vertical angle measurements - Temporary and permanent adjustments -Tacheometric systems - Tangential and stadia methods - Stadia systems - Determination of stadia constants	
UNIT IV - HYDROGRAPHIC SURVEYING	**(9)**
Introduction to Hydrographic surveying - Tides - Mean Sea Level - Vertical depth measurements - Soundings - Methods of locating soundings	
UNIT V - DIGITAL SURVEYING	**(9)**
Introduction, aerial photogrammetry, types of EDM instruments. Total station - Principles of remote sensing and its applications.	
TOTAL (L:45) = 45 PERIODS	

TEXTBOOKS:

1. Dr. B. C. Punmia, Ashok K. Jain and Arun K Jain, "Surveying Vol. I & II", Lakshmi Publications Pvt Ltd, New Delhi, Sixteenth Edition, 2016.
2. Duggal R.K, "Surveying Vol. I & II", Tata McGraw Hill Publishing Company Ltd., New Delhi, 2004.

REFERENCES:

1. R. Subramanian, "Surveying and Levelling", Oxford University Press, Second Edition, 2012.
2. Bannister and S. Raymond, "Surveying", Seventh Edition, Longman 2004.
3. S. K. Roy, "Fundamentals of Surveying", Second Edition, Prentice Hall of India 2010.
4. K. R. Arora, "Surveying Vol I & II", Standard Book house, Twelfth Edition 2013.
5 C. Venkatramaiah, "Textbook of Surveying", Universities Press, Second Edition, 2011.

Mapping of COs with POs / PSOs

Cos	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	3	2	-	-	-	-	-	2	2	-	-	2	2	3
2	3	3	2	2	-	-	-	-	2	-	-	2	3	3
3	2	2	-	2	-	-	-	-	-	-	-	2	2	3
4	2	-	-	-	2	-	-	-	2	2	2	2	3	3
5	3	2	2	-	3	-	-	2	2	2	2	3	3	3
CO (W.A)	**2.6**	**2.3**	**2**	**2**	**2.5**	-	**-**	**2**	**2**	**2**	**2**	**2.2**	**2.6**	**3**

22CEC05 - CONSTRUCTION MATERIALS AND PRACTICES				
	L	T	P	C
	3	0	2	4

PREREQUISITE : NIL

	Course Objectives		Course Outcomes
1.0	To gain knowledge about the various materials used for the construction work.	**1.1**	The students will be able to identify the role of bricks, stones, cement and rocks in construction.
2.0	To study the basic properties of concrete and steel.	**2.1**	The students will be able to infer the properties of concrete and steel as construction materials.
3.0	To get idea on the market forms of mortar , timber, steel	**3.1**	The students will be able to identify the usage of modern materials used in buildings.
4.0	To imparts knowledge on the construction and the construction techniques	**4.1**	The students will be able to interpret the various construction practices and techniques adopted in building construction.
5.0	To know the types of floors and roofs, plastering, damp proof courses and various support structures adopted in building construction.	**5.1**	The students will be able to select various equipment's for construction works conditioning of building

UNIT I - BUILDING MATERIALS	**(9)**
Introduction and types of building materials - Properties - Physical and mechanical properties. Stones and Rocks: Classification of Rocks - Qualities of good stones - Uses. Bricks: Constituents - Qualities of good brick - Classification - Uses. Cement: Ingredients - Qualities of good cement - Types and Uses of cement.	
UNIT II - MORTAR, CONCRETE AND STEEL	**(9)**
Mortar: Types of Mortars - Properties - Uses - Selection of mortar. Concrete: Ingredients - Types of Concrete - Properties - Uses - Reinforced concrete. Steel: Steel sections - steel as a reinforcing material - Types of reinforcing steels.	
UNIT III - OTHER MATERIALS	**(9)**
Timber: Characteristics of timber - Seasoning of timber - Properties and uses - Common forms of timber - Plywood - Veneer - False ceiling materials - Aluminum - Uses - Market forms - Glass - Ceramics - Refractories - Composite Materials - Types and applications - FRP - Fibre textiles - Geomembranes and Geotextiles for earth reinforcement.	
UNIT IV - CONSTRUCTION PRACTICES AND SERVICE REQUIREMENTS	**(9)**
Types of Foundations - Shallow and Deep Foundations - Stone Masonry - Brick Masonry - Plastering and Pointing - Cavity Walls - Diaphragm Walls - Formwork - Centering and Shuttering - Shoring - Scaffolding - Underpinning - Roofing - Flooring - Joints in concrete - Contraction/Construction/Expansion joints - Fire Protection - Thermal Insulation - Ventilation and Air conditioning - Acoustics and Sound Insulation - Damp Proofing.	

UNIT V - CONSTRUCTION EQUIPMENTS	(9)
Selection of equipment for earthwork excavation, concreting, material handling and erection of structures - Dewatering and pumping equipment.	

LIST OF EXPERIMENTS:

1. Determination of Tension on mild steel rod.
2. Determination of Compression strength on Bricks and Blocks.
3. Determination of Water Absorption Test on Bricks and Blocks.
4. Determination of Izod and Charpy impact test on metal specimens.
5. Finding out the Rockwell Hardness Number on metal Specimens.
6. Finding out the Brinell hardness test on metal Specimens.
7. Determination of Torsional strength of steel specimen.

TOTAL (L:45+P:30) = 75 PERIODS

TEXTBOOK:

1. Palanichamy M.S., "Basic Civil Engineering", 4th Edition, McGraw-Hill Education, New Delhi, 2020.

REFERENCES:

1. Navaneethakrishnan P., "Basic of Civil and Mechanical Engineering", 1st Edition, McGraw-Hill Education, New Delhi, 2016
2. Duggal S.K., "Building Materials", 5th Edition, New Age Publishers, 2021.

Mapping of COs with POs / PSOs

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	2	-	2	-	-	-	-	2	-	-	-	2	3	-
2	2	-	2	-	-	-	2	2	-	2	-	2	3	-
3	2	-	-	--	-	-	2	2	-	-	-	2	2	2
4	2	-	3	-	-	-	-	-	-	2	-	2	2	2
5	2	-	2	-	2	-	-	-	-	-	-	2	-	2
CO (W.A)	2	-	2.3	-	2	-	2	2	-	2	-	2	2.5	2

22CEC06 - FLUID MECHANICS AND HYDRAULICS ENGINEERING

L	T	P	C
3	0	2	4

PREREQUISITE : NIL

	Course Objectives		Course Outcomes
1.0	To provides knowledge about fluid properties.	**1.1**	The students will be able to predict the properties and characteristics of fluids.
2.0	To introduce the basic concepts of fluid dynamics.	**2.1**	The students will be able to classify different types of flow and compute the components related to various flows.
3.0	To understand the types of flow and velocity measurement in open channel. through	**3.1**	The students will be able to design economical sections for open channel flow.
4.0	To estimate head loss of flow through pipes and identify the conditions for choosing boundary conditions.	**4.1**	The students will be able to classify the various flow profiles and calculate the boundary layer thickness.
5.0	To study the performance of a model by dimensional analysis and similitude.	**5.1**	The students will be able to evaluate the dimensional and model parameters to solve complex fluid problems.

UNIT I - FLUID PROPERTIES, STATICS AND KINEMATICS	**(9)**
Properties of fluids - Types of fluids- Hydrostatic law - Pascal's law- Types and measurement of pressure - Hydrostatic pressure -Total pressure - Centre of pressure - Buoyancy - Metacentre - Equilibrium conditions.	
UNIT II - FLUID DYNAMICS	**(9)**
Classification and types of flow - flow lines and Path lines - Continuity equation - Velocity potential function and Stream function - Flow net - Euler's equation of motion - Bernoulli's equation and its applications	
UNIT III - OPEN CHANNEL FLOW	**(9)**
Types of flow- Specific energy - Critical flow - Velocity measurements by Manning's and Chezy' formula - Most economical sections- Characteristics and types of flow profiles- Back water and draw down curves – Surface profile calculations	
UNIT IV - FLOW THROUGH PIPES AND BOUNDARY LAYER	**(9)**
Flow through Pipes in series and parallel - Darcy Weisbach's formula-.Moody diagram - Hydraulic Jumps - Surges. Boundary layer concept, thickness and classification.	
UNIT V - DIMENSIONAL AND MODEL ANALYSIS	**(9)**
Dimensional analysis - Dimensional parameters - Rayleigh's method and Buckingham's Pi theorem - Model analysis - Hydraulic structures - Similitude - Scale effect - Distorted and undistorted models.	

LIST OF EXPERIMENTS:

1. Determination of Co-efficient of discharge of Orifice meter,
2. Determination of Co-efficient of discharge of Venturi meter.
3. Determination of friction loss in pipes
4. Determination of various types of minor losses in pipes
5. Evaluation of the performance characteristics of Pelton turbine
6. Evaluation of the performance characteristics of Francis / Kaplan turbine
7. Determination of Metacentric height of floating bodies
8. Evaluation of the performance characteristics of submersible pump

TOTAL (L:45+P:30) = 75 PERIODS

TEXTBOOK:

1. Bansal R.K., "A Textbook of Fluid Mechanics and Hydraulic Machines", 10th Edition, Laxmi Publications, New Delhi, 2018.

REFERENCES:

1. Modi P.M., and Seth S.M., "Hydraulics and Fluid Mechanics including Hydraulic Machines", 21st Edition, Standard Book House, New Delhi, 2017.
2. Victor L. Streeter, Benjamin E. Wylie and Bedford K.W., "Fluid Mechanics", 9th Edition, McGraw-Hill, India, 2010.

Mapping of COs with POs / PSOs

Cos	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	3	2	-	-	-	3	-	-	-	-	-	2	3	3
2	3	2	-	-	-	3	-	-	-	-	-	2	3	3
3	3	2	-	2	-	3	2	2	-	-	-	2	3	3
4	3	3	2	1	-	3	2	-	-	-	-	2	3	3
5	3	3	-	-	-	3	-	-	-	-	-	2	3	3
CO (W.A)	3	2.4	2	1.5	-	3	2	2	-	-	-	2	3	3

22CEP01- SURVEYING LABORATORY					
		L	T	P	C
		0	0	4	2
PREREQUISITE : NIL					
Course Objectives		**Course Outcomes**			
1.0	To apply the knowledge, techniques, skills, and applicable tools of the discipline to engineering and surveying activities.	**1.1**	The students will be able to apply the usage of basic surveying instruments like chain/tape, compass and levelling instruments.		
2.0	To measure the height and distance by Theodolite.	**2.1**	The students will be able to find the level differences and distances between the points.		
3.0	To familiarize concepts of bearing and included angles using different compass.	**3.1**	The students will be able to measure the angles by theodolite surveying.		
4.0	To impart knowledge on the principles of surveying and create awareness on the various methods of surveying, type of instruments and computations.	**4.1**	The students will be able to evaluate necessary surveys for social infrastructures.		
5.0	To get practice on total station.	**5.1**	The students will be able to analyse the various topography using total station		

LIST OF EXPERIMENTS:

1. Measurement of bearings of sides of a traverse with prismatic compass
2. Fixing bench mark with respect to temporary bench mark with dumpy level by fly leveling.
3. Contour plan of given area.
4. Determination of elevation of various points using dumpy level by rise and fall method.
5. Determination of elevation of various points using dumpy level by Height of Collimation Method.
6. Measurements of Horizontal Angles by method of repetition.
7. Study on Setting up of Total Station.
8. Remote elevation Measurement using Total Station
9. Missing Line Measurement Using Total Station
10. Area measurement using Total Station
11. Study on layout preparation using total station

TOTAL (P:60) = 60 PERIODS

TEXTBOOKS:

1. Dr. B. C. Punmia, Ashok K. Jainand Arun K Jain, "Surveying Vol. I & II", Lakshmi Publications Pvt Ltd, New Delhi, 17th Edition, 2016.
2. James M. Anderson and Edward M. Mikhail, "Surveying, Theory and Practice", Seventh Edition, McGraw Hill 2001
3. Bannisterand S. Raymond, "Surveying", Seventh Edition, Longman 2004
4. David Clark, "Plane and Geodetic Surveying for Engineers, Volume I", Constable and Company Ltd, London, CBS, 6th Edition, 2004.

REFERENCES:

1. T. P. Kanetkarand S. V. Kulkarni, "Surveying and Levelling - Parts 1 & 2", Vidyarthi Griha Prakashan, Pune, 24th Reprint, 2015.
2. S. K. Roy, "Fundamentals of Surveying", Second Edition, Prentice Hall of India 2004
3. K. R. Arora, "Surveying Vol. I & II", Standard Book house, Eleventh Edition, 2013.

Mapping of COs with POs / PSOs

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	3	2	-	-	-	-	-	2	2	-	-	2	2	3
2	3	3	2	2	-	-	-	-	2	-	-	2	3	3
3	2	2	-	2	2	-	-	-	-	-	-	2	2	3
4	2	-	-	-	2	-	-	-	2	2	2	2	3	3
5	3	2	2	-	3	-	-	2	2	2	2	3	3	3
CO (W.A)	2.6	2.3	2	2	2.3	-	-	2	2	2	2	2.2	2.6	3

22CEP02 - COMPUTER AIDED BUILDING DRAWING - I				
	L	T	P	C
	0	0	4	2

PREREQUISITE : NIL

	Course Objectives		Course Outcomes
1.0	To impart knowledge and skill relevant to Building drawing and Detailing lab using computer software.	**1.1**	The students will be able to apply the various basic commands for drafting and know the types of coordinate.
2.0	To make the students learn the various elements of Residential buildings.	**2.1**	The students will be able to sketch the detailed drawings of plan, elevation and section of a residential building.
3.0	To impart a thorough knowledge on the computer aided analysis and design of structural components.	**3.1**	The students will be able to apply the NBC provisions and Byelaws.
4.0	To study the different types of buildings and their views.	**4.1**	The students will be able to prepare plan, section and elevation for residential building.
5.0	To impart fundamental knowledge on AutoCAD to make the students draw the structures, the plan, elevation and sectional view of a building.	**5.1**	The students will be able to draw the plan, elevation and sectional view of the load bearing structure.

LIST OF EXPERIMENTS:

1. Introduction to AutoCAD and basic drafting tools /commands
2. Building Planning - NBC provisions and Bye-laws -Terminologies, Orientation, Ventilation & Lighting
3. Preparation of key plan and site plan
4. Draw the Building Elements - Foundations, Super structure, Roof, Staircase, Doors and Windows
5. Draw the Building Elements - Types of Roofs and Staircase
6. Draw the Building Elements - Types of Doors and Windows
7. Preparation of approval plan for a Residential Building
8. Drawing the Plan, Elevation and Section of a residential Building with Load Bearing Wall (Flat roof)
9. Draw a Plan, Elevation and Section of sloped roof residential building with load bearing wall
10. Draw a Single floor residential building - Plan, Section and Elevation

TOTAL (P:60) = 60 PERIODS

REFERENCES/ MANUAL /SOFTWARE:

1. Reference manual for AutoCAD
2. Sikka V.B., "A course in Civil Engineering Drawing", 4th Edition, S.K.Kataria and Sons, 2015.
3. Bhavikatti, S.S and Chitawadagi, M.V., "Building Planning and Drawing", I.K. International Publishing House Pvt.Ltd. New Delhi,2019

Mapping of COs with POs / PSOs														
Cos	**POs**												**PSOs**	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**
1	2	-	2	-	3	-	-	-	-	-	-	3	3	3
2	2	-	2	-	2	-	-	-	-	-	-	3	3	3
3	3	-	2	-	-	-	-	-	-	2	2	3	3	3
4	2	-	-	2	2	2	-	-	2	2	2	3	3	3
5	2	-	-	2	2	2	-	-	2	-	2	3	3	3
CO (W.A)	**2.2**	**-**	**2**	**2**	**2.3**	**2**	**-**	**-**	**2**	**2**	**2**	**3**	**3**	**3**

22MAN07 - SOFT / ANALYTICAL SKILLS - III *(Common to All Branches)*				
	L	**T**	**P**	**C**
	1	**0**	**2**	**0**

PRE REQUISITE : NIL

Course Objectives		**Course Outcomes**	
1.0	Improving overall language proficiency for personal or professional reasons	**1.1**	The students will be able to enhance their writing skills
2.0	To develop problem solving skills across all levels	**2.1**	The students will be able to develop problem solving skills across all levels
3.0	To develop students to workout solutions for problems that involving general reasoning.	**3.1**	The students will be able to solve reasoning problems with ease.

UNIT I - VERBAL COMPETENCY	**(5+10)**
Sentence Selection - Paragraph Formation - Sentence Correction - Spellings.	
UNIT II - APTITUDE	**(5+10)**
Clocks, Calendar, Age Problems - Problem on Trains - Problems on Numbers - Partnerships.	
UNIT III - LOGICAL & REASONING	**(5+10)**
Coding & Decoding - Logical Equivalent - Venn Diagram Problem.	
TOTAL (L:15, P:30) : 45 PERIODS	

REFERENCES:

1. Dr. R.S. Aggarwal, "A Modern Approach to Verbal and Non-Verbal Reasoning", S Chand and Company Limited, New Delhi, 2014.
2. Ashish Aggarwal, "Quick Arithmetic", S Chand and Company Limited, New Delhi, 2014.
3. Raymond Murphy, "English grammar in use", Fourth Edition, Cambridge University, 2012.

Cos	**Mapping of COs with POs / PSOs**													
	POs												**PSOs**	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**
1	-	-	-	-	-	-	-	-	3	3	-	2	-	1
2	-	3	2	2	-	-	1	-	2	-	-	3	2	-
3	-	3	2	2	-	-	1	-	2	-	-	3	2	-
CO (W.A)	-	2	1.3	1.3	-	-	0.6	-	2.3	1	-	2.6	1.3	0.3

22CEC07 - STRUCTURAL ANALYSIS					
		L	T	P	C
		3	I	0	4
PREREQUISITE : NIL					
Course Objectives		**Course Outcomes**			
1.0	To analysis determinate and indeterminate structures slope deflection method.	**1.1**	The students will be able to evaluate shear force and bending moment for beams and rigid frames using slope defection method.		
2.0	To determine end moments and constructing shear force and bending moment diagrams for the continuous beams.	**2.1**	The students will be able to determine the bending moment of beams and rigid frames using moment distribution method.		
3.0	To determine end moments for the beams and portal frames by flexibility matrix method.	**3.1**	The students will be able to determine the bending moment using flexibility matrix methods.		
4.0	To analyse the continuous beams and portal frames by stiffness matrix method.	**4.1**	The students will be able to determine the bending moment using stiffness matrix method.		
5.0	To analysis structures for moving loads.	**5.1**	The students will be able to analyse the beams subjected to moving loads.		

UNIT I - SLOPE DEFLECTION METHOD	**(9+3)**
Introduction to displacement method of analysis - Sign Conventions - Development of slope deflection equations - Analysis of continuous beams - Analysis of continuous beams with support settlement - Analysis of non-sway frames - Analysis of sway frames.	
UNIT II - MOMENT DISTRIBUTION METHOD	**(9+3)**
Introduction to moment distribution method - Stiffness factor - Carryover factor and distribution Factor - Analysis of continuous beams - Sinking of supports - Analysis of non-sway frames - Analysis of sway frames.	
UNIT III - FLEXIBILITY MATRIX METHOD	**(9+3)**
Introduction - Static and kinematic indeterminacy - Equilibrium and compatibility conditions - Primary structure - Element and global flexibility matrix - Applications - Analysis of indeterminate beams, frames and trusses (Redundancy restricted to two).	
UNIT IV - STIFFNESS MATRIX METHOD	**(9+3)**
Introduction to matrix methods of analysis - Displacement and force transformation matrices - Element and global stiffness matrix - Applications - Analysis of indeterminate beams - Analysis of portal frames - Analysis of trusses (Redundancy restricted to two).	
UNIT V - MOVING LOADS AND INFLUENCE LINES	**(9+3)**
Influence lines for reactions in statically determinate structures - Influence lines for member forces in pin-jointed frames - Influence lines for shear force and bending moment in beam sections - Muller Breslau's principle - Influence lines for continuous beams (2-degree redundant structures)	

TOTAL (L:45+T:15) = 60 PERIODS

TEXTBOOKS:

1. Devdas Menon, "Structural Analysis", 2nd Edition, Narosa Publishing House, New Delhi, 2018.
2. Vaidyanathan, R and Perumal, P., "Comprehensive Structural Analysis Volume I and II", Laxmi Publications Pvt. Ltd., Chennai, 4th ed., 2016.
3. S.S.Bhavikatti, "Structural Analysis - Vol. I & II", Vikas Publishing Pvt Ltd., New Delhi, 4th ed., 2013.

REFERENCES:

1. Hibbeler, R.C, "Structural Analysis", 10th Edition, Pearson India, Bengaluru, 2018.
2. Punmia.B.C, Ashok K.Jain, ArunK.Jain, "Theory of Structures", 13th Edition, Laxmi Publications, New Delhi, 2017

Mapping of COs with POs / PSOs

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	3	3	2	-	-	2	-	-	-	-	-	2	3	2
2	3	3	2	-	-	2	-	-	-	-	-	2	3	2
3	3	3	2	-	-	2	-	-	-	-	-	2	3	3
4	3	3	2	-	-	2	-	-	-	-	-	2	3	3
5	3	3	2	-	-	2	-	-	-	-	-	2	3	3
CO (W.A)	**3**	**3**	**2**	**-**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**2**	**3**	**2.6**

22CEC08 - WATER RESOURCES AND IRRIGATION ENGINEERING				
	L	T	P	C
	3	0	0	3

PREREQUISITE : NIL

	Course Objectives		Course Outcomes
1.0	To expose the clear knowledge on Water Resources, Irrigation Engineering concepts and National Water Policy.	**1.1**	The students will be able to identify the components of water storage structures along with its functions.
2.0	To impart knowledge on water policy and water resource management.	**2.1**	The students will be able to infer the importance of water resource. management
3.0	To emphasis the need and importance of Irrigation.	**3.1**	The students will be able to compute the delta, duty relationship and irrigation.
4.0	To provide training on design of impounding structures.	**4.1**	The students will be able to identify the types of canal irrigation and analyze the functions of diversion head works.
5.0	To impart knowledge on Reservoir management and Irrigation management practices.	**5.1**	The students will be able to apply participatory irrigation management and infer the types of irrigation methods.

UNIT I - WATER RESOURCES	**(9)**
Need for water resources - Water resources of Tamil Nadu and India - Planning of water resources - Assessment of water requirement for drinking and irrigation purposes - Reservoirs - Single and multipurpose reservoir - Multi objective - Storage capacity of reservoirs - Reservoir operation strategies - Design flood level - levees and flood walls.	
UNIT II - WATER RESOURCE MANAGEMENT	**(9)**
Financial aspects of water resources planning - National Water Policy - Consumptive and non - consumptive water use - Water quality - Scope and aims of master plan - Idea of basin as a unit for development - Water budget - Conjunctive use of surface and ground water.	
UNIT III - IRRIGATION ENGINEERING	**(9)**
Need - Advantages and Disadvantages - Connection between Duty, Delta and Base period - Causes affecting duty - Problems - Irrigation efficiencies - problems - Seasonal crops of India - Crop water Requirement - Evaluation of Consumptive use of water.	
UNIT IV - CANAL IRRIGATION	**(9)**
Types of impounding structures: Gravity dam - Diversion Head works - Canal drop - Cross drainage works - Canal regulations - Canal outlets - Canal classifications - Alignment of canals - River Training works - Kennedy's and Lacey's Regime theory.	
UNIT V - IRRIGATION METHODS AND MANAGEMENT	**(9)**
Types of Irrigation - Lift irrigation - Tank irrigation - Well irrigation - Irrigation methods: Surface and Sub - Surface and Micro irrigation - Merits and demerits - Irrigation scheduling - Water distribution - Participatory irrigation management with a case study - On farm development works - Participatory irrigation management - Case study.	
TOTAL (L:45) = 45 PERIODS	

TEXTBOOKS:

1. Garg S.K., "Water Resources Engineering Vol. II Irrigation Engineering and Hydraulic Structures", 34th Edition, Khanna Publishers,New Delhi, 2016.
2. Punmia B.C. and Pande B.B .Lal," Irrigation and Water Power Engineering", Laxmi Publishing, New Delhi, 2007
3. Asawa G.L., "Irrigation and Water Resources Engineering", 1st Edition, New Age International Publishers, New Delhi, 2005.

REFERENCES:

1. Suresh Ukarande, "Irrigation Engineering and Hydraulic Structures", 3rd Edition, Ane Books Pvt. Ltd., New Delhi, 2015.
2. Sharma R.K. "Irrigation Engineering", S.Chand and Co. 2007.

Mapping of COs with POs / PSOs

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	3	2	1	-	-	3	-	-	-	-	-	1	2	-
2	2	1	-	-	-	3	-	-	-	-	-	-	2	2
3	3	2	1	-	-	3	-	-	-	-	-	1	3	2
4	3	2	1	-	-	3	-	-	-	-	-	1	-	2
5	3	2	1	-	-	3	-	-	-	-	-	1	2	3
CO (W.A)	2.8	1.8	1	-	-	3	-	-	-	-	-	1	2.3	2.3

22CEC09 - SOIL MECHANICS					
		L	T	P	C
		3	0	2	4
PREREQUISITE : NIL					
Course Objectives		**Course Outcomes**			
1.0	To impart the fundamental concepts of soil mechanics	**1.1**	The students will be able to classify the soil and assess the engineering properties, based on index properties.		
2.0	To understand the role of water in soil behavior and how soil stresses, permeability and quantity of seepage	**2.1**	The students will be able to estimate soil stresses and prepare flow net diagram.		
3.0	To understand the soil stress distribution and stress influence under various loading conditions.	**3.1**	The students will be able to determine stress distribution for various types of foundation loads.		
4.0	To estimate the total settlement and time rate of settlement of the soil.	**4.1**	The students will be able to estimate the settlement in soils.		
5.0	To familiarize about the fundamental concepts in shear strength of soils	**5.1**	The students will be able to analyze shear properties of cohesive and cohesionless soils.		

UNIT I - WEIGHT VOLUME RELATIONS AND INDEX PROPERTIES	**(9)**
Soil formation -Three phase diagram - Weight-volume relations - Index properties of soils - Atterberg's limits - Classification of soils - BIS System.	
UNIT II - SOIL WATER AND PERMEABILITY	**(9)**
Soil water - Effective and neutral stresses - Flow of water through soils - Permeability - Laboratory methods - Darcy's law - Seepage and flow-nets - Quick sand.	
UNIT III - STRESS DISTRIBUTION IN SOILS	**(9)**
Vertical pressure distribution - Boussinesq's equation for point load and uniformly distributed loads - New mark's influence chart - Westergaard's equation -Isobar diagram - Pressure bulb - Contact pressure distribution.	
UNIT IV - CONSOLIDATION AND COMPACTION	**(9)**
Compressibility - e-log p curve - Preconsolidation pressure - Primary consolidation - Terzaghi's consolidation theory - Compaction - factors affecting soil compaction - Laboratory compaction tests - dry density and moisture content relationship - field compaction.	
UNIT V - SHEAR STRENGTH OF SOIL	**(9)**
Shear strength of soils - Stress analysis by Mohr's circle - Mohr's strength theory - Mohr-Coloumb strength envelope - Measurement of shear strength - Direct shear test - Triaxial compression - Unconfined compression test - Vane shear test - Shear strength of saturated cohesive soils - Shear strength of cohesionless soils.	

LIST OF EXPERIMENTS:

1. Determination of specific gravity of soil.
2. Determination of moisture content of soil.
3. Determination of grain size distribution using sieve analysis.
4. Determination of plasticity index of soil.
5. Determination of field density by sand replacement method
6. Determination of field density by core cutter method
7. Determination of moisture - density relationship using Standard Proctor Method
8. Determination of shear strength of soil by direct shear test

TOTAL (L:45+P:30) = 75 PERIODS

TEXTBOOKS:

1. Punmia, B.C., "Soil Mechanics and Foundations", Laxmi Publications Pvt. Ltd. New Delhi, 2005.
2. Gopal Ranjan and Rao, A.S.R., "Basic and Applied Soil Mechanics", New Age Ltd. International Publisher New Delhi (India) 2006.
3. Arora K.R"Soil Mechanics and Foundation Engineering ", Standard Publishers and Distributors, New Delhi, 2005.

REFERENCES:

1. McCarthy, D.F., "Essentials of Soil Mechanics and Foundations". Prentice-Hall, 2006.
2. Das, B.M., "Principles of Geotechnical Engineering". Brooks / Coles / Thompson Learning Singapore, 8th Edition, 2013.
3. Murthy, V.N.S., "Soil Mechanics and Foundation Engineering", CBS Publishers Distribution Ltd., New Delhi. 2015

Mapping of COs with POs / PSOs

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	3	2	2	-	-	-	2	-	-	2	-	3	3	3
2	2	2	1	-	-	-	-	-	-	2	-	2	2	2
3	2	3	2	-	-	-	-	-	-	2	-	2	2	2
4	2	3	2	-	-	2	2	2	-	2	-	3	3	3
5	2	2	2	-	-	2	2		-	2	-	2	3	2
CO (W.A)	**2.2**	**2.4**	**1.8**	**-**	**-**	**2**	**2**	**2**	**-**	**2**	**-**	**2.4**	**2.6**	**2.4**

22CEC10 - DESIGN OF REINFORCED CONCRETE ELEMENTS

(IS 456 and SP 16 code books are permitted)

	L	T	P	C
	3	0	0	3

PREREQUISITE : NIL

	Course Objectives		Course Outcomes
1.0	To understand the concept of working stress and limit state methods.	**1.1**	The students will be able to identify the basic concepts and methods in the design of reinforced concrete elements.
2.0	To gain knowledge of limit state design of beam	**2.1**	The students will be able to design beam using IS code of practice.
3.0	To understand the design concepts in slab and staircase	**3.1**	The students will be able to apply the concepts in design of slab and staircase.
4.0	To understand the concepts in the design of RC Column.	**4.1**	The students will be able to design RC columns of any cross section with different end conditions.
5.0	To give the knowledge in the concept of RC footings.	**5.1**	The students will be able to design RC footing of different cross section under various site conditions.

UNIT I - DESIGN PHILOSOPHY	**(6)**
Concept of Elastic method, ultimate load method and limit state method - Advantages of Limit State Method over other methods - Design codes and specification - Limit State philosophy as detailed in IS code.	
UNIT II - DESIGN OF BEAM	**(12)**
Analysis and design of singly and doubly reinforced rectangular beam and Flanged beams (T- Beams only) - Use of design aids for Flexure - Behaviour of RC members in Shear, Bond and Anchorage - Design requirements as per current code - Behaviour of rectangular RC beams in shear and torsion .	
UNIT III - DESIGN OF SLAB AND STAIRCASE	**(9)**
Analysis and design of cantilever, one way simply supported and continuous slabs and supporting beams -Two way slab - Design of simply supported and continuous slabs using IS code coefficients - Types of Staircases - Design of dog-legged Staircase.	
UNIT IV - DESIGN OF COLUMN	**(9)**
Types of columns - Braced and unbraced columns - Design of short rectangular and circular columns for axial, uniaxial and biaxial bending.	
UNIT V - DESIGN OF FOOTING	**(9)**
Design of wall footing - Design of axially and eccentrically loaded rectangular pad and sloped footings - Design of combined footing.	
TOTAL (L: 45) = 45 PERIODS	

TEXTBOOKS:

1. Gambhir.M.L., "Fundamentals of Reinforced Concrete Design", Prentice Hall of India Private Limited, New Delhi, 2006.
2. Krishnaraju.N, "Design of Reinforced Concrete Structures ", CBS Publishers & Distributors Pvt. Ltd., New Delhi.

REFERENCES:

1. Sinha, S.N., "Reinforced Concrete Design", Tata McGraw Hill Publishing Company Ltd., New Delhi, 2017.
2. Unnikrishna Pillai, S., Devdas Menon, "Reinforced Concrete Design", Tata McGraw Hill Publishing Company Ltd., 2021
3. Punmia.B.C., Ashok Kumar Jain, Arun Kumar Jain, "Limit State Design of Reinforced Concrete", Laxmi Publication Pvt. Ltd., New Delhi, 2016
4. Shah V L Karve S R., "Limit State Theory and Design of Reinforced Concrete", Structures Publilcations, Pune, 2013
5. IS 456 - Indian Standard Plain and Reinforced Concrete - Code of Practice. 2000
6. SP 16 :Design Aids for Reinforced Concrete to IS : 456- 1978

Mapping of COs with POs / PSOs

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	2	3	2	-	-		-	-	-	-	-	3	2	2
2	3	3	3	-	-	2	-	3	-	2	-	3	3	3
3	3	3	3	-	-	2	-	3	-	2	-	3	3	3
4	-	-	-	-	-	2	-	3	2	2	-	3	3	3
5	-	-	-	-	-	2	-	3	2	2	-	3	3	3
CO (W.A)	**2.7**	**3**	**2.7**	**-**	**-**	**2**	**-**	**3**	**2**	**2**	**2**	**3**	**2.8**	**2.8**

22CEC11- CONCRETE TECHNOLOGY

(IS 456 and IS 10262-2019 code books are permitted)

	L	T	P	C
	3	0	0	3

PREREQUISITE : NIL

	Course Objectives		Course Outcomes
1.0	To impart knowledge on the types and properties of cement, aggregates and admixtures.	**1.1**	The students will be able to explain the constituents of concrete.
2.0	To study about concrete design mix.	**2.1**	The students will be able to design the concrete by IS mix design
3.0	To study the behaviour of concrete at the fresh and hardened state.	**3.1**	The students will be able to determine the properties of fresh and hardened concrete.
4.0	To study about the Durability Properties of Concrete.	**4.1**	The students will be able to determine the durability properties of concrete.
5.0	To impart knowledge on the special concretes	**5.1**	The students will be able to infer the types of special concretes with its applications.

UNIT I - CONSTITUENTS OF CONCRETE	**(9)**
Cement - Manufacturing Process - Types of cement - Properties - Heat of Hydration - Field and Laboratory Test on cement; Aggregates - Fine and Coarse aggregates - Properties - Classifications - Testing methods of Fine and Coarse aggregates; Admixtures - Mineral and Chemical admixtures; Water - Quality of water for use in concrete.	
UNIT II - MIX DESIGN OF CONCRETE	**(9)**
Concrete Mix Proportioning - Methods of IS concrete mix proportion - Guidelines for normal concrete - Concrete - Concepts variables in proportioning - Concepts of Self Compacting Concrete (SCC) mix design.	
UNIT III - FRESH AND HARDENED CONCRETE PROPERTIES	**(9)**
Workability - measurement of workability - Statistical and quality control of concrete; Properties of fresh concrete - Test on fresh concrete - Test on hardened concrete - modulus of elasticity of concrete- Elasticity - Creep, Shrinkage and temperature effects - Stress and Strain characteristics - Non Destructive Tests for concrete.	
UNIT IV - DURABILITY PROPERTIES OF CONCRETE	**(9)**
Durability of concrete - Tests for durability - Strength and durability relationship - Factors affecting durability of concrete - Permeability- Rapid Chloride Permeability Test (RCPT) - Sorptivity - Alkali Aggregate Reaction - Chemical attack - Corrosion tests - Cracks in Concrete- Performance based durability design	
UNIT V - SPECIAL CONCRETES	**(9)**
Introduction to Polymer concrete, High performance concrete, High strength concrete, Fibre reinforced concrete, Light weight concrete, Ready mix concrete and pumping of concrete, Slurry Infiltrated Fiber Concrete (SIFCON), Permeable concrete, Self compacting concrete, Geo-polymer Concrete, Ferrocement.	
TOTAL (L:45) = 45 PERIODS	

TEXTBOOKS:

1. Gupta.B.L., Amit Gupta, "Concrete Technology", Jain Book Agency, 2010.
2. Shetty,M.S, "Concrete Technology", S.Chand and Company Ltd, New Delhi, 2003
3. Santhakumar.A. R "Concrete Technology", Oxford University Press, New Delhi, 2006.

REFERENCES:

1. Neville, A.M; "Properties of Concrete", Pitman Publishing Limited, London,1995
2. Gambhir.M.L. "Concrete Technology", Fifth Edition, McGraw Hill Education, 2017.
3. Job Thomas., "Concrete Technology", Cencage learning India Private Ltd, New Delhi, 2015.
4. IS10262-2019," Recommended Guidelines for Concrete Mix Design", Bureau of Indian Standards, New Delhi.
5. IS : 12269-1987,"Specification for 53 grade OPC", BIS, New Delhi
6. IS : 383 - 2016, "Coarse and Fine Aggregate - Specification's, BIS, New Delhi
7. IS: 456-2000, "Plain and Reinforced Concrete - Code of Practice", BIS, New Delhi.

Mapping of COs with POs / PSOs

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	2	2	-	-	-	2	-		-	-	-	2	3	2
2	3	3	3	2	-	-	-		-	3	3	3	3	2
3	2	-	-	2	-	2	-	2	-	2	2	3	3	2
4	3	2	-	-	2	-	-	3	-	-	-	3	3	3
5	2	2	-	2	-	-	-	2	-	-	2	3	2	3
CO (W.A)	**2.4**	**2.3**	**3**	**2**	**2**	**2**	-	**2.3**	-	**2.5**	**2.3**	**2.8**	**2.8**	**2.4**

22CEC12 - ENVIRONMENTAL ENGINEERING					
		L	T	P	C
		3	0	2	4
PREREQUISITE : NIL					
Course Objectives		**Course Outcomes**			
1.0	To understand the principles of water supply system and planning the sources	**1.1**	The students will be able to identify the water supply system, water sources and water quality characteristics and standards.		
2.0	To get knowledge in treatment of water.	**2.1**	The students will be able to design various water treatment units.		
3.0	To grasp the principles of collection, conveyance and treatment of wastewater.	**3.1**	The students will be able to design the various primary treatment units for wastewater		
4.0	To recognize the different primary and secondary treatment techniques of wastewater	**4.1**	The students will be able to design and choose the various secondary treatment units for wastewater		
5.0	To gain knowledge about solid waste disposal	**5.1**	The students will be able to select suitable treatment units for disposal of sewage and sludge.		

UNIT I - SOURCES AND CONVEYANCE OF WATER	**(9)**
Objectives of Public Water supply system - Intakes - Channels and pipes for conveying water - Planning, Design period, Population forecasting - water demand -Sources of water - Surface and Ground water - Characteristics of water	
UNIT II - WATER TREATMENT	**(11)**
Water treatment Objectives - Unit operations and processes in surface water treatment - Principles, functions and design of flash mixers, flocculators, sedimentation tanks and sand filters - Aeration - iron and manganese removal, defluoridation.	
UNIT III - PRIMARY SEWAGE TREATMENT	**(9)**
Characteristics of sewage, Primary treatment: Principles, functions and design of screen, grit chambers and primary sedimentation tanks – Layout of Sewage Treatment Plant.	
UNIT IV - SECONDARY SEWAGE TREATMENT	**(9)**
Activated Sludge Process and Trickling filter (no design); Other treatment methods - oxidation ditches, UASB -Waste Stabilization Ponds - Anaerobic Stabilization units - Septic tanks.	
UNIT V - DISPOSAL OF SEWAGE AND SLUDGE	**(7)**
Dilution - Self-purification of surface water bodies - Oxygen sag curve - Sewage farming - characteristics of Sludge -Thickening - Sludge digestion - Sludge disposal - Environmental Pollution Act.	

LIST OF EXPERIMENTS:

1. Determination of Turbidity by using Nephlometer
2. Measurement of pH and conductivity of water sample
3. Determination of Hardness by EDTA method
4. Determination of Alkalinity
5. Determination of Acidity in water
6. Determination of Chlorides
7. Determination of Optimum Coagulant by Jar test
8. Determination of Total, Dissolved and Suspended solids
9. Determination of Available chlorine in bleaching powder
10. Determination of COD for given sample

TOTAL (L:45+P:30) = 75 PERIODS

TEXTBOOKS:

1. Garg, S.K., "Environmental Engineering Vol. I and II", Khanna Publishers, New Delhi, 2010.
2. Modi, P.N. "Water Supply Engineering Vol. I", Standard Book House, New Delhi, 2010.
3. Punmia, B.C., Ashok K Jain and Arun K Jain, "Water Supply Engineering", Laxmi Publications Pvt. Ltd., New Delhi, 2013

REFERENCES:

1. Metcalf and Eddy, " Waste Water Engineering: Treatment and Reuse", 4th Edition, McGraw-Hill, New Delhi, 2017.
2. Duggal K.N., "Elements of Environmental Engineering" S. Chand and Co. Ltd., New Delhi, 2014.
3. George Tchobanoglous, Franklin Louis Burton, H. David Stensel, Metcalf and Eddy, "Wastewater Engineering, Treatment and Reuse", Tata McGraw-Hill Edition, 4th Edition, New Delhi, 2009.

Mapping of COs with POs / PSOs

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	2	-	-	-	-	-	-	-	-	-	-	2	-	2
2	3	3	-	-	-	-	2	2	-	-	-	2	2	2
3	2	2	3	2	-	2	2	2	-	-	-	2	2	2
4	-	2	2	2	-		2	-	-	-	2	2	3	3
5	-	-	2		-	2	2	-	-	-	2	2	2	3
CO (W.A)	**2.3**	**2.3**	**2.5**	**2**	-	**2**	**2**	**2**	-	-	**2**	**2**	**2.3**	**2.4**

22CEP03 - COMPUTER AIDED BUILDING DRAWING - II				
	L	T	P	C
	0	0	4	2

PREREQUISITE : NIL

Course Objectives		Course Outcomes	
1.0	To impart knowledge and skill relevant to Building drawing and Detailing lab using computer software.	**1.1**	The students will be able to select the various basic commands used for drafting and know the types of coordinate.
2.0	To make the students learn the various elements of Residential buildings.	**2.1**	The students will be able to sketch the detailed drawings of plan, elevation and section of a multi storey residential building
3.0	To impart a thorough knowledge on the computer aided analysis and design of structural components.	**3.1**	The students will be able to prepare a approval plan.
4.0	To study the different types of buildings and their views.	**4.1**	The students will be able to prepare plan, section and elevation for industrial building.
5.0	To impart fundamental knowledge on AutoCAD to make the students draw the structures, the plan, elevation and sectional view of a building.	**5.1**	The students will be able to draw the plan, elevation and sectional view of the commercial building.

LIST OF EXPERIMENTS:

1. Draw the Plan, Elevation and Section of an Industrial Building
2. Draw the Plan, Elevation and Section of a School Building with Framed structure
3. Draw the multi-Storied residential building with Dog legged staircase - Plan, Section and Elevation
4. Draw a Primary Health Center- Plan, Section and Elevation
5. Draw a Industrial building - Plan, Section and Elevation
6. Draw a Hostel Building - Plan, Section and Elevation
7. Draw a plan for Shopping Mall
8. Draw a Plan for Apartment Building
9. Layout Preparation for Individual Villas
10. Preparation of approval plan for a Commercial Building
11. 3D view for Residential Building

TOTAL (P:60) = 60 PERIODS

REFERENCES/ MANUAL /SOFTWARE:

1. Reference manual for AutoCAD
2. Sikka V.B., "A course in Civil Engineering Drawing", 4th Edition, S.K.Kataria and Sons, 2015.
3. Bhavikatti, S.S and Chitawadagi, M.V., "Building Planning and Drawing", I.K. International Publishing House Pvt.Ltd. New Delhi,2019

Mapping of COs with POs / PSOs														
Cos	**POs**												**PSOs**	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**
1	2	-	2	3	3	-	-	-	3	3	-	3	3	3
2	2	-	2	3	3	2	-	2	3	3	3	3	3	3
3	3	-	3	3	3	3	-	-	3	3	3	3	3	3
4	2	-	2	2	3	2	-	2	2	3	3	3	3	3
5	3	2	2	3	3	2	-	2	3	3	3	3	3	3
CO (W.A)	**2.4**	**2**	**2.2**	**2.8**	**3**	**2.3**	-	**2**	**2.8**	**3**	**3**	**3**	**3**	**3**

22MAN08 - SOFT / ANALYTICAL SKILLS - IV *(Common to All Branches)*				
	L	**T**	**P**	**C**
	1	**0**	**2**	**0**
PRE REQUISITE : NIL				

Course Objectives		**Course Outcomes**	
1.0	To recollect the functional understanding of basic grammar and its structure	**1.1**	The students will be able to apply the knowledge of basic grammar to construct the sentences.
2.0	To develop students to workout solution for problems that involves mathematics aptitude.	**2.1**	The students will be able to solve aptitude problems with ease
3.0	To enrich their knowledge and to develop their logical reasoning ability	**3.1**	The students will be able to solve reasoning problems with ease.

UNIT I - VERBAL	**(5+10)**
Articles - Fill in the blanks - Grammatical Error - Sentence improvement	
UNIT II - APTITUDE	**(5+10)**
Speed and Distance - Time and Work - Mixture And Alligations - Permutation and Combinations	
UNIT III - LOGICAL AND REASONING	**(5+10)**
Seating Arrangement - Directions and Distance - Non verbal Reasoning	
TOTAL (L:15, P:30) : 45 PERIODS	

REFERENCES:

1. Dr. R.S. Aggarwal, "A Modern Approach to Verbal & Non-Verbal Reasoning", S Chand and Company Limited, New Delhi, 2014.
2. Ashish Aggarwal, "Quick Arithmetic", S Chand and Company Limited, New Delhi, 2014.
3. Raymond Murphy, "English grammar in use", Fourth Edition, Cambridge University, 2012.

Mapping of COs with POs / PSOs

Cos	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	-	-	-	-	-	-	-	-	3	3	-	2	-	1
2	-	3	2	2	-	-	1	-	2	-	-	3	2	-
3	-	3	2	2	-	-	1	-	2	-	-	3	2	-
CO (W.A)	-	2	1.3	1.3	-	-	0.6	-	2.3	1	-	2.6	1.3	0.3

22MAN09 - INDIAN CONSTITUTION (Common to All Branches)				
	L	T	P	C
	1	0	0	0
PRE REQUISITE : NIL				

Course Objectives		Course Outcomes	
1.0	To educate students to learn about the Constitutional Law of India.	1.1	The students will be able to Gain Knowledge about the Constitutional Law of India.
2.0	To motivate students to Understand the role of Union Government.	2.1	The students will be able to know the Union Government and role of President and Prime Minister.
3.0	To make students to understand about State Government.	3.1	The students will be able to acquire knowledge about State Government and role of Governor, Chief Minister.
4.0	To understand about District Administration, Municipal Corporation and Zila Panchayat.	4.1	The students will be able to understand the District Administration, Municipal Corporation and Zila Panchayat.
5.0	To encourage students to Understand about the election commission.	5.1	The students will be able to understand the role and function of election commission.

UNIT I - THE CONSTITUTION INTRODUCTION	**(9)**
The History of the Making of the Indian Constitution - Preamble and the Basic Structure, and its interpretation - Fundamental Rights and Duties and their interpretation - State Policy Principles.	
UNIT II - UNION GOVERNMENT	**(9)**
Structure of the Indian Union - President - Role and Power - Prime Minister and Council of Ministers - Lok Sabha and Rajya Sabha	
UNIT III - STATE GOVERNMENT	**(9)**
Governor - Role and Power - Chief Minister and Council of Ministers - State Secretariat	
UNIT IV - LOCAL ADMINISTRATION	**(9)**
District Administration - Municipal Corporation - Zila Panchayat	
UNIT V - ELECTION COMMISSION	**(9)**
Role and Functioning - Chief Election Commissioner - State Election Commission	
TOTAL (L:45) : 45 PERIODS	

TEXT BOOKS:

1. Rajeev Bhargava, "Ethics and Politics of the Indian Constitution", Oxford University Press, New Delhi, 2008.
2. B.L. Fadia, "The Constitution of India", Sahitya Bhawan; New edition (2017).
3. DD Basu, "Introduction to the Constitution of India", Lexis Nexis; Twenty-Third 2018 edition.

REFERENCES:

1. Steve Blank and Bob Dorf, "The Startup Owner's Manual: The Step-by-Step Guide for Building a Great Company", K & S Ranch ISBN – 978-0984999392
2. Eric Ries, "The Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses" , Penguin UK ISBN - 978-0670921607
3. Adrian J. Slywotzky with Karl Weber, "Demand: Creating What People Love Before They Know They Want It", Headline Book Publishing ISBN - 978-0755388974
4. Clayton M. Christensen, "The Innovator's Dilemma: The Revolutionary Book That Will Change the Way You Do Business", Harvard business ISBN: 978-142219602.

REFERENCES: Web link

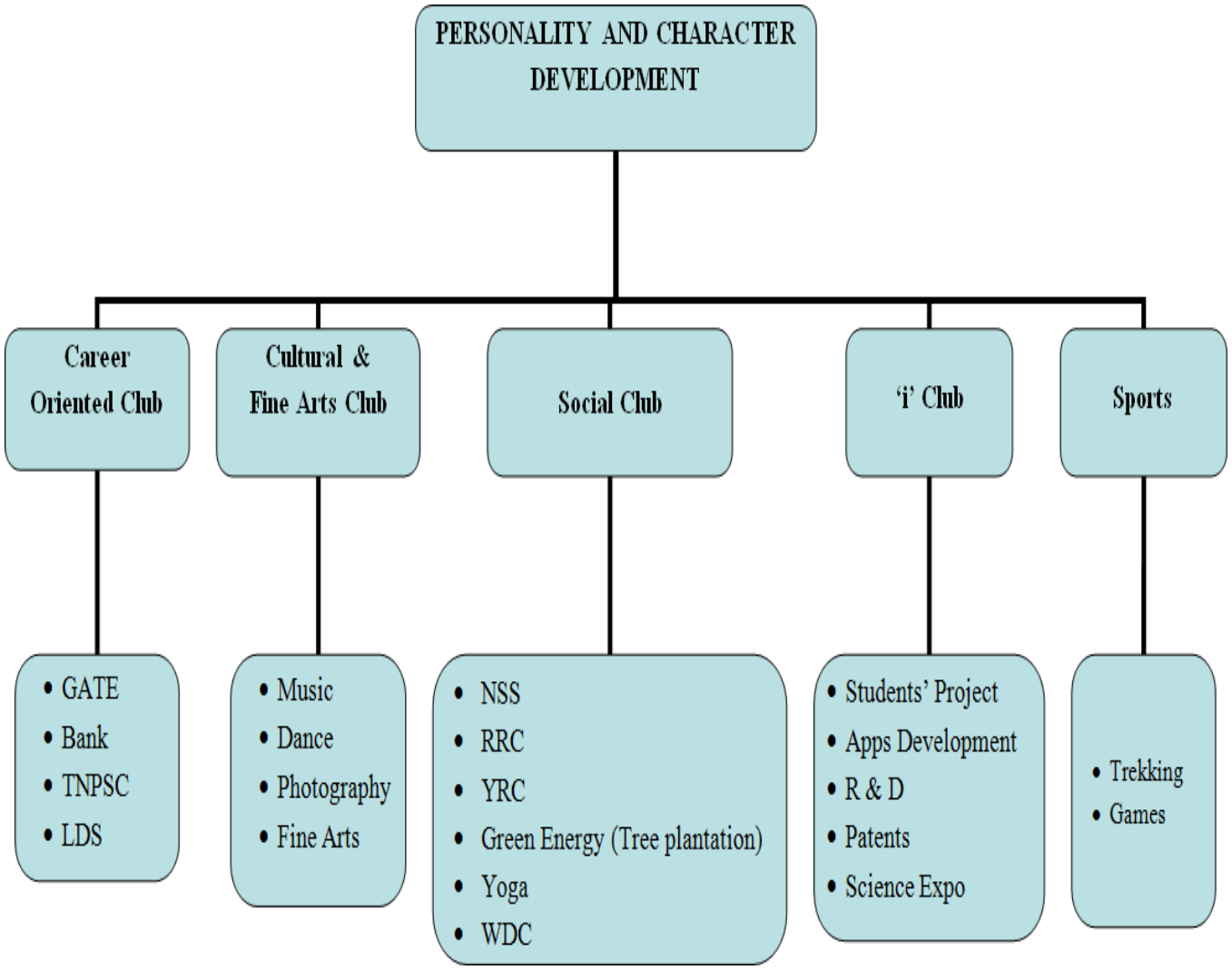
1. https://www.fundable.com/learn/resources/guides/startup
2. https://corporatefinanceinstitute.com/resources/knowledge/finance/corporate- structure/
3. https://www.finder.com/small-business-finance-tips
4. https://www.profitbooks.net/funding-options-to-raise-startup-capital-for-your-business/

Mapping of COs with POs / PSOs

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1						3		3		2		3		
2						3		3		2		3		
3						3		3		2		3		
4						3		3		2		3		
5						3		3		2		3		
CO (W.A)						**3**		**3**		**2**		**3**		

22GED01 - PERSONALITY AND CHARACTER DEVELOPMENT

L	T	P	C
0	0	I	0



*LDS - Leadership Development Skills

OBJECTIVES :				
Career Oriented Club	**Cultural & Fine Arts Club**	**Social Club**	**'i' club**	**Sports**
• To provide support for identifying specific career field of interests and career path • To provide support for preparing for competitive exams	• To bring out the hidden talent of students in music, dance and other fine arts. • To promote photography skill among the students • To develop and enhance the performance of students by participating in various events • To inculcatemanagerial capabilities such as event management and stage organization	• To create social awareness and develop a sense of social and civic responsibility • To inculcate socially and environmentally sound practices and be aware of the benefits • To encourage the students to work along with the peoplein rural areas, thereby developing their character, social consciousness, commitment, discipline and being helpful towards the community.	• To inculcate the basic concepts of innovation • To foster the networking between students, build teams, exchange ideas, do projects and discuss entrepreneurial opportunities • To enrich the academic experience, buildcompetencies andrelationships beyond the classroom	• To provide opportunities to excel at sports • To promote an understanding of physical and mental well-being through an appreciation of stress, rest and relaxation. • To develop an ability to observe, analyze and judge the performance of self and peers in sporting activities. • To develop leadership skills and nurture the team building qualities. **Trekking:** • To provide opportunities to explore nature and educating about the purity of nature • To improve physical and mental health.

OUTCOMES : At the end of this course, the students will be able to				
• Find a better career of their interest. • Make use of their knowledge during competitive exams and interviews.	• Take part in various events • Develop team spirit, leadership and managerial qualities	• Develop socially responsive qualities by applying acquired knowledge • Build character, social consciousness, commitment and discipline	• Apply the acquired knowledge in creating better solutions that meet new requirements and market needs • Develop skills on transforming new knowledge or new Technology into viable products and services on commercial markets as a team	• Demonstrate positive leadership skills that contribute to the organizational effectiveness • Take part an active role in their personal wellness (emotional, physical, and spiritual) that supports a healthy lifestyle • Create inclination towards outdoor activity like nature study and Adventure.

TOTAL [2 x (P: 15)]: 30 PERIODS

(Cumulatively for Two Semesters)

22GYA01 HERITAGE OF TAMILS *(For Common To All Branches)*				
	L	**T**	**P**	**C**
	I	**0**	**0**	**I**
PRE REQUISITE : NIL				

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.	
TOTAL (L:15) : 15 PERIODS	

TEXT-CUM-REFERENCE BOOKS

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

5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
6. Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.
7. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
9. Keeladi - 'Sangam City Civilization on the banks of river Vaigai' (Jointly Published by: Department 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.

22GYA01 தமிழர் மரபு (அனைத்து பாடப்பிரிவினருக்கும்)				
	L	T	P	C
	1	0	0	1
முன் தேவை: இல்லை				

அலகு 1 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 – தமிழ்க 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 2 மரபு – பாறை ஓவியங்கள் முதல் நவீன ஓவியங்கள் வரை – சிற்பக்கலை:	**(3)**
நடுகல் முதல் நவீன சிற்பங்கள் வரை – ஐம்பொன் சிலைகள் – பழங்குடியினர் மற்றும் அவர்கள் தயாரிக்கும் கைவினைப் பொருட்கள், பொம்மைகள்– தேர் செய்யும் கலை– சுடுமண் சிற்பங்கள் – நாட்டுப்புறத் தெய்வங்கள் – குமரிமுனையில் திருவள்ளுவர் சிலை – இசைக் கருவிகள் – மிருதங்கம், பறை, வீணை, யாழ், நாதஸ்வரம் – தமிழர்களின் சமூக பொருளாதார வாழ்வில் கோவில்களின் பங்கு.	
அலகு 3 நாட்டுப்பறக் கலைகள் மற்றும் வீர விளையாட்டுகள்:	**(3)**
தெருக்கூத்து, கரகாட்டம், வில்லுப்பாட்டு, கணியான் கூத்து, ஒயிலாட்டாம், தோல்பாவைக்கூத்து, சிலம்பாட்டம், வளரி, புலியாட்டம், தமிழர்களின் விளையாட்டுகள்.	
அலகு 4 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 நாடுகளின் சோழர்களின் வெற்றி.	
அலகு 5 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 – தமிழ் புத்தக்களின் அச்சு வரலாறு.	
TOTAL (L:15) : 15 PERIODS	

TEXT-CUM-REFERENCE BOOKS

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

5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
6. Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.
7. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
9. Keeladi - 'Sangam City Civilization on the banks of river Vaigai' (Jointly Published by: Department 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.

22GYA02 TAMILS AND TECHNOLOGY *(For Common To All Branches)*				
	L	**T**	**P**	**C**
	I	**0**	**0**	**I**
PRE REQUISITE : NIL				

UNIT I - WEAVING AND CERAMIC TECHNOLOGY	**(3)**
Weaving Industry during Sangam Age – Ceramic technology – Black and Red Ware Potteries (BRW) – Graffiti on Potteries.	
UNIT II - DESIGN AND CONSTRUCTION TECHNOLOGY	**(3)**
Designing and Structural construction House & Designs n household materials during Sangam Age - Building materials and Hero stones of Sangam age – Details of Stage Constructions in Silappathikaram - Sculptures and Temples of Mamallapuram - Great Temples of Cholas and other worship places - Temples of Nayaka Period - Type study (Madurai Meenakshi Temple)- Thirumalai Nayakar Mahal - Chetti Nadu Houses, Indo - Saracenic architecture at Madras during British Period.	
UNIT III - MANUFACTURING TECHNOLOGY	**(3)**
Art of Ship Building - Metallurgical studies - Iron industry - Iron smelting,steel -Copper and gold- Coins as source of history - Minting of Coins – Beads making-industries Stone beads -Glass beads - Terracotta beads -Shell beads/ bone beats - Archeological evidences - Gem stone types described in Silappathikaram.	
UNIT IV - AGRICULTURE AND IRRIGATION TECHNOLOGY	**(3)**
Dam, Tank, ponds, Sluice, Significance of Kumizhi Thoompu of Chola Period, Animal Husbandry - Wells designed for cattle use - Agriculture and Agro Processing - Knowledge of Sea - Fisheries – Pearl - Conche diving - Ancient Knowledge of Ocean - Knowledge Specific Society.	
UNIT V - SCIENTIFIC TAMIL & TAMIL COMPUTING	**(3)**
Development of Scientific Tamil - Tamil computing – Digitalization of Tamil Books – Development of Tamil Software – Tamil Virtual Academy – Tamil Digital Library – Online Tamil Dictionaries – Sorkuvai Project.	
TOTAL (L:15) : 15 PERIODS	

TEXT-CUM-REFERENCE BOOKS

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

5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
6. Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.
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8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
9. Keeladi - 'Sangam City Civilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by: The Author)
11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

22GYA02 தமிழரும் தொழில்நுட்பமும் (அனைத்து பாடப்பிரிவினருக்கும்)				
	L	T	P	C
	I	0	0	I
முன் தேவை: இல்லை				

அலகு 1 நெசவு மற்றும் பானைத் தொழில்நுட்பம்:	(3)
சங்ககாலத்தில் நெசவுத்தொழில் – பானைத் தொழிலநுட்பம் – கருப்பு சிவப்பு பாண்டங்கள் – பாண்டங்களில் கீறல் குறியீடுகள்.	
அலகு 2 வடிவமைப்பு மற்றும் கட்டிடத் தொழில்நுட்பம்:	**(3)**
சங்ககாலத்தில் வடிவமைப்பு மற்றும் கட்டுமானங்கள் மற்றும் சங்ககாலத்தில் வீட்டுப் பொருட்களில் வடிவமைப்பு – சங்ககாலத்தில் கட்டுமான பொருட்களும் நடுக்கல்லும் – சிலப்பதிகாரத்தில் மேடை அமைப்பு பற்றிய விவரங்கள் – மாமல்லபுரச் சிற்பங்களும், கோவில்களும் – சோழர் காலத்துப் பெருங்கோயில்கள் மற்றும் பிற வழிபாட்டுத் தலங்கள் – நாயக்கர் காலக் கோயில்கள் – மாதிரி கட்டமைப்புகள் பற்றி அறிதல், மதுரை மீனாட்சி அம்மன் ஆலயம் மற்றும் திருமலை நாயக்கர் மஹால் – செட்டிநாட்டு வீடுகள் – பிரிட்டிஷ் காலத்தில் சென்னையில் இந்தோ–சாரோசெனிக் கட்டிடக் கலை.	
அலகு 3 உற்பத்தி தொழில் நுட்பம்:	**(3)**
கப்பல் கட்டும் கலை – உலோகவியல் – இரும்புத் தொழிற்சாலை – இரும்பை உருக்குதல், எக்கு – வரலாற்றுச் சான்றுகளாக செம்பு மற்றும் தங்க நாணயங்கள் – நாணயங்கள் அச்சடித்தல் – மணி உருவாக்கும் தொழிற்சாலைகள் – கல்மணிகள், கண்ணாடி மணிகள் – சுடுமண் மணிகள் – சங்கு மணிகள் – எலும்புத் துண்டுகள் – தொல்லியல் சான்றுகள் – சிலப்பதிகாரத்தில் மணிகளின் வகைகள்.	
அலகு 4 வேளாண்மை மற்றும் நீர்பாசனத் தொழில் நுட்பம்:	**(3)**
அணை, ஏரி, குளங்கள், மதகு – சோழர்காலக் குமுழித் தூம்பின் முக்கியத்துவம் – கால்நடை பராமரிப்பு – கால்நடைகளுக்காக வடிவமைக்கப்பட்ட கிணறுகள் – வேளாண்மை மற்றும் வேளாண்மைச் சார்ந்த செயல்பாடுகள் – கடல்சார் அறிவு – மீன்வளம் – முத்து மற்றும் முத்துக்குளித்தல் – பெருங்கடல் குறித்த பண்டைய அறிவு – அறிவுசார் சமூகம்.	
அலகு 5 அறிவியல் தமிழ் மற்றும் கணித்தமிழ்:	**(3)**
அறிவியல் தமிழின் வளர்ச்சி – கணித்தமிழ் வளர்ச்சி – தமிழ் நூல்களை மின் பதிப்பு செய்தல் – தமிழ் மென்பொருட்கள் உருவாக்கம் – தமிழ் இணையக் கல்விக்கழகம் – தமிழ் மின் நூலகம் – இணையத்தில் தமிழ் அகராதிகள் – சொற்குவைத் திட்டம்.	
TOTAL (L:15) : 15 PERIODS	

TEXT-CUM-REFERENCE BOOKS

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

5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
6. Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.
7. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
9. Keeladi - 'Sangam City Civilization on the banks of river Vaigai' (Jointly Published by: Department 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.