KONGU ENGINEERING COLLEGE

(Autonomous Institution Affiliated to Anna University, Chennai)

PERUNDURAI ERODE – 638 060

TAMILNADU INDIA

Estd : 1984

REGULATIONS, CURRICULUM & SYLLABI – 2024

(CHOICE BASED CREDIT SYSTEM AND OUTCOME BASED EDUCATION)

(For the students admitted from the academic year 2024 - 2025)

BACHELOR OF ENGINEERING DEGREE IN MECHANICAL ENGINEERING

DEPARTMENT OF MECHANICAL ENGINEERING

KONGU
Assuring the Best

CDC

B.E. MECHANICAL ENGINEERING CURRICULUM – R2024
(For the students admitted from the academic year 2024-25 onwards)

SEMESTER – I														
Course Code	Course Title	Hours / Semester						Credit	Maximum Marks			Category	Type
		CI		LI	TW	SL	TH		CA	ESE	Total		
		L	T	P									
Theory/Theory with Practical													
24EGT11	English for Effective Communication - I	45	0	0	45	0	90	3	40	60	100	HS	C
24MAC11	Matrices and Ordinary Differential Equations	45	7	16	52	0	120	4	50	50	100	BS	A
24CYT12	Chemistry for Mechanical Systems	45	0	0	45	0	90	3	40	60	100	BS	C
24CSC11	Problem Solving and Programming in C	45	0	30	45	0	120	4	100	0	100	ES	OT
24MET11	Engineering Drawing	30	15	0	45	0	90	3	40	60	100	ES	A
24TAM01	Heritage of Tamils	15	0	0	15	0	30	1	100	0	100	HS	OT
Practical / Employability Enhancement													
24CYL12	Chemistry Laboratory for Mechanical Systems	0	0	30	0	0	30	1	60	40	100	BS	
24GCL12	Foundation Laboratory – Electrical, IoT and Web Technologies	0	0	90	0	0	90	3	100	0	100	ES	
24MNT12	Quantitative Aptitude – I	30	0	0	0	0	30	0	100	0	100	MC	
24MNT11	Student Induction Program	0	0	90	0	0	90	0	100	0	100	MC	
Total Credits to be earned								22					

CI – Classroom Instructions, LI – Laboratory Instructions, TW – Term Work, SL – Self Learning, L – Lecture, T – Tutorial, P – Practical, C – Credit, TH – Total Hours, CA – Continuous Assessment, ESE – End Semester Examination.

Type: A – Analytical, D – Design using Hardware, S – Simulation using Coding, C – Concept, OC – Online course, OT - others

Signature of the Chairman
Board of Studies - Mechanical

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KONGU ENGINEERING COLLEGE

B.E. MECHANICAL ENGINEERING CURRICULUM – R2024
(For the students admitted from the academic year 2024-25 onwards)

SEMESTER – II

Course Code	Course Title	Hours / Semester						Credit	Maximum Marks			Category	Type
		CI		LI	TW	SL	TH		CA	ESE	Total		
		L	T	P									
Theory/Theory with Practical													
24EGT21	English for Effective Communication - II	45	0	0	45	0	90	3	40	60	100	HS	C
24MAC21	Multivariable Calculus and Complex Analysis	45	7	16	52	0	120	4	50	50	100	BS	A
24PHT21	Applied Physics	45	0	0	45	0	90	3	40	60	100	BS	C
24ITC23	Python Programming	45	0	30	45	0	120	4	100	0	100	ES	OT
24MET21	Engineering Mechanics	45	0	0	45	0	90	3	40	60	100	PC	A
24TAM02	Tamils and Technology	15	0	0	15	0	30	1	100	0	100	HS	OT
Practical / Employability Enhancement													
24PHL21	Applied Physics Laboratory	0	0	30	0	0	30	1	60	40	100	BS	
24GCL11	Foundation Laboratory – Manufacturing, Design and Robotics	0	0	90	0	0	90	3	100	0	100	ES	
24MNT21	Quantitative Aptitude – II	30	0	0	0	0	30	0	100	0	100	MC	
24VEC11	Yoga and Values for Holistic Development	15	0	15	0	0	30	1	100	0	100	HS	
Total Credits to be earned								**23**					

CI – Classroom Instructions, LI – Laboratory Instructions, TW – Term Work, SL – Self Learning, L – Lecture, T – Tutorial, P – Practical, C – Credit, TH – Total Hours, CA – Continuous Assessment, ESE – End Semester Examination

Type: A – Analytical, D – Design using Hardware, S – Simulation using Coding, C – Concept, OC – Online course, OT - others

Signature of the Chairman
Board of Studies - Mechanical

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B.E. MECHANICAL ENGINEERING CURRICULUM – R2024
(For the students admitted from the academic year 2024-25 onwards)

SEMESTER – III

Course Code	Course Title	Hours / Semester						Credit	Maximum Marks			Category	Type
		CI		LI	TW	SL	TH		CA	ESE	Total		
		L	T	P									
Theory/Theory with Practical													
24MEC31	Engineering Materials and Metallurgy	45	0	30	45	0	120	4	50	50	100	ES	C
24EEC32	Electrical Drives and Industrial Electronics	45	0	30	45	0	120	4	50	50	100	ES	C
24MET31	Engineering Thermodynamics	45	0	0	45	0	90	3	40	60	100	PC	A
24MET32	Strength of Materials	45	15	0	60	0	120	4	40	60	100	PC	A
24MET33	Manufacturing Technology	45	0	0	15	30	90	3	40	60	100	PC	OC
24GET31	Universal Human Values	30	0	0	30	0	60	2	100	0	100	HS	OT
Practical / Employability Enhancement													
24MEL31	Manufacturing Technology and Material Property Testing Laboratory	0	0	30	0	0	30	1	60	40	100	PC	
24MEL32	Machine Drawing using AutoCAD Laboratory	0	0	30	0	0	30	1	60	40	100	PC	
24GEP31	Mini Project - I	0	0	30	0	0	30	1	100	0	100	EC	
Total Credits to be earned								**23**					

CI – Classroom Instructions, LI – Laboratory Instructions, TW – Term Work, SL – Self Learning, L – Lecture, T – Tutorial, P – Practical, C – Credit, TH – Total Hours, CA – Continuous Assessment, ESE – End Semester Examination.

Type: A – Analytical, D – Design using Hardware, S – Simulation using Coding, C – Concept, OC – Online course, OT - others

Sign... of the Chairman
Board of S... ...s - Mechanical

ACADEMIC CELL * KONGU ENGINEERING COLLEGE *

24EGT11 - ENGLISH FOR EFFECTIVE COMMUNICATION - I									
(Common to all Engineering and Technology Branches)									
Programme & Branch	**All B.E/B.Tech Branches**	**Sem**	**Category**	**L**	**T**	**P**	**SL***	**Total**	**Credit**
Prerequisites	**Nil**	**1**	**HS**	**45**	**0**	**0**	**45**	**90**	**3**

Preamble	This course is designed to enhance the communication skills and verbal aptitude in English language required for various workplace communication and social interactions.

Unit – I	**Grammar, Verbal Aptitude, Listening, Speaking, Reading & Writing**	**9**

Grammar: Parts of Speech – Articles – Determiners – **Verbal Aptitude:** Synonyms and Antonyms – Selecting Words – **Listening:** Listening and Filling in Information – Speech Units – **Speaking:** Introducing Oneself – Discussion on Social Media Etiquette – **Reading:** Importance of Good Communication – Comprehension and Inference, Reading for facts and opinions – Building a Positive Attitude: An Excerpt from *You Can Win* – **Writing:** Email Etiquette – Email Writing – Responding to Emails

Unit – II	**Grammar, Verbal Aptitude, Listening, Speaking, Reading & Writing**	**9**

Grammar: Types of Sentences – Assertive, Interrogative, Imperative and Exclamatory – Question Tags– **Verbal Aptitude:** Prefixes and Suffixes – Collocations – Idiomatic Expressions – **Listening:** Identifying main and Secondary Points – **Speaking:** Asking Questions – Role Play – **Reading:** Reading for Comprehension – Verbal and Non-Verbal Communication – Winning Strategies: An Excerpt from *You Can Win*- **Writing:** Descriptive Writing – Product/Process Description – Letter Writing: Formal Letters – Seeking Permission and Inviting Chief Guest

Unit – III	**Grammar, Verbal Aptitude, Listening, Speaking, Reading & Writing**	**9**

Grammar: Tenses – Phrasal Verbs– **Verbal Aptitude:** Jumbled Sentences – Sentence Formation– **Listening:** Taking Notes from a Discussion – **Speaking:** Retelling an Incident – Discussing Tourist Destinations – **Reading:** Process of Communication–Scanning - Motivating Yourself and Others Every Day: An Excerpt from *You Can Win* – **Writing:** Paragraph Writing: Narrative and Compare & Contrast

Unit – IV	**Grammar, Verbal Aptitude, Listening, Speaking, Reading & Writing**	**9**

Grammar: Prepositions – Transitional Words/Phrases – Discourse Markers – **Verbal Aptitude:** One Word Substitution - Sentence Completion – **Listening:** Listening for Specific Information – **Speaking:** Small Talk–Telephonic Conversations– **Reading:** Channels of communication – Building Positive Self-Esteem and Image: An Excerpt from *You Can Win* – **Writing:** Instructions – Recommendations and Suggestions

Unit – V	**Grammar, Verbal Aptitude, Listening, Speaking, Reading & Writing**	**9**

Grammar: Subject Verb Agreement – Gerunds and Infinitives– **Verbal Aptitude:** Homonyms, Homophones and Homographs – Cloze Test using Verb Forms, Prepositions and Articles – **Listening:** Listening and Identifying Parts from a Description – **Speaking:** Agreeing and Disagreeing – **Reading:** Skimming – Reading to Summarize – Setting and Achieving your Goals: An Excerpt from *You Can Win* – **Writing:** Transcoding: Identifying Trends and Patterns in Graphs and Expressing with Graph Specific Vocabulary

TEXT BOOK:

1.	Sudharshana N P and Savitha C, *English for Technical Communication*, 2nd Edition, Cambridge University Press, New Delhi, 2016.

REFERENCES:

1.	Ashraf Rizvi. Effective Technical Communication, 2nd Edition, McGraw-Hill India, 2017.
2.	S. P. Dhanavel. English and Communication Skills for Students of Science and Engineering, Orient Black Swan Publishers, Hyderabad, 2009.
3.	Shiv Khera. You Can Win: A Step-by-Step Tool for Top Achievers. Bloomsbury Publishing, 2018.

* includes Term Work (TW) & Assignments, Tutorials and Case Studies

COURSE OUTCOMES: On completion of the course, the students will be able to		BT Mapped (Highest Level)
CO1	learn and use various aspects of English vocabulary to perform well in verbal aptitude tests of different types	Applying (K3)
CO2	listen and understand different spoken discourses	Applying (K3)
CO3	present ideas clearly and confidently in formal and informal conversations and discussions	Creating (K6)
CO4	comprehend the given text and respond appropriately for technical and professional purposes	Understanding (K2)
CO5	select appropriate words , phrases and grammatical units and apply them in both spoken and written communication	Analyzing (K4)

Mapping of COs with POs and PSOs

COs/ POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1						1		1	3	1	1		
CO2								1	3		1		
CO3								2	3	1	2		
CO4						1			3	1	2		
CO5									3		2		

1 – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom's Taxonomy

ASSESSMENT PATTERN – THEORY

Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %
CAT1	-	35	50	-	-	15	100
CAT2	-	45	35	-	-	20	100
CAT3	-	30	35	35	-	-	100
ESE	-	20	40	20	-	20	100

* ±3% may be varied (CAT 1,2& 3 – 50 marks & ESE – 100 marks)

R-W

Signature of the Chairman
Board of Studies - S & H (English)

J-Rajesh

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24MAC11 - MATRICES AND ORDINARY DIFFERENTIAL EQUATIONS									
(Common to all Engineering and Technology branches)									
Programme & Branch	**All B.E/B.Tech Branches**	**Sem.**	**Category**	**L**	**T**	**P**	**SL***	**Total**	**Credit**
Prerequisites	**Nil**	**1**	**BS**	**45**	**7**	**16**	**52**	**120**	**4**

Preamble	To provide the skills to the students for solving different real time problems by applying matrices and ordinary differential equations.	
Unit – I	**Matrices:**	**9**
Introduction – Characteristic equation – Eigen values and Eigen vectors of a real matrix – Properties of Eigen values and Eigen vectors (without proof) – Cayley – Hamilton theorem (Statement and applications only) - Orthogonal matrices – Orthogonal transformation of a symmetric matrix to diagonal form – Quadratic form – Nature of Quadratic forms - Reduction of quadratic form to canonical form by orthogonal transformation.		
Unit – II	**Ordinary Differential Equations:**	**9**
Introduction – Solution of First order differential equations: Exact differential equations – Leibnitz's Linear Equation – Bernoulli's equation – Clairaut's equation - Applications: Law of natural growth and decay.		
Unit – III	**Ordinary Differential Equations of Higher Order:**	**9**
Linear differential equations of second and higher order with constant coefficients - Particular Integrals for the types: e^{ax} – cosax / sinax – x^n – $e^{ax}x^n$, e^{ax} sinbx and e^{ax} cosbx – Differential Equations with variable coefficients: Euler-Cauchy's equation – Legendre's equation.		
Unit – IV	**Applications of Ordinary Differential Equations:**	**9**
Method of variation of parameters – Simultaneous first order linear equations with constant coefficients – Applications of differential equations: Simple harmonic motion – Electric circuits (Differential equations and associated conditions need to be given).		
Unit – V	**Laplace Transform:**	**9**
Introduction – Conditions for existence – Laplace transform of elementary functions – Basic properties – Derivatives and integrals of transforms – Transform of periodic functions - Inverse Laplace transform: Inverse Laplace transform of elementary functions – Partial fraction method – Convolution Theorem – Applications: Solution of linear ODE of second order with constant coefficients.		

LIST OF EXPERIMENTS / EXERCISES:

1.	Introduction to MATLAB
2.	Computation of eigen values and eigen vectors
3.	Solving first order ordinary differential equations
4.	Solving higher order ordinary differential equations
5.	Solution of Simultaneous first order ODEs
6.	Solving second order ODE by variation of parameters
7.	Determining Laplace and inverse Laplace transform of basic functions
8.	Solution of Second order ODE by employing Laplace transforms

TEXT BOOK:

1.	Kandasamy P., Thilagavathy K. and Gunavathy K., "Engineering Mathematics For First Year B.E/B.Tech", Reprint Edition 2016, S.Chand and Co., New Delhi.

REFERENCES/ MANUAL / SOFTWARE:

1.	Kreyszig E, "Advanced Engineering Mathematics ", 10th Edition, John Wiley, New Delhi, India, 2016.
2.	Ramana B V, "Higher Engineering Mathematics", 1st Edition, Tata McGraw-Hill Publishing Company Limited, New Delhi, 2018.
3.	Duraisamy C., Vengataasalam S., Arun Prakash K. and Suresh M., "Engineering Mathematics - I", 2nd Edition, Pearson India Education, New Delhi, 2018.
4.	Grewal B.S., "Higher Engineering Mathematics" 44thEdition, Khanna Publishers, New Delhi, 2018.
5.	Matrices and Ordinary Differential Equations Laboratory Manual.

*includes Term Work (TW) & Online / Certification course hours

COURSE OUTCOMES: On completion of the course, the students will be able to		BT Mapped (Highest Level)
CO1	Use the matrix algebra methods and MATLAB for solving practical problems.	Applying (K3) Manipulation (S2)
CO2	Identify the appropriate method for solving first order ordinary differential equations.	Applying (K3) Manipulation (S2)
CO3	Solve higher order linear differential equations with constant and variable coefficients.	Applying (K3) Manipulation (S2)
CO4	Apply the concept of ordinary differential equations for modeling and finding solutions to engineering problems.	Applying (K3) Manipulation (S2)
CO5	Apply Laplace Transform to solve complex engineering problems.	Applying (K3) Manipulation (S2)

Mapping of COs with POs and PSOs

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	3	2		3								
CO2	3	3	2		3								
CO3	3	3	2		3								
CO4	3	3	2		3								
CO5	3	3	3		3								

1 – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom's Taxonomy

ASSESSMENT PATTERN - THEORY

Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %
CAT1		40	60				100
CAT2		40	60				100
CAT3		30	70				100
ESE		30	70				100

* ±3% may be varied (CAT 1, 2 & 3 – 50 marks & ESE – 100 marks)

Signature of the Chairman
Board of Studies - S4 H

ACADEMIC CELL * KONGU ENGINEERING COLLEGE *

24CYT12 - CHEMISTRY FOR MECHANICAL SYSTEMS									
(Common to Mechanical, Mechatronics & Automobile branches)									
Programme & Branch	**B.E - MECH, MTS & AUTO branches**	**Sem.**	**Category**	**L**	**T**	**P**	**SL***	**Total**	**Credit**
Prerequisites	**Nil**	**1**	**BS**	**45**	**0**	**0**	**45**	**90**	**3**

Preamble	This course explores the basic principles of water treatment, energy storage devices, electrochemistry, corrosion, fuels and combustion. It also aims to impart the fundamentals of chemistry of engineering materials towards innovations in engineering and also for societal applications.	
Unit – I	**WATER TECHNOLOGY**	**9**
Introduction - types of water - hardness of water- expression of hardness - units of hardness –water quality parameters-estimation of hardness of water by EDTA method – determination of alkalinity - DO, BOD and COD (Definition and Significance only) - disadvantages of using hard water in industry: scale, sludge and boiler corrosion - softening of water: Internal treatment process - carbonate and calgon conditioning - External treatment method - demineralization process and reverse osmosis.		
Unit – II	**ELECTROCHEMISTRY AND CORROSION**	**9**
Electrochemistry: Introduction - cells - types - representation of galvanic cell – Electrode potential – Nernst equation (derivation of cell EMF) – construction, working and applications of glass electrode - conductometric titrations – mixture of weak and strong acid Vs strong base. **Corrosion:** Introduction - chemical corrosion - Pilling – Bedworth's rule - electrochemical corrosion - mechanism with examples - galvanic series- factors influencing rate of corrosion - corrosion control by organic coating (paints) - constituents and functions with examples.		
Unit – III	**ENERGY STORAGE DEVICES**	**9**
Batteries: Introduction - discharging and charging of battery - characteristics of battery - types of batteries – primary battery: silver button cell - secondary battery: Ni-Cd battery -modern battery: lithium-ion battery - choice of batteries for electric vehicles. **Fuel Cells:** Introduction - Importance and classification of fuel cells - description, principle, components and working of fuel cells: alkaline fuel cell, phosphoric acid fuel cell and direct methanol fuel cell - comparison of batteries with fuel cells.		
Unit – IV	**FUELS AND COMBUSTION**	**9**
Introduction – classification of fuels - characteristics of a good fuel - combustion - calorific values – gross and net calorific values (simple problems) -Flue gas analysis by Orsat's method- solid fuels - coal and its varieties – proximate analysis – significance – metallurgical coke - Otto-Hoffman byproduct method - liquid fuel - refining of petroleum - knocking: spark ignition engine - octane number, compression ignition engine - cetane number - gaseous fuel - LPG.		
Unit – V	**CHEMISTRY OF ENGINEERING MATERIALS**	**9**
Lubricants: Introduction – classification - properties: viscosity, viscosity index, flash and fire point, cloud and pour point, oiliness, aniline point and carbon residue. **Explosives**: Introduction - classification - manufacture of important explosives (TNT, GTN and RDX). **Adhesives**: Introduction-requisites of a good adhesive - classification of adhesives - adhesive bonding- chemical action of adhesive - industrial adhesives.		

TEXT BOOK:

1.	Roussak , O.V. Gesser, H. D. " Applied Chemistry: A Textbook for Engineers and Technologists", 2nd Edition ,Springer, 2013, for Units I, II, IV.
2.	Palanisamy P.N., Manikandan P., Geetha A., Manjula Rani K., Kowshalya V.N., "Chemistry for Engineering", Revised Edition ,Pearson Education, New Delhi, 2024, for Units I, III, IV, V

REFERENCES:

1.	Payal B. Joshi, Shashank Deep, "Engineering Chemistry", Oxford University Press, New Delhi, 2019.
2.	Wiley Editorial Board, "Wiley Engineering Chemistry", 2nd Edition, Wiley India Pvt. Ltd, New Delhi, Reprint 2019.

*includes Term Work(TW) & Online / Certification course hours

COURSE OUTCOMES: On completion of the course, the students will be able to		BT Mapped (Highest Level)
CO1	analyze the water quality parameters for suitability of industrial and domestic applications.	Analysing (K4)
CO2	investigate the fundamental principles of electrochemistry and corrosion control measures to prevent corrosion.	Analysing (K4)
CO3	examine the chemistry of energy storing devices and meeting the future prospectus of energy storage.	Analysing (K4)
CO4	investigate the concepts of fuels and combustion for efficient engineering applications.	Analysing (K4)
CO5	examine the needy engineering materials for betterment of industries.	Analysing (K4)

Mapping of COs with POs and PSOs

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	2	1		1							
CO2	3	2	1	1									
CO3	3	2	1	1									
CO4	3	2	1	1									
CO5	3	2	1	1									

1 – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom's Taxonomy

ASSESSMENT PATTERN - THEORY

Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %
CAT1		40	50	10			100
CAT2		40	50	10			100
CAT3		40	50	10			100
ESE		40	50	10			100

* ±3% may be varied (CAT 1, 2 & 3 – 50 marks & ESE – 100 marks)

Signature of the Chairman
Board of Studies -

ACADEMIC CELL
KONGU ENGINEERING COLLEGE

PCV

24CSC11 - PROBLEM SOLVING AND PROGRAMMING IN C									
Programme & Branch	**All BE/BTech Engineering & Technology branches, except CSE, IT,CSD, AI&ML, AI&DS**	**Sem**	**Category**	**L**	**T**	**P**	**SL***	**Total**	**Credit**
Prerequisites	**Nil**	**1**	**ES**	**45**	**0**	**30**	**45**	**120**	**4**

Preamble	The course is designed for use by freshmen students taking their first course in programming. It deals with the techniques needed to practice computational thinking, the art of using computers to solve problems and the ways the computers can be used to solve problems. This course also focuses on developing programming skills using C language.	
Unit – I	**Introduction to Computer and Problem Solving:**	**9**
Overview of computers: Types, Generations, Characteristics, Basic computer Organization – Problem solving techniques: Algorithms - Flowcharts – Pseudo codes – Structuring the logic: Sequential, selection and repetitive structure		
Unit – II	**Introduction to C and Control Statements:**	**9**
The structure of a C program – Compiling and executing C program – C Tokens – Character set in C – Keywords – identifiers- Basic data Types – Variables – constants – Input / Output statements – operators - decision making and looping statements		
Unit – III	**Arrays and Functions:**	**9**
Declaring, initializing and accessing arrays – operations on arrays – Two dimensional arrays and their operations. Functions : Introduction- Using functions, function declaration and definition – function call – return statement – passing parameters to functions: basic data types and arrays – storage classes – recursive functions		
Unit – IV	**Strings and Pointers:**	**9**
Strings :Introduction – operations on strings : finding length, concatenation, comparing and copying – string and character manipulation functions, Arrays of strings. Pointers: declaring pointer variables – pointer expression and arithmetic, pointers and 1D arrays , pointers and strings		
Unit – V	**User-defined Data Types and File Handling:**	**9**
User-defined data types: Structure: Introduction – nested structures– arrays of structure – structure and functions - unions – enumerated data type. File Handling: Introduction - opening and closing files – reading and writing data to files -Manipulating file position indicator : fseek(), ftell() and rewind()		

LIST OF EXPERIMENTS / EXERCISES:

1.	Writing algorithms and drawing flowcharts using Raptor Tool for problems involving sequential, Selection and repetition structures
2.	Programs for demonstrating the use of different types of format Specifiers
3.	Programs for demonstrating the use of different types of operators like arithmetic, logical, relational and ternary operators
4.	Programs for demonstrating using decision making statements
5.	Programs for demonstrating using repetitive statements
6.	Programs for demonstrating one-dimensional array
7.	Programs for demonstrating two-dimensional array
8.	Programs to demonstrate modular programming concepts using functions
9.	Programs to demonstrate strings (Using built-in and user-defined functions)
10.	Programs to illustrate the use of pointers
11.	Programs to illustrate the use of structures and unions
12.	Programs to implement file Handling

*includes Term Work(TW) & Online / Certification course hours

TEXT BOOK:	
1.	Reema Thareja, "Programming in C ", 2nd Edition, Oxford University Press, New Delhi, 2018
REFERENCES/ MANUAL / SOFTWARE:	
1.	Yashavant Kanetkar, "Let us C", 16th Edition, BPB Publications, 2018.
2.	Sumitabha Das, "Computer Fundamentals and C Programming", 1st Edition, McGraw Hill, 2018.
3.	Balagurusamy E., "Programming in ANSI C", 7th Edition, McGraw Hill Education, 2017.
4.	Behrouz A. Forouzan & Richard F.Gilberg, "Computer Science A Structured Programming Approach Using C", 3rd Edition, Cengage,2017.
5.	https://www.cprogramming.com/tutorial/c-tutorial.html

COURSE OUTCOMES: **On completion of the course, the students will be able to**		**BT Mapped (Highest Level)**
CO1	apply problem-solving techniques to express the solutions for the real world problems.	Applying (K3) Precision (S3)
CO2	develop simple C programs using appropriate looping and control statements	Applying (K3) Precision (S3)
CO3	develop simple C programs using the concepts of arrays and modular programming	Applying (K3) Precision (S3)
CO4	apply the concepts of pointers and develop C programs using strings and pointers	Applying (K3) Precision (S3)
CO5	make use of user-defined data types and file concepts to solve real world problems	Applying (K3) Precision (S3)

Mapping of COs with POs and PSOs

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	1	1					1	1	1		
CO2	3	2	2	1					1	1	1		
CO3	3	2	2	1					1	1	1		
CO4	3	2	2	1					1	1	1		
CO5	3	2	2	1					1	1	1		

1 – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom's Taxonomy

Signature of the Chairman
Board of Studies - CSE

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P. Kalaivani

24MET11 – ENGINEERING DRAWING									
(Common to Civil, Mech, MTS, Auto, Chem, ECE, EEE, EIE, FT branches)									
Programme & Branch	**BE / BTech – Civil, Mech, MTS, Auto, Chem, ECE, EEE, EIE, FT branches**	**Sem.**	**Category**	**L**	**T**	**P**	**SL***	**Total**	**Credit**
Prerequisites	**Nil**	**1 / 2#**	**ES**	**30**	**15**	**0**	**45**	**90**	**3**

Preamble	To impart knowledge on engineering curves, orthographic projections, sectional views, development of surfaces, isometric projections and AutoCAD through free hand sketching and drawing instruments.	
Unit – I	**Introduction to Engineering drawing and Engineering Curves**	**6+3**
Use of drafting instruments - BIS conventions and specifications - Size, layout and folding of drawing sheets - Lettering and dimensioning. Projection of pointsin different quadrants. Engineering Curves: Conic section- Ellipse, Parabola, Hyperbola (Eccentricity method). Cycloidal Curves- Cycloids and Involutes of circle and Hexagon.		
Unit – II	**Projection of planes and Solids**	**6+3**
Projection of polygonal surface and circular lamina inclined to both reference planes. Projections of simple solids like prisms, pyramids, cylinder and cone when the axis is inclined to one reference plane by change of position method.		
Unit – III	**Sectioning of Solids and Development of Surfaces**	**6+3**
Sectioning of prisms, pyramids, cylinder and cone in simple vertical position by cutting planes inclined to HP and perpendicular to VP - Obtaining true shape of section. Development of Lateral Surfaces of Simple and truncated Solids Like Prisms, Pyramids, Cylinders and Cones(Cutting planes inclined to HP and perpendicular to VP only).		
Unit – IV	**Isometric Projection**	**6+3**
Principles of isometric projection - Isometric scale - Isometric projections of simple and truncated solids like prisms, pyramids and cylinders. Conversion of orthographic in to isometric views		
Unit – V	**Orthographic Projection and Introduction to AutoCAD**	**6+3**
Conversion of isometric projection into orthographic projection (Freehand sketching only). Introduction to Computer Aided Drawing: Role of CAD in design and development of new products. Creating two-dimensional drawing with dimensions using suitable software (Minimum 2 exercises mandatory). Introduction to Solid Modelling: Creating 3D models of various components using suitable modelling software. (Minimum 2 exercises mandatory).		

TEXT BOOK:

1.	Basant Agrawal, Agrawal C.M., "Engineering Drawing", 3rd Edition, McGraw Hill Education, 2019.

REFERENCES:

1.	Lakh winder pal singh, Harwinder Singh., "Engineering Drawing and Principles and Applications", 1st Edition, Cambridge Ubiversity Press, 2021

*includes Term Work(TW) & Online / Certification course hours

#sem1: Cvil, Mech, MTS, Auto, Chem branches & sem 2: ECE, EEE, EIE, FT branches

COURSE OUTCOMES: On completion of the course, the students will be able to		BT Mapped (Highest Level)
CO1	interpret international standards of drawings and sketch the engineering curves	Applying (K3)
CO2	draw the projection of planes and solids	Applying (K3)
CO3	draw sectioning and developing of3D primitive objects like prisms, pyramids, cylinders, cones	Applying (K3)
CO4	sketch the isometric projections of simple and truncated solids and convert orthographic projection in to isometric drawing	Applying (K3)
CO5	obtain multi view projections and solid models of objects using CAD tools	Applying (K3)

Mapping of COs with POs and PSOs

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	1			2					3			
CO2	3	1	1		2					3			
CO3	3	1	1		2					3			
CO4	3	1	1		2					3			
CO5	3	1	1		2					3			

1 – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom's Taxonomy

ASSESSMENT PATTERN - THEORY

Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %
CAT1	-	-	100	-	-	-	100
CAT2	-	-	100	-	-	-	100
CAT3	-	-	100	-	-	-	100
ESE	-	-	100	-	-	-	100

* ±3% may be varied (CAT 1, 2 & 3 – 50 marks & ESE – 100 marks)

Signature of the Chairman
Board of Studies - Mechanical

ACADEMIC CELL
KONGU ENGINEERING COLLEGE

N

24TAM01- HERITAGE OF TAMILS									
(Common to All Engineering and Technology Branches)									
Programme & Branch	**All B.E/B.Tech Branches**	**Sem.**	**Category**	**L**	**T**	**P**	**SL***	**Total**	**Credit**
Prerequisites	**NIL**	**1**	**HS**	**15**	**0**	**0**	**15**	**30**	**1**

Preamble	The objective of this course is to impart knowledge about Tamil language, literature, paintings, sculptures, folk arts, heroic games, doctrines, contribution of Tamils to Indian culture.	
UNIT I	**Language and Literature**	**3**
Language families in india - dravidian languages – tamil as a classical language - classical literature in tamil – secular nature of sangam literature – distributive justice in sangam literature - management principles in thirukural - tamil epics and impact of buddhism & jainism in tamil land - bakthi literature azhwars and nayanmars - forms of minor poetry - development of modern literature in tamil - contribution of bharathiyar and bharathidhasan.		
UNIT II	**Heritage - Rock Art Paintings to Modern Art – Sculpture**	**3**
Hero stone to modern sculpture - bronze icons - tribes and their handicrafts - art of temple car making - - massive terracotta sculptures, village deities, thiruvalluvar statue at kanyakumari, making of musical instruments - mridhangam, parai, veenai, yazh and nadhaswaram - role of temples in social and economic life of tamils.		
UNIT III	**Folk and Martial Arts**	**3**
Therukoothu – karagattam - villu pattu - kaniyan koothu – oyillattam - leather puppetry – silambattam – valari - tiger dance - sports and games of tamils.		
UNIT IV	**Thinai Concept of Tamils**	**3**
Flora and fauna of tamils & aham and puram concept from tholkappiyam and sangam literature - aram concept of tamils - education and literacy during sangam age - ancient cities and ports of sangam age - export and import during sangam age - overseas conquest of cholas.		
UNIT V	**Contribution of Tamils to Indian National Movement and Indian Culture**	**3**
Contribution of tamils to indian freedom struggle - the cultural influence of tamils over the other parts of india – self-respect movement - role of siddha medicine in indigenous systems of medicine – inscriptions & manuscripts – print history of tamil books.		

TEXT BOOK:

1.	S.Muthuramalingam, M.Saravanakumar, Heritage of Tamils, Yes Dee Publishing Pvt Ltd, 2023, for Units I,II,III,IV,V.

REFERENCES:

1.	Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukarasu) (Published by : International Institute of Tamil Studies).
2.	The Contribution of Tamil of the Tamils to Indian Culture(Dr.M.Valarmathi)(Puplished by International Institute of Tamil Studies).
3.	Keeladi – 'Sangam City C ivilzation on the banks of river Vaigai; (Jointly Published by: Department of Archaeology & Tamilnadu Text Book and Educational Services Corporation, Tamilnadu).

*includes Term Work(TW) & Online / Certification course hours

COURSE OUTCOMES: படிப்பை முடித்தவுடன், மாணவர்கள்		BT Mapped (Highest Level)
CO1	explain valuable concepts in language and literature of tamils.	Understanding (K2)
CO2	illustrate about the tamils sculpture and their paintings.	Understanding (K2)
CO3	summarize about the tamils folk and martial arts.	Understanding (K2)
CO4	explain the thinai concept of tamils.	Understanding (K2)
CO5	explain the contribution of Tamils to the Indian National Movement and Indian culture.	Understanding (K2)

Mapping of COs with POs and PSOs

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1						2	3	2	2		3		
CO2						2	3	2	2		3		
CO3						2	3	2	2		3		
CO4						2	3	2	2		3		
CO5						2	3	2	2		3		

1 – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom's Taxonomy

ASSESSMENT PATTERN – THEORY

Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %
CAT1	40	60					100
CAT2	40	60					100
CAT3	40	60					100
ESE	NA						

* ±3% may be varied (CAT 1, 2 & 3 – 50 marks)

R.W2

Signature of the Chairman
Board of Studies - S & H (Chemistry)

ACADEMIC CELL * KONGU ENGINEERING COLLEGE *

24TAM01-தமிழர் மரபு									
(Common to All Engineering and Technology Branches)									
Programme & Branch	**All B.E/B.Tech Branches**	**Sem.**	**Category**	**L**	**T**	**P**	**SL***	**Total**	**Credit**
Prerequisites	**NIL**	**1**	**HS**	**15**	**0**	**0**	**15**	**30**	**1**

Preamble	தமிழர்களின் மொழி, இலக்கியம், ஓவியங்கள், சிற்பக்கலைகள், நாட்டுப்புறக் கலைகள், வீர விளையாட்டுக்கள், திணைக் கோட்பாடுகள், இந்திய பண்பாட்டிற்குத் தமிழர்களின் பங்களிப்பைப் பற்றிய அறிவை வழங்குவதே இந்த பாடத்தின் நோக்கமாகும்.	
அலகு - I	**மொழி மற்றும் இலக்கியம்**	3
இந்திய மொழிக் குடும்பங்கள் - திராவிட மொழிகள் - தமிழ் ஒரு செம்மொழி - தமிழ் செவ்விலக்கியங்கள் - சங்க இலக்கியத்தின் சமயச் சார்பற்ற தன்மை - சங்க இலக்கியத்தில் பகிர்தல் அறம் - திருக்குறளில் மேலாண்மைக் கருத்துக்கள் - தமிழ் காப்பியங்கள், தமிழகத்தில் சமண பௌத்த சமயங்களின் தாக்கம் - பக்தி இலக்கியம், ஆழ்வார்கள் மற்றும் நாயன்மார்கள் - சிற்றிலக்கியங்கள் - தமிழில் நவீன இலக்கியத்தின் வளர்ச்சி - தமிழ் இலக்கிய வளர்ச்சியில் பாரதியார் மற்றும் பாரதிதாசன் ஆகியோரின் பங்களிப்பு.		
அலகு - II	**மரபு - பாறை ஓவியங்கள் முதல் நவீன ஓவியங்கள் வரை - சிற்பக் கலை**	3
நடுகல் முதல் நவீன சிற்பங்கள் வரை - ஐம்பொன் சிலைகள் - பழங்குடியினர் மற்றும் அவர்கள் தயாரிக்கும் கைவினைப் பொருட்கள், பொம்மைகள் - தேர் செய்யும் கலை - சுடுமண் சிற்பங்கள் - நாட்டுப்புறத் தெய்வங்கள் - குமரிமுனையில் திருவள்ளுவர் சிலை - இசைக் கருவிகள் - மிருதங்கம், பறை, வீணை, யாழ், நாதஸ்வரம் - தமிழர்களின் சமூக பொருளாதார வாழ்வில் கோவில்களின் பங்கு.		
அலகு - III	**நாட்டுப்புறக் கலைகள் மற்றும் வீர விளையாட்டுக்கள்**	3
தெருக்கூத்து, கரகாட்டம், வில்லுப்பாட்டு, கணியான் கூத்து, ஒயிலாட்டம், தோல்பாவைக் கூத்து, சிலம்பாட்டம், வளரி, புலியாட்டம், தமிழர்களின் விளையாட்டுகள்.		
அலகு - IV	**தமிழர்களின் திணைக் கோட்பாடுகள்**	3
தமிழகத்தின் தாவரங்களும், விலங்குகளும் - தொல்காப்பியம் மற்றும் சங்க இலக்கியத்தில் அகம் மற்றும் புறக் கோட்பாடுகள் - தமிழர்கள் போற்றிய அறக்கோட்பாடு- சங்கக்காலத்தில் தமிழகத்தில் எழுத்தறிவும் கல்வியும் - சங்ககால நகரங்களும் துறை முகங்களும் - சங்ககாலத்தில் ஏற்றுமதி மற்றும் இறக்குமதி - கடல்கடந்த நாடுகளில் சோழர்களின் வெற்றி.		
அலகு - V	**இந்திய தேசிய இயக்கம் மற்றும் இந்திய பண்பாட்டிற்குத் தமிழர்களின் பங்களிப்பு**	3
இந்திய விடுதலைப்போரில் தமிழர்களின் பங்கு - இந்தியாவின் பிறபகுதிகளில் தமிழ் பண்பாட்டின் தாக்கம் - சுயமரியாதை இயக்கம் - இந்திய மருத்துவத்தில் சித்த மருத்துவத்தின் பங்கு - கல்வெட்டுகள், கையெழுத்துப்படிகள் - தமிழ்ப் புத்தகங்கள்களின் அச்சு வரலாறு.		

TEXT BOOK:

1.	ஆ. பூபாலன், தமிழர் மரபு, VRB Publishers Pvt Ltd, 2022,அலகு I,II,III,IV,V.

REFERENCES:

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

*includes Term Work(TW) & Online / Certification course hours

COURSE OUTCOMES: படிப்பை முடித்தவுடன், மாணவர்கள்		BT Mapped (Highest Level)
CO1	தமிழ் மொழி மற்றும் இலக்கியத்தில் மதிப்புமிக்க கருத்துக்களை விளக்க முடியும்.	Understanding (K2)
CO2	தமிழர்களின் சிற்பம் மற்றும் அவர்களின் ஓவியங்கள் பற்றி விளக்க முடியும்.	Understanding (K2)
CO3	தமிழர்களின் நாட்டுப்புற மற்றும் தற்காப்புக் கலைகளைப் பற்றி சுருக்கமாகக் கூற முடியும்.	Understanding (K2)
CO4	தமிழர்களின் திணைக் கோட்பாடுகளைப் பற்றி விளக்க முடியும்.	Understanding (K2)
CO5	இந்திய தேசிய இயக்கம் மற்றும் இந்திய பண்பாட்டிற்குத் தமிழர்களின் பங்களிப்பு பற்றி விளக்க முடியும்.	Understanding (K2)

Mapping of COs with POs and PSOs

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1						2	3	2	2		3		
CO2						2	3	2	2		3		
CO3						2	3	2	2		3		
CO4						2	3	2	2		3		
CO5						2	3	2	2		3		

1 – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom's Taxonomy

ASSESSMENT PATTERN – THEORY

Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %
CAT1	40	60					100
CAT2	40	60					100
CAT3	40	60					100
ESE	NA						

* ±3% may be varied (CAT 1, 2 & 3 – 50 marks)

Signature of the Chairman
Board of Studies - S & H (Chemistry)

ACADEMIC CELL * KONGU ENGINEERING COLLEGE *

24CYL12 – CHEMISTRY LABORATORY FOR MECHANICAL SYSTEMS

(Common to MECH, MTS & Automobile branches)

Programme & Branch	B.E & MECH, MTS & AUTO branches	Sem.	Category	L	T	P	SL*	Total	Credit
Prerequisites	Nil	1	BS	0	0	30	0	30	1

Preamble	This course aims to impart the basic concepts of volumetric, conductometric, spectrophotometric and pH meter experiments for the estimation of given samples and thereby, to improve the analytical skills. It also aims to impart knowledge on water quality parameters like hardness, alkalinity, DO, COD, corrosion rate of iron, chromium and sulphur.

LIST OF EXPERIMENTS / EXERCISES:

1.	Assessment of the given water sample for the suitability of drinking / industrial purpose by estimating the carbonate, non-carbonate and total hardness by EDTA method.
2.	Estimation of type and amount of alkalinity present in the given river/bore well water sample.
3.	Volumetric estimation of chromium present in the given solution using permanganometric method.
4.	Perform Winkler's method for the determination of dissolved oxygen in the given wastewater sample.
5.	Determination of strength and amount of acid in a given solution using pH meter.
6.	Determination of strength and amount of mixture of acids present in the given solution using Conductivity meter.
7.	Determination of COD in the given water sample.
8.	Determination of concentration of Nickel by Spectrophotometric method.
9.	Performing Permanganometric titration for the determination of corrosion rate of iron in acidic medium.
10.	Estimation of sulphur present in the given fuel using electro-analytical techniques.
11.	Construction and working of Zinc -Copper Electrochemical Cell (Demonstration).
12.	Report preparation -based on the data received from the analysed water quality parameters (Demonstration).

REFERENCES/ MANUAL /SOFTWARE:

1.	Palanisamy P.N., Manikandan P., Geetha A. and Manjula Rani K., "Chemistry Laboratory Manual", 1st Edition, Rajaganapathy Publishers, Erode, 2024.

COURSE OUTCOMES: On completion of the course, the students will be able to		BT Mapped (Highest Level)
CO1	determine the amount of water quality parameters like, hardness, alkalinity, DO, COD present in the given solution.	Analyzing (K4), Precision (S3)
CO2	estimate the concentration of Nickel by spectrophotometer and sulphur by electro analytical method.	Analyzing (K4), Precision (S3)
CO3	estimate the strength and amount of acids using conductivity meter and pH meter, iron and chromium using permanganometric method.	Analyzing (K4), Precision (S3)

Mapping of COs with POs and PSOs

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	2	2	3	2		2	1						
CO2	2	2	3	2		2	1						
CO3	2	2	3	2		2	1						

1 – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom's Taxonomy

*includes Term Work(TW) & Online / Certification course hours

Signature of the Chairman
Board of Studies -

ACADEMIC CELL * KONGU ENGINEERING COLLEGE *

24GCL12 - FOUNDATION LABORATORY – ELECTRICAL, IOT AND WEB TECHNOLOGIES

(Common to all BE/BTech branches)

Programme & Branch	All BE/BTech Branches	Sem.	Category	L	T	P	SL*	Total	Credit
Prerequisites	Nil	1/2	ES	0	0	90	0	90	3
Preamble	This course is designed to provide a foundational knowledge on engineering with hands-on experience on the house wiring, Internet of Things and Web Technologies.								

LIST OF EXPERIMENTS / EXERCISES:

	PART A – Electrical Installation (30 Hours)
1.	Determination of load currents and select suitable components for Protection
2.	Develop a wiring circuit for incandescent lamp and fluorescent lamp using Simple and Staircase Wiring
3.	Develop and Investigate wiring circuits for Calling Bell System and Dimmable Light
4.	Create wiring circuit for single phase motor
5.	Development of IOT based energy monitoring and control
6.	Measurement and analysis of electrical parameters for Photovoltaic Solar Panel
	PART B – Internet of Things (30 Hours)
1.	Design a Single layer PCB layout designing
2.	Fabricate Single layer PCB printing
3.	Assembling, soldering and desoldering practice on single layer PCB
4.	Sensor and actuator interfacing with internet enabled microcontroller
5.	Sensor and actuator calibration
6.	Integration of microcontroller based system with Cloud platform
	PART C – Web Technologies (30 Hours)
1.	Design a simple web page using basic HTML tags and CSS properties
2.	Design a responsive webpage using Bootstrap framework
3.	Design a webpage for signup and login validation form using Javascript and PHP
4.	Create a database connectivity using PHP, MySQL and host the website in the server.

REFERENCES/ MANUAL /SOFTWARE:

1.	Laboratory Manual
2.	Eric T.Freeman,Elisabeth Robson, "Head First JavaScript Programming A Brain-Friendly Guide", 1st Edition, O'Reilly , 2014.
3.	Eric T.Freeman,Elisabeth Robson, "Head First HTML and CSS",2nd Edition, O'Reilly , 2012
4.	Lynn Beighley,"Head First SQL",1st Edition, O'Reilly,2007.

COURSE OUTCOMES: On completion of the course, the students will be able to		**BT Mapped (Highest Level)**
CO1	Design electrical wiring circuits for buildings based on their requirement	Applying(K3) Precision (S3)
CO2	Develop IoT based solutions and PCB for real world use cases.	Applying (K3), Precision (S3)
CO3	Design and host an interactive dynamic website.	Applying(K3), Precision (S3)

Mapping of COs with POs and PSOs

COs/POs /PSOs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO 8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	3	3	2	3		1	3	2	2	2		
CO2	3	3	3	2	3		1	3	2	2	2		
CO3	3	2	1	1		3	3	2	2	3			

1 – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom's Taxonomy

Signature of the Chairman
Board of Studies - EEE

ACADEMIC CELL * KONGU ENGINEERING COLLEGE *

24MNT12 - QUANTITATIVE APTITUDE - I

(Common to all Engineering and Technology branches)

Programme & Branch	All B.E/B.Tech Branches	Sem.	Category	L	T	P	SL*	Total	Credit
Prerequisites	Basic Mathematical skills	1	MC	20	0	0	10	30	0

Preamble	To impart problem solving skills and enhance analytical skills.	
Unit – I	**Number system and Equations:**	**6**

Number systems: Classification of numbers – Rules of divisibility – BODMAS Rule – HCF and LCM – Decimal fractions –Simplification – Problems.
Equations: Solving equations with one variable – Solving simultaneous linear equations with two variables – Applications of simultaneous linear equations – Problems on ages – Simple problems.

Unit – II	**Ratio, Proportion and Percentage:**	**6**

Ratio and Proportion: Third, Fourth and mean proportional – Comparison of ratios – Compound ratio – Duplicate ratio – Sub duplicate ratio – Triplicate ratio – Sub triplicate ratio – Chain rule – Simple problems.
Percentages: Basic Concepts – Problems on percentages – Problems on population – Problems on depreciation.

Unit – III	**Profit and Loss, Interest:**	**8**

Profit and Loss: Basic concepts – Cost price – Selling price – Profit and Loss – Simple problems.
Simple and Compound interest: Concepts – Percentage of interest – Difference between simple interest and compound interest – Simple problems.

TEXT BOOK:

1.	Dr R.S.Agarwal, "Quantitative Aptitude for Competitive Examinations", Revised Edition, S.Chand and company limited, 2022.

REFERENCES/ MANUAL / SOFTWARE:

1.	Abhijit Guha,"Quantitative Aptitude for Competitive Examination", 7th Edition, McGraw Hill Education, India, 2020.
2.	https://www.indiabix.com/aptitude/questions-and-answers
3.	https://www.geeksforgeeks.org/aptitude-questions-and-answers

COURSE OUTCOMES: On completion of the course, the students will be able to		**BT Mapped (Highest Level)**
CO1	Solve equations with one and two variables.	Applying (K3)
CO2	Solve ratio, proportion and percentage problems.	Applying (K3)
CO3	Solve profit and loss, simple interest and compound interest problems.	Applying (K3)

Mapping of COs with POs and PSOs

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	2	2											
CO2	2	2											
CO3	3	3											

1 – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom's Taxonomy

ASSESSMENT PATTERN - THEORY

Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %
CAT1		30	70				100
CAT2		30	70				100
CAT3		30	70				100

* ±3% may be varied (CAT 1, 2 & 3 – 50 marks & ESE – 100 marks)

*includes Term Work (TW) & Online / Certification course hours

R.W

Signature of the Chairman
Board of Studies - S4H

ACADEMIC CELL * KONGU ENGINEERING COLLEGE *

24EGT21 - ENGLISH FOR EFFECTIVE COMMUNICATION - II									
(Common to all Engineering and Technology branches)									
Programme & Branch	**All B.E/B.Tech Branches**	**Sem**	**Category**	**L**	**T**	**P**	**SL***	**Total**	**Credit**
Prerequisites	**Nil**	**2**	**HS**	**45**	**0**	**0**	**45**	**90**	**3**

Preamble	This course aims at up skilling the learners to listen, speak, read, and write as well as to facilitate the students in practicing the language skills to acquire verbal and communicative proficiency in professional and academic contexts.	
sUnit – I	**Grammar, Verbal Aptitude, Listening, Speaking, Reading & Writing**	**9**
Grammar: Simple, Compound, and Complex Sentences – **Verbal Aptitude:** Odd Words – Paired words – **Listening:** Listening to a Match Commentary and Filling in a Table – Listening to TED talks - **Speaking:** Apologizing – Talking about Manners and Etiquette – **Reading:** Scanning a Text, Power Point Presentations – The Best Way to Start a New Habit : An Excerpt from *Atomic Habits* **Writing:** Business Letters: Enquiry and Complaint		
Unit – II	**Grammar, Verbal Aptitude, Listening, Speaking, Reading & Writing**	**9**
Grammar: Direct and Indirect Speech – **Verbal Aptitude:** Words often Confused – Verbal Analogy – **Listening:** Listening to a Lecture and Sorting Information – Career Related Conversation – **Speaking:** Group Discussion – Speaking about Career Choices and Professional Skills – **Reading:** Reading for Local and Global Comprehension – How to Find and Fix the Causes of Your Bad Habits: An Excerpt from *Atomic Habits* - **Writing: Job Application:** Cover Letter and Resume – Student Portfolio		
Unit – III	**Grammar, Verbal Aptitude, Listening, Speaking, Reading & Writing**	**9**
Grammar: Active and Passive Voice – **Verbal Aptitude:** Error Spotting – Sentence Improvement – Abbreviations and Acronyms – **Listening:** Listening to Podcast Interviews and News/Motivational Speeches – **Speaking:** Presenting a Point of View – Giving Opinions about Podcast – **Reading:** Reading a Procedure – Cross Cultural Communication - How to Make Good Habits Inevitable and Bad Habits Impossible: An Excerpt from *Atomic Habits* – **Writing:** Types of Essays: Argumentative and Opinion based Essays		
Unit – IV	**Grammar, Verbal Aptitude, Listening, Speaking, Reading & Writing**	**9**
Grammar: If/Conditional Clause – Modals Verbs – Conversational Devices - **Verbal Aptitude:** Sentence Correction – Sentence Selection – **Listening:** Listening and Filling a Mind Map – Listening to Interviews, Celebrity talks – **Speaking:** Giving Advice and Suggestions – Interviewing Classmates - **Reading:** Reading for Information, Researching for Supporting Evidence – Technical Communication: Modes of Technology-based Communication – How to Stick with Good Habits Every Day : An Excerpt from *Atomic Habits* **Writing:** Dialogue Writing – Writing Reviews: Product and Documentary films/Web Series		
Unit – V	**Grammar, Verbal Aptitude, Listening, Speaking, Reading & Writing**	**9**
Grammar: Common Errors in Tenses – Verb - Preposition combinations – **Verbal Aptitude:** Coding and Decoding – **Listening:** Listening for key points – Speeches of New Inventions – **Speaking:** Asking for and Giving Permission – Talking about Gadgets, Inventions and Technology – **Reading:** Categorizing Information – Technical Communication: Effective use of Technology-based Communication – The Goldilocks Rule: How to Stay Motivated in Life and Work: An Excerpt from *Atomic Habits* – **Writing:** Report Writing: IV Report and Case Study Report		

TEXT BOOK:

1.	Sudharshana N P and Savitha C, *English for Technical Communication*, 2nd Edition, Cambridge University Press, New Delhi, 2016.

REFERENCES:

1.	Ashraf Rizvi. Effective Technical Communication, 2nd Edition, McGraw-Hill India, 2017.
2.	S. P. Dhanavel. English and Communication Skills for Students of Science and Engineering, Orient Black Swan Publishers, Hyderabad, 2009.
3.	James Clear. Atomic Habits By James Clear. Dharman, 2023.

* includes Term Work (TW) & Assignments, Tutorials and Case Studies

COURSE OUTCOMES: On completion of the course, the students will be able to		BT Mapped (Highest Level)
CO1	construct contextual and functional grammar to enhance the linguistic competence	Applying (K3)
CO2	listen, comprehend and infer implied meanings of the given text	Applying (K3)
CO3	speak clearly to develop competence to participate in oral discourses such as discussions / meetings / interviews and deliver presentations	Creating (K6)
CO4	critically read various texts by understanding contextual meanings and respond appropriately	Understanding (K2)
CO5	Analyze different genres of writing and making precise non-technical and technical documents	Analyzing (K4)

Mapping of COs with POs and PSOs

COs/ POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1						1		1	3	1	1		
CO2								2	3		1		
CO3								2	3	1	2		
CO4						1			3	1	2		
CO5									3		2		

1 – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom's Taxonomy

ASSESSMENT PATTERN – THEORY

Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %
CAT1	-	30	70	-	-	-	100
CAT2	-	30	35	-	-	35	100
CAT3	-	20	45	35	-	-	100
ESE	-	20	55	10	-	15	100

* ±3% may be varied (CAT 1, 2& 3 – 50 marks & ESE – 100 marks)

Signature of the Chairman
Board of Studies - S&H (English)

ACADEMIC CELL
KONGU ENGINEERING COLLEGE

24MAC21 - MULTIVARIABLE CALCULUS AND COMPLEX ANALYSIS									
(Common to CIVIL, MECH, MTS, ECE, EEE, EIE & FT branches)									
Programme & Branch	**B.E – CIVIL, MECH,MTS, ECE,EEE,EIE & B.Tech - FT**	**Sem.**	**Category**	**L**	**T**	**P**	**SL***	**Total**	**Credit**
Prerequisites	**Nil**	**2**	**BS**	**45**	**7**	**16**	**52**	**120**	**4**

Preamble	To impart the knowledge of partial derivatives, evaluation of real and complex integrals, vector calculus and analytic functions to the students for solving the problems related to various engineering disciplines.	
Unit – I	**Functions of Several Variables:**	**9**
Functions of two or more variables – Partial derivatives – Total differential – Applications: Maxima and minima – Constrained maxima and minima – Lagrange's multiplier method.		
Unit – II	**Multiple Integrals:**	**9**
Double integration in cartesian coordinates – Change of order of integration – Application: Area between two curves – Triple integration in cartesian coordinates – Volume as triple integrals.		
Unit – III	**Vector Calculus:**	**9**
Directional derivative – Gradient of a scalar point function – Divergence of a vector point function – Curl of a vector – Solenoidal and Irrotational vectors – Vector Integration: Introduction – Green's and Gauss divergence theorems (without proof) – Verification of the above theorems and evaluation of integrals using them.		
Unit – IV	**Analytic Functions:**	**9**
Functions of a complex variable – Analytic functions – Necessary and sufficient conditions (excluding proof) – Cauchy–Riemann equations (Statement only) – Properties of analytic function (Statement only) – Harmonic function – Construction of analytic function – Conformal mapping: $w = z + a$, az, $1/z$ – Bilinear transformation.		
Unit – V	**Complex Integration:**	**9**
Introduction – Cauchy's theorem (without proof) – Cauchy's integral formula – Singularities – Classification – Cauchy's residue theorem (without proof) – Applications: Evaluation of definite integrals involving sine and cosine functions over the circular contour.		

LIST OF EXPERIMENTS / EXERCISES:	
1.	Finding ordinary and partial derivatives
2.	Computing extreme values of function of two variables
3.	Evaluating double and triple integrals
4.	Finding the area between two curves
5.	Computing gradient, divergence and curl of point functions
6.	Applying Milne-Thomson method for constructing analytic function
7.	Determination of Mobius transformation for the given set of points
8.	Finding poles and residues of an analytic function

TEXT BOOK:	
1.	Kandasamy P., Thilagavathy K. and Gunavathy K., "Engineering Mathematics For First Year B.E/B.Tech", Reprint Edition 2016, S.Chand and Co., New Delhi.
REFERENCES/ MANUAL / SOFTWARE:	
1.	Kreyszig E, "Advanced Engineering Mathematics ", 10th Edition, John Wiley, New Delhi, India, 2016.
2.	Ramana B V, "Higher Engineering Mathematics", 1st Edition, Tata McGraw-Hill Publishing Company Limited, New Delhi, 2018.
3.	Duraisamy C., Vengataasalam S., Arun Prakash K. and Suresh M., "Engineering Mathematics - II", 2nd Edition, Pearson India Education, New Delhi, 2018.
4.	Grewal B.S, "Higher Engineering Mathematics" 44thEdition, Khanna Publishers, New Delhi, 2018.
5.	Multivariable Calculus and Complex Analysis Laboratory Manual.

*includes Term Work (TW) & Online / Certification course hours

COURSE OUTCOMES: On completion of the course, the students will be able to		BT Mapped (Highest Level)
CO1	Compute the total derivatives and extreme values of multivariable functions.	Applying (K3) Manipulation (S2)
CO2	Apply multiple integrals to compute the area and volume of the regions.	Applying (K3) Manipulation (S2)
CO3	Apply the concepts of derivatives and line integrals of point functions in engineering problems.	Applying (K3) Manipulation (S2)
CO4	Construct analytic functions and bilinear transformations and determine the image of given region under the given conformal mapping.	Understanding (K2) Manipulation (S2)
CO5	Apply the techniques of complex integration to evaluate real and complex integrals over closed curves.	Applying (K3) Manipulation (S2)

Mapping of COs with POs and PSOs

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	3	2		3								
CO2	3	3	2		3								
CO3	3	3			3								
CO4	3	3			3								
CO5	3	3	3		3								

1 – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom's Taxonomy

ASSESSMENT PATTERN - THEORY

Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %
CAT1		40	60				100
CAT2		40	60				100
CAT3		50	50				100
ESE		30	70				100

* ±3% may be varied (CAT 1, 2 & 3 – 50 marks & ESE – 100 marks)

Signature of the Chairman
Board of Studies - S & H

ACADEMIC CELL
KONGU ENGINEERING COLLEGE

24PHT21 – APPLIED PHYSICS									
(Common to CIVIL, MECH, MTS and AUTO branches)									
Programme& Branch	**BE - CIVIL, MECH, MTS and AUTO branches**	**Sem.**	**Category**	**L**	**T**	**P**	**SL***	**Total**	**Credit**
Prerequisites	**Nil**	**2**	**BS**	**45**	**0**	**0**	**45**	**90**	**3**

Preamble	This course aims to impart the knowledge on crystal physics, quantum physics, acoustics, ultrasonics, laser, fiber optics and select materials characterization techniques. It also describes the applications of aforementioned topics in engineering.	
Unit – I	**Crystal Physics:**	**9**
Classification of solids – Space lattice – Unit cell – Crystal structure – Bravais lattice – Single and polycrystalline materials – Lattice planes – Miller indices – Interplanar spacing in cubic crystal – Number of atoms per unit cell – Atomic radius – Coordination number – Atomic packing factor – Body centered cubic– Face centered cubic – Hexagonal close packed crystal structure – Crystal imperfections: line, surface and volume imperfections.		
Unit – II	**Quantum Physics and Applications:**	**9**
Blackbody radiation – Planck's theory – Compton scattering – Matter waves – Properties – Heisenberg uncertainty principle – Schrodinger's time-independent and time-dependent wave equations – Physical significance of wave function – Particle in a one-dimensional box.		
Unit – III	**Acoustics and Ultrasonics:**	**9**
Classification of sound – Characteristics of sound – Reverberation and reverberation time – Growth and decay of sound – Sabine's formula for reverberation time – Determination of sound absorption coefficient – Factors affecting acoustics of buildings and their remedies – Ultrasonics – Properties of ultrasonic waves – Generation of ultrasonic waves – Magnetostrictive generator and Piezoelectric generator – Non-destructive testing – Flaw detection.		
Unit – IV	**Laser and Fiber optics:**	**9**
Stimulated absorption – Spontaneous emission – Stimulated emission – Einstein's coefficients and their relations – Population inversion – Pumping – CO_2 laser – Holography – Fiber optics – Numerical aperture and acceptance angle – Classification of optical fibers based on refractive index, modes and materials – Fiber optic communication system – Temperature and displacement sensors.		
Unit – V	**Characterization Techniques and Advanced Materials:**	**9**
Importance of materials characterization – X-ray diffraction (powder method) – Scanning electron microscope – Transmission electron microscope – UV-visible spectroscopy – Raman spectroscopy – Nuclear Magnetic Resonance – Role of physics in advanced materials – Metallic glasses – Shape memory alloys .		

TEXT BOOK:

1.	Katiyar A.K, Pandey C.K, "Engineering Physics: Theory and Practical", 2nd edition, Wiley, 2015 (Unit I, II).
2.	Tamilarasan K and Prabu K, "Physics for Engineering I", 1st Edition, McGraw Hill Education Pvt. Ltd., New Delhi, 2023(Unit III, IV, V).

REFERENCES:

1.	Malik H.K and Singh A.K, "Engineering Physics", 2nd Edition McGraw-Hill Education, New Delhi, 2022.
2.	Euth Ortiz Ortega, HamedHosseinian, Ingrid Berenice Aguilar Meza, Maria Jose Rosales Lopez, Andrea Rodriguez Vera, Samira Hosseini, "Material Characterization Techniques and Applications", Springer 2022.

*includes Term Work (TW) & Online / Certification course hours

COURSE OUTCOMES: On completion of the course, the students will be able to		BT Mapped (Highest Level)
CO1	analyze seven crystal systems, interplanar spacing in cubic lattice, BCC, FCC, HCP crystal systems and the types of crystal imperfections and their impacts.	Analyzing (K4)
CO2	investigate the concepts of quantum mechanics to describe Planck's theory, Compton effect and the behavior of electrons in a metal by solving Schrodinger's wave equations.	Analyzing (K4)
CO3	explore the concepts of growth and decay of sound energy in a hall to compute Sabine's formula and to recognize the requirements of acoustically good buildings and also to describe the production of ultrasonic waves and testing of materials by non-destructive method.	Analyzing (K4)
CO4	examine the concepts of stimulated emission of radiation to explain the working and the applications of laser in engineering and technology. To apply the principle of propagation of light through optical fiber to compute acceptance angle and numerical aperture and also to explain fiber optic communication system and the working of fiber optic sensors.	Analyzing (K4)
CO5	Inspect Raman effect, X-ray diffraction, matter waves, nuclear magnetic resonance, metallic glasses and shape memory alloys.	Analyzing (K4)

Mapping of COs with POs and PSOs

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	2					1	1		1		
CO2	3	2	2					1	1		1		
CO3	3	2	2					1	1		1		
CO4	3	2	2					1	1		1		
CO5	3	2	2					1	1		1		

1 – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom's Taxonomy

ASSESSMENT PATTERN - THEORY

Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %
CAT1		40	50	10			100
CAT2		40	50	10			100
CAT3		40	50	10			100
ESE		40	50	10			100

* ±3% may be varied (CAT 1,2,3 – 50 marks & ESE – 100 marks)

Signature of the Chairman
Board of Studies - S&H, Physics

ACADEMIC CELL
KONGU ENGINEERING COLLEGE

24ITC23 - PYTHON PROGRAMMING

(Common to Civil, Mechanical, Mechatronics, Chemical, Food Technology& Automobile Engineering branches)

Programme & Branch	B. E Civil , Mechanical, Automobile B.Tech Chemical Engineering ,Food Technology	Sem.	Category	L	T	P	SL*	Total	Credit
Prerequisites	Programming in C	2	ES	45	0	30	45	120	4

Preamble	This course deals with core python programming. It gives a comprehensive introduction to problem solving using python constructs and libraries.	
Unit –I	**Introduction:**	**9**
Problem solving strategies – program design tools – Types of errors – Testing and Debugging- Basics: Literals – variables and identifiers – data types – input operation – comments – reserved words – indentation – Operators and Expressions – Decision Control Statements: Introduction – conditional statement – iterative statements – Nested Loops – break, continue and pass statements– elsein loops.		
Unit –II	**Lists, Tuples and Dictionary:**	**9**
Lists: Access, update, nested, cloning, operations, methods , comprehensions, looping – Tuple: Create, utility, access, update, delete, operations, assignments, returning multiple values, nested tuples, index and count method – Dictionary: Create, access, add and modify, delete, sort, looping, nested, built-in methods – list vs tuple vs dictionary.		
Unit –III	**Strings and Regular Expressions:**	**9**
Strings: Concatenation , append, multiply on strings – Immutable – formatting operator – Built-in string methods and functions – slice operation – functions – operators – comparing – iterating – string module – Regular Expressions – match, search, sub, findall and finditer functions – flag options.		
Unit –IV	**Functions and Modules:**	**9**
Functions: Introduction – definition – call – variable scope and lifetime – return statement – function arguments – lambda function – documentation strings – programming practices recursive function- Modules: Modules – packages – standard library methods – function redefinition.		
Unit –V	**Object Orientation:**	**9**
Class and Objects: Class and objects–class methods and self–constructor–class and object variables–destructor–public and private data member. NumPy : NumPy Arrays – Computation on NumPy Arrays. Matplotlib : Line plots – Scatter Plots		

LISTOF EXPERIMENTS / EXERCISES:

1.	Programs using conditional and looping statements
2.	Implementation of list and tuple operations
3.	Implementation of dictionary operations
4.	Perform various string operations
5.	Use regular expressions for validating inputs
6.	Demonstration of different types of functions and parameter passing
7.	Develop programs using classes and objects
8.	Perform computation on Numpy arrays
9.	Draw different types of plots using Matplotlib

TEXT BOOK:

1. ReemaThareja.,"PythonProgrammingusingproblemsolvingapproach",3rdimpression, Oxford University Press., NewDelhi, 2017.

REFERENCES:

1. Nageswara Rao, "Core Python Programming", 2nd Edition, DreamTech Press, New Delhi, 2018.
2. Jake Vander Plas, " Python Data Science Handbook Essential Tools for Working with Data", O'Reilly Publishers, 1st Edition,2016.

*includes Term Work(TW) & Online / Certification course hours

COURSE OUTCOMES: On completion of the course, the students will be able to		BT Mapped (Highest Level)
CO1	use basic python constructs to build simple programs	Applying(K3), Precision(S3)
CO2	apply list, tuple and dictionary to handle variety of data.	Applying(K3), Precision(S3)
CO3	apply strings and regular expression for searching and retrieval	Applying(K3), Precision(S3)
CO4	solve the problems using functions and modules.	Applying(K3), Precision(S3)
CO5	apply object oriented concepts and perform data science operations using python	Applying(K3), Precision(S3)

Mapping of COs with POs and PSOs

COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	2	2	1				1	1	1	3	1
CO2	3	2	2	2	1				1	1	1	3	1
CO3	3	2	2	2	1				1	1	1	3	1
CO4	3	2	2	2	1				1	1	1	3	1
CO5	3	2	2	2	1				1	1	1	3	1

1 – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom's Taxonomy

ASSESSMENT PATTERN – THEORY

Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %
CAT1		25	75				100
CAT2		25	75				100
CAT3		25	75				100
ESE		25	75				100

***±3% may be varied (CAT 1,2,3–50marks & ESE–100marks)**

Signature of the Chairman
Board of Studies - IT

ACADEMIC CELL * KONGU ENGINEERING COLLEGE *

24MET21 - ENGINEERING MECHANICS									
(Common to Mechanical & Mechatronics Engineering branches)									
Programme & Branch	**B.E. - Mechanical Engineering, B.E. - Mechatronics Engineering branches**	**Sem.**	**Category**	**L**	**T**	**P**	**SL***	**Total**	**Credit**
Prerequisites	**Nil**	**2**	**PC**	**45**	**0**	**0**	**45**	**90**	**3**

Preamble	This course provides introduction to the basic concepts of forces, inertia, centroid and moment of area along with their effects. It introduces the phenomenon of friction and its effects. It familiarizes students to cognitive learning in applied mechanics and develops problem-solving skills.

Unit – I	**Statics of Particles**	**9**

Introduction – Laws of Mechanics – Parallelogram and Triangular Law of Forces – Principle of Transmissibility – Coplanar Forces – Resolution and Composition of Force - Free Body Diagram – Equilibrium of a Particle in Plane – Forces in Space - Vectorial representationof Forces – Equilibrium of a Particle in Space.

Unit – II	**Statics of Rigid Bodies**	**9**

Moments: Moment of a Force about a Point and about an Axis – Vectorial Representation of Moments and Couples – Varignon's Theorem – Equivalent Systems of Forces – Single Equivalent Force. Types of Supports and their Reactions – Requirements of Stable Equilibrium – Equilibrium of Rigid Bodies in Two Dimensions – Trusses: Method of Joints.

Unit – III	**Properties of Surfaces and Solids**	**9**

Determination of Areas and Volumes — First Moment of Area and Centroid of Sections — T Section - I Section - Angle Section - HollowSection from Primary Simpler Sections — Second Moment of Plane Areas — Parallel Axis Theorem and Perpendicular Axis Theorem - TSection - I Section - Angle Section - Hollow Section — Polar Moment of Inertia — Product of Inertia.

Unit – IV	**Friction and Rectilinear motion of particles**	**6+3**

Friction: Surface Friction – Laws of Dry Friction – Sliding Friction – Static and Kinetic Friction – Ladder Friction – Wedge Friction – Belt Friction. Rectilinear Motion of Particles: Displacement - Velocity and Acceleration and their Relationship – Relative Motion- Curvilinear Motion — Projectile Motion.

Unit – V	**Dynamics of Particles**	**6+3**

Dynamics of Particles: Newton's Law, Work - Energy and Impulse - Momentum Principles — Impact of Elastic Bodies. General Plane Motion.

TEXT BOOK:

1. Dubey N.H., Engineering Mechanics Statics and dynamics" 2nd Edition, McGraw Hill Education, New Delhi, 2021.

REFERENCES:

1. Hibbeler R.C., "Engineering Mechanics", 14th Edition, Pearson Education, New Delhi, 2017.
2. Meriam J L, Kraige L G , Bolton J.N., " Engineering Mechanics: Statics and Engineering Mechanics: Dynamics, 9th edition, Wiley student edition, 2021

*includes Term Work(TW) & Online / Certification course hours

COURSE OUTCOMES: On completion of the course, the students will be able to		BT Mapped (Highest Level)
CO1	represent the forces in vector components (both 2D and 3D) and apply equilibrium conditions	Applying (K3)
CO2	calculate the moment produced by various force systems and conclude the static equilibrium equations for rigid body system	Analyzing (K4)
CO3	compute the centroid, centre of gravity and moment of inertia of geometrical shapes and solids respectively	Applying (K3)
CO4	manipulate the effect of dry friction and its applications	Applying (K3)
CO5	apply the different principles to study the motion of a body and analyse their constitutive equations	Analyzing (K4)

Mapping of COs with POs and PSOs

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3		2								1		3
CO2	3	3	2								1		3
CO3	3		2								1		3
CO4	3	3	2								1		3
CO5	3		2								1		3

1 – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom's Taxonomy

ASSESSMENT PATTERN - THEORY

Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %
CAT1		20	50	30			100
CAT2		20	50	30			100
CAT3		20	50	30			100
ESE		10	60	30			100

* ±3% may be varied (CAT 1, 2 & 3 – 50 marks & ESE – 100 marks)

Signature of the Chairman
Board of Studies - Mechanical

ACADEMIC CELL * KONGU ENGINEERING COLLEGE *

24TAM02 - TAMILS AND TECHNOLOGY									
(Common to All Engineering and Technology Branches)									
Programme & Branch	**All BE/BTech Branches**	**Sem.**	**Category**	**L**	**T**	**P**	**SL***	**TOT**	**Credit**
Prerequisites	**Nil**	**2**	**HS**	**15**	**0**	**0**	**15**	**30**	**1**

Preamble	This course aims to impart the essential knowledge on the tamil culture and related technology	
UNIT – I	**WEAVING AND CERAMIC TECHNOLOGY**	**3**
Weaving Industry during Sangam Age – Ceramic technology – Black and Red Ware Potteries (BRW) – Graffiti on Potteries.		
UNIT – II	**DESIGN AND CONSTRUCTION TECHNOLOGY**	**3**
Designing and Structural construction House & Designs in household materials during Sangam Age – Building materials and Hero stones of Sangam age – Details of Stage Constructions in Silappathikaram – Sculptures and Temples of Mamallapuram – Great Temples of Cholas and other worship places – Temples of Nayaka Period – Type study (Madurai Meenakshi Temple) – Thirumalai Nayakar Mahal – Chetti Nadu Houses, Indo – Saracenic architecture at Madras during British Period.		
UNIT – III	**MANUFACTURING TECHNOLOGY**	**3**
Art of Ship Building – Metallurgical studies – Iron industry – Iron smelting, steel – Copper and gold – Coins as source of history – Minting of Coins – Beads making – industries Stone beads – Glass beads –Terracotta beads –Shell beads/ bone beats – Archeological evidences – Gem stone types described 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.		

TEXT BOOK:

1.	Social Life of Tamils (Dr.K.K.Pillay) A joint Publication of TNTB & ESC and RMRL – (in print)
2.	Social Life of the Tamils – The Classical Period (Dr.S.Sigaravelu) (Published by: International Institute of Tamil Studies).

REFERENCES:

1.	தமிழக வரலாறு - மக்களும் பண்பாடும் - கே கே பிள்ளை (வெளியீடு தமிழ்நாடு பாடநூல் மற்றும் கல்வியில் பணிகள் கழகம்), உலகத் தமிழாராய்ச்சி நிறுவனம், சென்னை, 2002
2.	கணினித்தமிழ் முனைவர் இல. சுந்தரம், விகடன் பிரசுரம், 2016
3.	கீழடி வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம்.(தொல்லியல் துறை வெளியீடு)
4.	பொருநை ஆற்றங்கரை நாகரிகம் (தொல்லியல் துறை வெளியீடு
5.	Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukarasu) (Published by : International Institute of Tamil Studies)
6.	The Contribution of the Tamils to Indian Culture (Dr.M.Valarmathi)(Puplished by International Institute of Tamil Studies).
7.	Keeladi – 'Sangam City Civilzation on the banks of river Vaigai; (Jointly Published by: Department of Archaeology & Tamilnadu Text Book and Educational Services Corporation, Tamilnadu)
8.	Studies in the History of India with Special Reference to Tamilnadu (Dr.K.K.Pillay) (Published by : The Author)
9.	Porunai Civilization (Jointly Published by: Department of Archaeology & Tamilnadu Textbook and Educational Services Corporation, Tamilnadu)
10.	Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

*includes Term Work (TW) & Online / Certification course hours

COURSE OUTCOMES: On completion of the course, the students will be able to		BT Mapped (Highest Level)
CO1	explain weaving and ceramic technology in tamil culture and tamil society.	Understanding (K2)
CO2	Illustrate about the design and construction technology.	Understanding (K2)
CO3	summarize about the manufacturing technology.	Understanding (K2)
CO4	explain the agriculture and irrigation technology.	Understanding (K2)
CO5	explain the significance of tamil in scientific and computing.	Understanding (K2)

Mapping of COs with POs and PSOs

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1						3		3	2	2			
CO2						3		3	2	2			
CO3						3		3	2	2			
CO4						3		3	2	2			
CO5						3		3	2	2			

1 – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom's Taxonomy

ASSESSMENT PATTERN – THEORY

Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %
CAT1	40	60					100
CAT2	40	60					100
CAT3	40	60					100
ESE	NA						

* ±3% may be varied (CAT 1,2,3 – 50 marks)

Signature of the Chairman
Board of Studies - S&H (Physics)

ACADEMIC CELL * KONGU ENGINEERING COLLEGE *

24TAM02 - தமிழரும் தொழில்நுட்பமும்									
(Common to All Engineering and Technology Branches)									
Programme & Branch	**All BE/BTech Branches**	**Sem.**	**Category**	**L**	**T**	**P**	**SL***	**TOT**	**Credit**
Prerequisites	**Nil**	**2**	**HS**	**15**	**0**	**0**	**15**	**30**	**1**
முன்னுரை	தமிழ் கலாச்சாரத்தோடு ஒன்றிய தொழில் நுட்பங்களை பற்றிப் எடுத்துரைத்தல்								
அலகு - I	**நெசவு மற்றும் பானை தொழில்நுட்பம்**							**3**	
சங்க காலத்தில் நெசவு தொழில் – பானைத் தொழில்நுட்பம் கருப்பு சிவப்பு பாண்டங்கள் – பாண்டகளில் கீறல் குறியீடுகள்									
அலகு - II	**வடிவமைப்பு மற்றும் கட்டிடத் தொழில்நுட்பம்**							**3**	
சங்க காலத்தில் வடிவமைப்பு மற்றும் கட்டுமானங்கள் & சங்க காலத்தில் வீட்டுப்பொருட்களில் வடிவமைப்பு – சங்க காலத்தில் கட்டுமான பொருட்களும் நடுகல்லும் – சிலப்பதிகாரத்தில் மேடை அமைப்பு பற்றிய விவரங்கள் – மாமல்லபுரச்சிற்பங்களும், கோவில்களும் – சோழர் காலத்து பெருங்கோயில்கள் மற்றும் பிற வழிபாட்டுத் தலங்கள் – நாயக்கர் காலக் கோயில்கள் –மாதிரிகட்டமைப்புகள் பற்றி அறிதல், மதுரை மீனாட்சி அம்மன் ஆலயம் மற்றும் திருமலை நாயக்கர் மஹால் – செட்டிநாட்டு வீடுகள் – பிரிட்டிஷ் காலத்தில் சென்னை இந்தோ-சாரோசெனிக் கட்டிடக் கலை.									
அலகு - III	**உற்பத்தித் தொழில்நுட்பம்**							**3**	
கப்பல் கட்டும் கலை – உலோகவியல் – இரும்புத் தொழிற்சாலை – இரும்பை உருக்குதல், எஃகு – வரலாற்றுச்சான்றுகளாக செம்பு மற்றும் தங்க நாணயங்கள் – நாணயங்கள் அச்சடித்தல் – மணி உருவாக்கும் தொழிற்சாலைகள் – கல்மணிகள் – கண்ணாடி மணிகள் – சுடுமண் மணிகள் – சங்கு மணிகள் – எலும்புத்துண்டுகள் – தொல்லியல் சான்றுகள் – சிலப்பதிகாரத்தில் மணிகளின் வகைகள்.									
அலகு - IV	**வேளாண்மை மற்றும் நீர்ப்பாசனத் தொழில்நுட்பம்**							**3**	
அணை, ஏரி, குளங்கள், மதகு – சோழர்கால குமிழித் தூம்பின் முக்கியத்துவம் – கால்நடை பராமரிப்பு – கால்நடைகளுக்காக வடிவமைக்கப்பட்ட கிணறுகள் – வேளாண்மை மற்றும் வேளாண்மை சார்ந்த செயல்பாடுகள் – கடல்சார் அறிவு – மீன்வளம் – முத்து மற்றும் முத்துக்குளித்தல் – பெருங்கடல் குறித்த பண்டைய அறிவு – அறிவுசார் சமூகம்.									
அலகு - V	**அறிவியல் தமிழ் மற்றும் கணினித்தமிழ்**							**3**	
அறிவியல் தமிழின் வளர்ச்சி – கணினித்தமிழ் வளர்ச்சி – தமிழ் நூல்களை மின்பதிப்பு செய்தல் – தமிழ் மென்பொருட்கள் உருவாக்கம் – தமிழ் இணையக் கல்விக்கழகம் – தமிழ் மின் நூலகம் – இணையத்தில் தமிழ் அகராதிகள் சொற்குவைத் திட்டம்.									

TEXT BOOK:

1.	தமிழக வரலாறு - மக்களும் பண்பாடும் - கே கே பிள்ளை (வெளியீடு தமிழ்நாடு பாடநூல் மற்றும் கல்வியில் பணிகள் கழகம்), உலகத் தமிழாராய்ச்சி நிறுவனம், சென்னை, 2002
2.	கணினித்தமிழ் முனைவர் இல. சுந்தரம், விகடன் பிரசுரம், 2016

REFERENCES:

1.	கீழடி-வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம்.(தொல்லியல் துறை வெளியீடு)
2.	பொருநை-ஆற்றங்கரை நாகரிகம் (தொல்லியல் துறை வெளியீடு)
3.	Social Life of Tamils (Dr.K.K.Pillay) A joint Publication of TNTB & ESC and RMRL – (in print)
4.	Social Life of the Tamils – The Classical Period (Dr.S.Sigaravelu) (Published by: International Institute of Tamil Studies).
5.	Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukarasu) (Published by : International Institute of Tamil Studies)
6.	The Contribution of the Tamil to Indian Culture (Dr.M.Valarmathi) (Puplished by International Institute of Tamil Studies).
7.	Keeladi – 'Sangam City Civilzation on the banks of river Vaigai; (Jointly Published by: Department of Archaeology & Tamilnadu Text Book and Educational Services Corporation, Tamilnadu)
8.	Studies in the History of India with Special Reference to Tamilnadu (Dr.K.K.Pillay) (Published by: The Author)
9.	Porunai Civilization (Jointly Published by: Department of Archaeology & Tamilnadu Textbook and Educational Services Corporation, Tamilnadu)
10.	Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

*includes Term Work (TW) & Online / Certification course hours

COURSE OUTCOMES: படிப்பை முடித்தவுடன், மாணவர்கள்		BT Mapped (Highest Level)
CO1	தமிழ் கலாச்சாரம் மற்றும் தமிழ் சமூகத்தினுடைய நெசவு மற்றும் பானை தொழில்நுட்பம் பற்றி விளக்க முடியும்.	Understanding (K2)
CO2	தமிழர்களின் வடிவமைப்பு மற்றும் கட்டிடத் தொழில்நுட்ப ஆற்றல் பற்றி விளக்க முடியும்.	Understanding (K2)
CO3	தமிழர்களின் உற்பத்தித் தொழில்நுட்பம் பற்றி சுருக்கமாகக் கூற முடியும்.	Understanding (K2)
CO4	தமிழர்களின் வேளாண்மை மற்றும் நீர்ப்பாசனத் தொழில்நுட்பம் பற்றி விளக்க முடியும்.	Understanding (K2)
CO5	தமிழர்களின் அறிவியல் தமிழ் மற்றும் கணினித்தமிழ் பற்றி விளக்க முடியும்.	Understanding (K2)

Mapping of COs with POs and PSOs

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1						3		3	2	2			
CO2						3		3	2	2			
CO3						3		3	2	2			
CO4						3		3	2	2			
CO5						3		3	2	2			

1 – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom's Taxonomy

ASSESSMENT PATTERN – THEORY

Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %
CAT1	40	60					100
CAT2	40	60					100
CAT3	40	60					100
ESE	NA						

* ±3% may be varied (CAT 1,2,3 – 50 marks)

Signature of the Chairman
Board of Studies - S&H (Physics)

ACADEMIC CELL * KONGU ENGINEERING COLLEGE *

24PHL21 - APPLIED PHYSICS LABORATORY

(Common to CIVIL, MECH, MTS and AUTO branches)

Programme& Branch	BE - CIVIL, MECH, MTS and AUTO branches	Sem.	Category	L	T	P	SL*	TOT	Credit
Prerequisites	Nil	2	BS	0	0	30	0	30	1

Preamble	This course aims to impart hands on training in the determination of the physical parameters such as Young's modulus, thermal conductivity, AC frequency, compressibility of a liquid, wavelength of laser, particle size, acceptance angle and numerical aperture of an optical fiber, specific resistance, band gap, thickness of a thin film and also to impart skills on writing coding / developing project / product related to societal requirement.

LIST OF EXPERIMENTS / EXERCISES:

1.	Determination of the Young's modulus of the material of a given beam using uniform bending method.
2.	Determination of the thermal conductivity of a bad conductor using Lee's disc.
3.	Determination of the frequency of alternating current using electrically vibrating tuning fork (Melde's apparatus).
4.	Determination of the wavelength of the given semiconductor laser.
5.	Determination of the particle size of the given powder using laser.
6.	Determination the acceptance angle and numerical aperture of the given optical fiber.
7.	Determination of the specific resistance of the given metallic wire using Carey Foster's bridge.
8.	Determination of the band gap of a given semiconducting material using post-office box.
9.	Determination of the thickness of a thin film using air-wedge arrangement.
10.	Writing coding for any one of the above experiments / developing a project / a product.

REFERENCES/ MANUAL /SOFTWARE:

1.	Laboratory Manual

COURSE OUTCOMES: On completion of the course, the students will be able to		**BT Mapped (Highest Level)**
CO1	determine the Young's modulus of a material, the thermal conductivity of a bad conductor and the frequency of an alternating current.	Analyzing (K4), Precision (S3)
CO2	determine the wavelength of a semiconductor laser, the particle size of a powder material, and the acceptance angle and numerical aperture of an optical fiber.	Analyzing (K4), Precision (S3)
CO3	determine the specific resistance of a metallic wire, the band gap of semiconducting materials, the thickness of a thin film and develop a coding / project / product.	Analyzing (K4), Precision (S3)

Mapping of COs with POs and PSOs

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	2	3				3	1		2		
CO2	3	2	2	3				3	1		2		
CO3	3	2	2	3				3	1		2		

1 – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom's Taxonomy

*includes Term Work (TW) & Online / Certification course hours

Signature of the Chairman
Board of Studies - S & H, (Physics)

ACADEMIC CELL * KONGU ENGINEERING COLLEGE *

CDC

24GCL11 – FOUNDATION LABORATORY - MANUFACTURING, DESIGN AND ROBOTICS									
(Common to all BE/BTech branches)									
Programme & Branch	**All BE/BTech Branches**	**Sem.**	**Category**	**L**	**T**	**P**	**SL***	**Total**	**Credit**
Prerequisites	**Nil**	**1/2**	**ES**	**0**	**0**	**90**	**0**	**90**	**3**

Preamble	This course provides the hands-on experience to develop a prototype model with the basic knowledge of Computer-aided Design, Manufacturing Processes, 3D Printing Technology, Robotics and Embedded Control.

LIST OF EXPERIMENTS / EXERCISES:

	PART A – Manufacturing Laboratory (30 Hours)
1.	Selection of product, free hand sketching and detailing
2.	Construction of model using Arc/TIG/MIG/Gas/Spot welding operations
3.	Enhancing the model with sheet metal
4.	Creating the parts of the model using lathe
5.	Creating the parts of the model using milling and drilling machines
	PART B – Product Design and Development Laboratory (30 Hours)
1.	Free hand sketching and detailing of the component
2.	3D part modelling of the component using CAD software
3.	Engineering Analysis of the component model
4.	Generate the component using 3D printer
	PART C – Robotics Laboratory (30 Hours)
1.	Design of electronic circuit and its debugging
2.	Assembly and interfacing of sensors, actuators and wireless communion modules with audrino UNO
3.	Development of embedded programming and interfacing for motion control and obstacle avoidance
4.	Demonstration and testing of robot in static environment
	REFERENCES/ MANUAL /SOFTWARE:
1.	Foundation Engineering Laboratory Manual
2.	SOLID WORKS 2022 Software

COURSE OUTCOMES: On completion of the course, the students will be able to		**BT Mapped (Highest Level)**
CO1	develop the prototype model using mechanical operations like welding, forming and machining processes	Applying (K3), Precision (S3)
CO2	sketch 3D model and develop the prototype using 3D printer	Applying (K3), Precision (S3)
CO3	design and develop the autonomous robot for real-time applications	Applying (K3), Precision (S3)

Mapping of COs with POs and PSOs

COs/POs /PSOs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	3	3	2				3	2		2		
CO2	3	3	3	3				3	2		2		
CO3	3	3	3	2				3	2		2		

1 – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom's Taxonomy

Signature of the Chairman
Board of Studies - Mechanical

ACADEMIC CELL
KONGU ENGINEERING COLLEGE

24MNT21 - QUANTITATIVE APTITUDE - II									
(Common to all Engineering and Technology branches)									
Programme & Branch	**All B.E/B.Tech Branches**	**Sem.**	**Category**	**L**	**T**	**P**	**SL***	**Total**	**Credit**
Prerequisites	**Basic Mathematical skills**	**2**	**MC**	**20**	**0**	**0**	**10**	**30**	**0**

Preamble	To impart problem solving skills and enhance analytical skills.	
Unit – I	**Averages, Alligations, Time and Work:**	**6**
Averages, Alligations or Mixtures: Concepts – Definition – Formula – Simple problems on averages – Alligation or Mixture rule – Applications – Problems. **Time and Work:** Concepts – Work and wages – Pipes and Cisterns – Simple problems.		
Unit – II	**Time and Distance:**	**6**
Time and Distance: Time, speed and distance – Conversions – Average speed – Relative speed – Problems on boats and streams – Upstream and downstream – Simple problems.		
Unit – III	**Permutation and Combination, Probability:**	**8**
Permutation and Combination: Concepts – Simple problems. **Probability:** Basic Concepts – Applications – Simple problems.		

TEXT BOOK:

1.	Dr.R.S.Agarwal, "Quantitative Aptitude for Competitive Examinations", Revised Edition, S.Chand and company limited, 2022.

REFERENCES/ MANUAL / SOFTWARE:

1.	Abhijit Guha,"Quantitative Aptitude for Competitive Examination", 7th Edition, McGraw Hill Education, India, 2020.
2.	https://www.indiabix.com/aptitude/questions-and-answers
3.	https://www.geeksforgeeks.org/aptitude-questions-and-answers

COURSE OUTCOMES: **On completion of the course, the students will be able to**		**BT Mapped (Highest Level)**
CO1	Solve averages, alligations or mixtures, time and work problems.	Applying (K3)
CO2	Solve the problems on time and distance, upstream and downstream oriented applications problems.	Applying (K3)
CO3	Solve problems involving permutation, combination and probability concepts.	Applying (K3)

Mapping of COs with POs and PSOs

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	2	2											
CO2	2	3											
CO3	3	2											

1 – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom's Taxonomy

ASSESSMENT PATTERN - THEORY

Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %
CAT1		30	70				100
CAT2		30	70				100
CAT3		30	70				100

* ±3% may be varied (CAT 1, 2 & 3 – 50 marks & ESE – 100 marks)

*includes Term Work (TW) & Online / Certification course hour

Signature of the Chairman
Board of Studies - S 4 H

ACADEMIC CELL * KONGU ENGINEERING COLLEGE *

24VEC11 - YOGA AND VALUES FOR HOLISTIC DEVELOPMENT									
(Common to All Engineering and Technology Branches)									
rogramme & Branch	**All B.E./B.Tech. Branches**	**Sem.**	**Category**	**L**	**T**	**P**	**SL***	**Total**	**Credit**
Prerequisites	**Nil**	**1**	**HS**	**15**	**0**	**15**	**0**	**30**	**1**

Preamble	Yoga or yogasanas are considered as art and science of healthy living by our ancient gurus. It is method to bring harmony of body and mind for general wellbeing. Yoga is considered as one of the greatest gifts to the world by Indians for healthy living. Students in particular are benefitted by learning yoga.	
Unit – I	**Introduction:**	**2**
The Origins of Yoga – Definitions - Concepts - Aims and objectives of Yoga – Yoga is a Science and Art – Rules and Regulations of Asanas – Classifications of Yogasanas – Patanjali's Ashtanga Yoga – Pranayama – Mudras & Bandhas - Shatkarma (Cleansing Practice) - Streams of Yoga – Modern Trends in yoga.		
Unit – II	**Yoga and Mind:**	**2**
The Nature of Mind - Five Elements and the Mind - Meditation and the Mind - Functions of the Mind - Role of Yoga in Psychological problems: Mood Disorders, Major Depressive Disorder, Cyclothymic Disorder.		
Unit – III	**Yoga and Values, Diet:**	**2**
Human Values – Social Values – Role of Yoga in Personality Integration - Concepts of Natural Diet - Naturopathy Diet – Eliminative Diet – Soothing Diet – Constructive Diet.		
Unit – IV	**Asanas:**	**2**
Prayer - Starting & Closing - Preparatory practices – Loosening Practices – Meaning, Definitions and Objectives of Asanas - Principles of Practicing Asanas. Asanas: Standing – Sitting – Prone – Supine – Suryanamaskar.		
Unit – V	**Pranayama and Meditation:**	**2**
Breathing Practices for awareness - Definitions and Objectives of Pranayama - Principles of Practicing Pranayama. Pranayama: Nadi Shuddhi - Kapalabathi – Sitali – Sitkari – Bhranari – Ujjayi – Relaxation Techniques – Meditation.		

TEXT BOOK:

1.	Swami satyananda saraswathi, "Asana pranayama mudra bandha", Bihar school of yoga, 4th Edition, 1969.
2.	Swami mukthi Bodhanandha, "Hatha yoga pradipika", Bihar school of yoga, 4th Edition, 1985.

REFERENCES:

1.	B.K.S. Iyenkar, "Yoga the path of holistic health", DK Limited, 2nd Edition, 1969.
2.	Selvarasu, "Kriya cleansing in yoga", Aruvi yoga, 3rd Edition, 2002.

COURSE OUTCOMES: On completion of the course, the students will be able to		BT Mapped (Highest Level)
CO1	realize the importance of yoga in physical health.	Applying (K3)
CO2	realize the importance of yoga in mental health.	Applying (K3)
CO3	realize the role of yoga in personality development and diet.	Applying (K3)
CO4	do the loosening practices, Asanas and realize its benefits.	Applying (K3)
CO5	do the practice of Pranayama, meditation and realize its benefits	Applying (K3)

Mapping of COs with POs and PSOs

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1						3		2	1		
CO2						3		2			
CO3						3		3			
CO4						3		2	3		
CO5						3		3			

1 – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom's Taxonomy

ASSESSMENT PATTERN – THEORY

Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %
CAT1	-	-	-	-	-	-	-
CAT2	-	-	-	-	-	-	-
CAT3	20	30	50	-	-	-	100
ESE	-	-	-	-	-	-	-

* ±3% may be varied (CAT3 – 100 marks)

Signature of the Chairman
Board of Studies - S & H (Maths)

ACADEMIC CELL * KONGU ENGINEERING COLLEGE *

24MEC31 - ENGINEERING MATERIALS AND METALLURGY

Programme & Branch	B.E. & Mechanical Engineering	Sem.	Category	L	T	P	SL*	Total	Credit
Prerequisites	Physics for Mechanical Engineering	3	ES	45	0	30	45	120	4

Preamble	This course deals with the physics, structure-property relationship and allied applications of ferrous metals, non-ferrous metals, alloys, polymers, ceramics, bio-materials, composite materials and nano materials. It also describes the different heat treatment processes and their influence on the physico-mechanical properties of metals.	
Unit – I	**Ferrous Metals**	**9**
Classification of Engineering Materials - Comparison between Metals and Non-Metals - Alloys - Solid Solutions - Principles of Alloy Formation - Substitutional and Interstitial - Phase Diagrams - Lever Rule - Isomorphous - Eutectic - Eutectoid - Peritectic and Peritectoid Reactions - Iron - Iron Carbide Equilibrium Diagram - Classification of Steel and Cast Iron - Microstructure - Properties and Applications - Ferrite and Austenite Stabilizers.		
Unit – II	**Ferrous and Non-Ferrous Alloys**	**9**
Effect of Alloying Elements - Manganese - Silicon - Chromium - Molybdenum - Vanadium - Titanium and Tungsten on the Technical Properties of Steel - Stainless and Tool Steels - High Strength Low Alloy Steels - Maraging Steels - Aluminium and its Alloys - Precipitation Strengthening Treatment - Copper and its Alloys - Magnesium and its Alloys - High Entropy Alloys.		
Unit – III	**Heat Treatment**	**9**
Definition - Purpose of Heat Treatments - Nucleation, Grain Growth and Kinetics - Full Annealing - Stress Relief - Recrystallization and Spheroidizing - Normalizing - Quenching - Hardening and Tempering of Steel - Isothermal Transformation Diagrams - Cooling Curves Superimposed on Time Temperature Transformation Diagram - Critical Cooling Rate - Austempering - Martempering - Hardenability - Jominy End Quench Test. Case Hardening - Carburizing - Nitriding - Cyaniding - Carbonitriding - Flame and Induction Hardening.		
Unit – IV	**Polymers and Ceramics**	**9**
Polymers – Types - Thermoset and Thermoplastics - Glass Transition and Melting Temperature of Polymers - Structures - Properties and Applications of Polyethylene - Polypropylene - Polystyrene - Polyvinyl chloride - Poly methyl methaacrylate - Polyethylene terephthalate - Polycarbonate - Polyamide - Polyimide - Polyamide-imide - Polyphenylene oxide - Polyphenylene sulfide - Polyether ether ketone - Polytetrafluroethylene - Urea - Phenolformaldehydes. Processing - Extrusion - Injection molding - Compression molding - Transfer molding - Extrusion blow molding - Rotational molding - Thermoforming. Engineering Ceramics - Properties and Applications of Alumina - Silicon Carbide - Silicon Nitride - Partially Stabilized Zirconia and Sialon.		
Unit – V	**Powder Metallurgy and Introduction to New Materials**	**9**
Introduction - Production of Metallic Powders - Processing Methods - Compaction Methods - Design Consideration in Powder Metallurgy - Products. Anisotropic materials - Composites - Fiber and Particulate Reinforced Materials - Biomaterials - Implantable Materials - Temporary and Permanent Implants - Bio-degradable Materials - Nanomaterials - Overview of Nanostructured Materials - Hybrid Nanomaterials.		

LIST OF EXPERIMENTS / EXERCISES:

1.	Microstructural Analysis of Low Carbon and Eutectoid Steel.
2.	Microstructural Analysis of Grey Cast Iron and Spheroidal Cast Iron.
3.	Microstructural Analysis of Copper, Bronze and Tin.
4.	Microstructural Analysis of Aluminium and its Alloys.
5.	Microstructural Analysis of Magnesium and its Alloys.
6.	Microstructural Analysis of Aluminium based Composites.
7.	Microstructural Analysis of Magnesium based Composites.
8.	Test the mechanical properties of Polyethylene and Polypropylene. Make a comparative analysis on stress-strain behaviour
9.	Test the mechanical properties of Epoxy and Polyester resin. Make a comparative analysis on stress-strain behaviour
10.	Test the mechanical properties of non-biodegradable and biodegradable materials. Make a comparison on their structure-property relationship.

TEXT BOOK:

1.	William D. Callister Jr., David G. Rethwisch. "Callister's Materials Science and Engineering". Global Edition, 10th Edition, Wiley India Pvt. Ltd., 2019.

*includes Term Work(TW) & Online / Certification course hours

R. Rajavelan

REFERENCES/ MANUAL / SOFTWARE:	
1.	Sina Ebnesajjad. "Handbook of Biopolymers and Biodegradable Plastics: Properties, Processing and Applications", 1st Edition, Elsevier, Amsterdam, Netherlands, 2013
2.	Laboratory Manual

COURSE OUTCOMES: On completion of the course, the students will be able to		BT Mapped (Highest Level)
CO1	interpret the microstructure, composition and properties of ferrous metals through conceptual and experimental study	Applying (K3), Precision (S3)
CO2	interpret the effect of alloying elements on the microstructure and technical properties of metals through conceptual and experimental study	Applying (K3), Precision (S3)
CO3	apply the principles of heat-treatment processes	Applying (K3), Precision (S3)
CO4	demonstrate the structure-property relationship and allied applications of polymers and ceramics	Applying (K3), Precision (S3)
CO5	reveal the principles of metal-forming process and infer the development of new materials	Applying (K3), Precision (S3)

Mapping of COs with POs and PSOs

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3		2								2	3	
CO2	3		2								1	3	
CO3	3		2								2	3	
CO4	3											3	
CO5	3		2								2	3	

1 – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom's Taxonomy

ASSESSMENT PATTERN - THEORY

Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %
CAT1		60	40				100
CAT2		60	40				100
CAT3		60	40				100
ESE		60	40				100

* ±3% may be varied (CAT 1, 2 & 3 – 50 marks & ESE – 100 marks)

Signature of the Chairman
Board of Studies - Mechanical

ACADEMIC CELL * KONGU ENGINEERING COLLEGE *

RRD

24EEC32 - ELECTRICAL DRIVES AND INDUSTRIAL ELECTRONICS									
Programme & Branch	**B.E. & Mechanical Engineering**	**Sem.**	**Category**	**L**	**T**	**P**	**SL***	**Total**	**Credit**
Prerequisites	**Physics for Mechanical Engineering**	**3**	**ES**	**45**	**0**	**30**	**45**	**120**	**4**

Preamble	This course imparts knowledge about the selection of electrical drives for AC and DC, starting of AC&DC motors Students learn about the speed control of various motors.	
Unit – I	**Electrical Drives**	**9**
Basic Elements – Types of Electric Drives – Factors influence the choice of electrical drives – Heating and cooling curves – Loading conditions and classes of duty – Selection of power rating for drive motors with regard to thermal overloading and Load variation factors - Mechanical characteristics – Speed-Torque characteristics of various types of load and drive motors		
Unit – II	**Motor Characteristics**	**9**
DC Machine -Construction-Working principle-Torque Equation, Speed-Torque Characteristics of DC Motors-Series, Shunt and Compound Motors –Three Phase Induction Motor-Construction-Working principle-Torque Equation and Speed-Torque Characteristics.		
Unit – III	**Solid State Speed Control of DC Drives**	**9**
Speed Control of DC Series and Shunt Motors – Armature and Field Control, Ward-Leonard Control System – Controlled Rectifiers Fed DC Drive and Chopper Based DC Drive (First and Second Quadrant Operation) – Selection of DC Drives for Cranes and Paper Mill.		
Unit – IV	**Solid State Speed Control of AC Drives**	**9**
Speed Control of Three Phase Induction Motor – Voltage Control, Voltage / Frequency Control, Slip Power Recovery Scheme – Inverter and AC Voltage Controller Based Induction Drives – Selection of AC Drives for Textile Mill and Cement Mill.		
Unit – V	**Basic Electronics**	**9**
Theory of PN Junction Diode - Operation of Rectifiers (Half wave, Full wave) and Filters - Zener Diodes - Zener Diode as Voltage Regulator Transistors: Types- Operation of NPN Transistor- Transistor as an Amplifier -Operation and Characteristics of Thyristor: Silicon Controlled Rectifier - UPS and SMPS (Block Diagram approach).		

LIST OF EXPERIMENTS / EXERCISES:	
1.	Load Test on DC Shunt Motor.
2.	Speed Control of DC Shunt Motor (Armature control and Field control).
3.	Load Test on Three-Phase Slip Ring Induction Motor.
4.	Speed Control of Three-Phase Induction Motor.
5.	Characteristics of Half wave and full wave rectifier.
6.	Operational Analysis of Choppers (Step Up and Step Down).
7.	VI characteristics of PN junction diode.
8.	Voltage regulator using Zener diode.

TEXT BOOK:	
1.	Dubey G.K, "Fundamentals of Electrical Drives", 2nd Edition, Narosa Publishing House, New Delhi, 1994, Reprint – 2022.

REFERENCES/ MANUAL / SOFTWARE:	
1.	Vedam Subrahmanyam—Electric Drives: Concepts and Applications, Tata McGraw Hill Publishing Company, New Delhi, 2nd Edition, 2001, Reprint – 2017.
2.	Pillai, S. K, —A First Course on Electric Drives, 2nd Edition, Wiley Eastern Limited, New Delhi, 1998, Reprint 2012.
3.	Muthusubramanian R. and Salivahanan S., "Basics of Electrical and Electronics Engineering", 18th reprint, Tata McGraw Hill, 2014.
4.	Laboratory Manual

*includes Term Work(TW) & Online / Certification course hours

COURSE OUTCOMES: On completion of the course, the students will be able to		BT Mapped (Highest Level)
CO1	Categorize and explain the operation of electrical drives.	Understanding (K2), Manipulation (S2)
CO2	Classify and interpret the operation of AC and DC machines.	Understanding (K2), Manipulation (S2)
CO3	Apply the appropriate speed control techniques for AC and DC motor drives.	Applying (K3), Precision (S3)
CO4	Identify suitable DC and AC drive systems for specific industrial applications.	Understanding (K2), Precision (S3)
CO5	Demonstrate the basic functions of semiconductor devices.	Understanding (K2), Precision (S3)

Mapping of COs with POs and PSOs

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	2	2				1			1	2	
CO2	3	2	2	2				1			1	2	
CO3	3	2	2	2				1			1	2	
CO4	3	2	2	2				1			1	2	
CO5	3	2	2	2				1			1	2	

1 – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom's Taxonomy

ASSESSMENT PATTERN - THEORY

Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %
CAT1		80	20				100
CAT2		80	20				100
CAT3		80	20				100
ESE		80	20				100

* ±3% may be varied (CAT 1, 2 & 3 – 50 marks & ESE – 100 marks)

Signature of the Chairman
Board of Studies - ECE

ACADEMIC CELL * KONGU ENGINEERING COLLEGE *

24MET31 - ENGINEERING THERMODYNAMICS									
(Use of Steam Tables and Psychrometric Chart are permitted for the End Semester Examination)									
Programme & Branch	**B.E. - Mechanical Engineering**	**Sem.**	**Category**	**L**	**T**	**P**	**SL***	**Total**	**Credit**
Prerequisites	**Nil**	**3**	**PC**	**45**	**0**	**0**	**45**	**90**	**3**
Preamble	This course is designed to impart essential understanding of thermodynamic principles and their practical applications. It also delves into the characteristics of steam, gases, and atmospheric air								
Unit – I	**Basic Concepts and First Law of Thermodynamics**							**9**	
Basic Concepts: Microscopic and Macroscopic Approaches - Concept of Continuum - Thermodynamic System – Types - Thermodynamic Properties - State – Path - Process - Quasi-Static Process - Work - Modes of Work - Zeroth Law of Thermodynamics - Concept of Temperature and Heat. First Law of Thermodynamics: Law - Application to Closed and Open Systems.									
Unit – II	**Second Law of Thermodynamics**							**9**	
Kelvin–Planck Statement - Clausius Statement - Efficiency - Carnot Cycle - Carnot's Theorem - Heat Engine - Reversed Carnot Cycle - COP – Refrigerator - Heat pump - Reversibility – Irreversibility - Inequality of Clausius. Entropy - Principle of Increase of Entropy - Absolute Entropy - Basic Concepts of Exergy.									
Unit – III	**Properties of Pure Substances**							**9**	
Thermodynamic Properties of Pure Substances in Solid Phase - Liquid Phase - Vapour phase – p-v Diagram - p-T Diagram - T-s Diagram - h-s Diagram - pvT Surfaces. Steam - Formation of Steam – Thermodynamic Properties of Steam - Use of Steam Tables and Mollier Chart - Calculations of Work Done - Heat Transfer in Non-Flow and Flow Processes.									
Unit – IV	**Ideal and Real Gases**							**9**	
Concept of Ideal and Real Gases and their Properties - Equation of State - Avogadro's Law - Compressibility - Compressibility Chart - Dalton's Law of Partial Pressure - Gas Mixtures. Thermodynamic Relations – Exact Differentials - TdS Equations - Maxwell's Equations - Clausius-Clapeyron Equation – Joule Kelvin Coefficient									
Unit – V	**Psychrometry**							**9**	
Definition - Properties of Atmospheric Air - Calculations of Properties of Air - Vapour Mixtures - Psychrometric Chart – Psychrometric Processes - Sensible Heat Exchange Processes - Latent Heat Exchange Processes - Adiabatic Mixing - Evaporative Cooling.									
TEXT BOOK:									
1.	Nag P.K.. "Engineering Thermodynamics". 6th Edition, McGraw Hill Education Pvt. Ltd., Chennai, 2018.								
REFERENCES:									
1.	Yunus A. Cengel, Michael A. Boles and Mehmet kanoglu "Thermodynamics: An Engineering Approach". 10th Edition, McGraw Hill Education Pvt. Ltd., New Delhi, 2024								

*includes Term Work(TW) & Online / Certification course hours

COURSE OUTCOMES: On completion of the course, the students will be able to		BT Mapped (Highest Level)
CO1	solve the open and closed system problems using first law of thermodynamics.	Applying (K3)
CO2	apply the second law of thermodynamics to solve the problems on heat engines, refrigerator and heat pumps.	Applying (K3)
CO3	utilize steam tables in determination of the thermodynamic properties of pure substances.	Applying (K3)
CO4	differentiate the behaviors of real and ideal gases and derive thermodynamic relations.	Applying (K3)
CO5	apply the psychrometric concepts in heat exchange processes	Applying (K3)

Mapping of COs with POs and PSOs

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3		2								2	3	
CO2	3		2								1	3	
CO3	3		2								2	3	
CO4	3											3	
CO5	3		2								2	3	

1 – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom's Taxonomy

ASSESSMENT PATTERN - THEORY

Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %
CAT1		30	70				100
CAT2		30	70				100
CAT3		30	70				100
ESE		30	70				100

* ±3% may be varied (CAT 1, 2 & 3 – 50 marks & ESE – 100 marks)

Signature of the Chairman
Board of Studies - Mechanical

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24MET32 – STRENGTH OF MATERIALS									
Programme & Branch	**B.E. - Mechanical Engineering**	**Sem.**	**Category**	**L**	**T**	**P**	**SL***	**Total**	**Credit**
Prerequisites	**Engineering Mechanics**	**3**	**PC**	**45**	**15**	**0**	**60**	**120**	**4**

Preamble	The course provides the various properties of materials, deformable bodies, biaxial state of stress, thin and thick Cylinders, spherical shells, types of beams, bending stresses and deflection of beams. It also imparts the design of Columns, torsion on circular shaft and springs.

Unit – I	**Deformation of Solids**	**9+3**

Mechanical Properties -Concept of Resistance and deformation - Tension and Compressive Stresses - pure shear stress - Stress-Strain diagrams for brittle and ductile materials - working stress Young's modulus of elasticity, Poisson's ratio, Modulus of rigidity and Bulk modulus - Relation between elastic constants - Thermal Stresses. Strain Energy: Uniaxial Loads – Gradually Applied Load.

Unit – II	**Thin Cylinders and Biaxial State of Stresses**	**9+3**

Thin Cylinders - spherical shells subjected to internal fluid pressure. Biaxial Stresses: Stresses at a Point on Inclined Planes – Principal Planes and Stresses – Mohr's Circle for Biaxial Stress- Maximum Shear Stress.

Unit – III	**Transverse Loading on Beams and Stresses In Beam**	**9+3**

Types of supports - Types of beams - Types of loads - point load and uniformly distributed load - Shear Force and Bending Moment diagrams. Point of Theory of Simple Bending: Assumptions –Bending stresses in beams of standard cross Sections.

Unit – IV	**Deflection of Beams and Columns and Struts**	**9+3**

Slope and deflection of beams - Double Integration method - Macaulay's method.
Columns: End Condition – Equivalent Length of Column – Euler's Equation – Slenderness Ratio – Rankine's Formula for Columns.

Unit – V	**Torsion on Circular shafts and Springs**	**9+3**

Torsion – Shear Stress Distribution – Hollow and Solid Circular shaft – Torsional Rigidity – Torsional Stiffness – Axial load and torque on helical springs - stresses and deformations - strain energy on spring.

TEXT BOOK:

1. Rajput R.K., "Text Book of Strength of Materials", 7th Edition, S.Chand and Company Ltd., New Delhi, 2019; 2021

REFERENCES:

1. Mechanics of Materials, Beer and Johnston, McGraw Hill India Pvt. Ltd., 2020, 8th Edition (SI Units).
2. Timoshenko S.P. "Elements of Strength of Materials", 10th Edition, Tata McGraw Hill Publishing Company, New Delhi, 2010.
3. Rattan S.S. "Strength of Materials", 3rd Edition, Tata McGraw Hill Education Private Ltd., Chennai, 2018.

*includes Term Work(TW) & Online / Certification course hours

COURSE OUTCOMES: On completion of the course, the students will be able to		BT Mapped (Highest Level)
CO1	apply the concepts of stress and Strain on ductile and brittle materials.	Applying (K3)
CO2	estimate the stresses and deformations induced in thin, thick and spherical shells.	Analyzing (K4)
CO3	construct the shear force and bending moment diagrams of loaded beams and analyze the bending stresses.	Analyzing (K4)
CO4	analyze the slope and the deflection of beams and strengths of the columns	Analyzing (K4)
CO5	evaluate the torsional behavior of circular shafts and helical springs	Applying (K3)

Mapping of COs with POs and PSOs

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	1								1		3
CO2	3	2	1								1		3
CO3	3	3	1								1		3
CO4	3	3	1								1		3
CO5	3	2	1								1		3

1 – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom's Taxonomy

ASSESSMENT PATTERN - THEORY

Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %
CAT1		20	55	25			100
CAT2		15	45	40			100
CAT3		15	45	40			100
ESE		15	45	40			100

* ±3% may be varied (CAT 1, 2 & 3 – 50 marks & ESE – 100 marks)

Signature of the Chairman
Board of Studies - Mechanical

ACADEMIC CELL * KONGU ENGINEERING COLLEGE *

24MET33 - MANUFACTURING TECHNOLOGY									
Programme & Branch	**B.E. - Mechanical Engineering**	**Sem.**	**Category**	**L**	**T**	**P**	**SL***	**Total**	**Credit**
Prerequisites	**Physics for Mechanical Engineering**	**3**	**PC**	**45**	**0**	**0**	**45**	**90**	**3**
Preamble	To provide the basic concepts and techniques of metal casting processes, deformation processes, special welding processes and fundamentals of plastic processes.								
Unit – I	**Metal Casting Processes**								**9**
Introduction - Classification - Types of Casting Processes - Pattern: Types - Material - Allowances - Molding Sand – Preparation for Sand Casting - Properties - Cores: Types - Applications - Heating - Pouring - Cooling - Solidification of Pure Metals and Alloys - Directional Solidification - Design: Runner - Riser - Gate.									
Unit – II	**Special Casting Processes**								**9**
Expendable Mold Casting Processes – Shell Molding – Vacuum Molding – Expanded Polystyrene Process – Investment Casting – Plastic Mold Casting – Ceramic Mold Casting – Permanent Mold Casting – Die Casting – Centrifugal Casting – Continuous Casting – Squeeze Casting – Slush Casting – Defects in Casting.									
Unit – III	**Welding Processes**								**9**
Introduction – Fusion Welding Processes: Arc Welding – Gas Welding – Resistance Spot Welding – Electron Beam Welding – Laser Beam Welding – Electro Slag Welding – Thermit Welding – Solid State Welding Processes: Friction Stir Welding – Forge Welding – Diffusion Welding – Explosive Welding – Friction Welding – Ultrasonic Welding – Soldering and Brazing.									
Unit – IV	**Metal Forming Processes**								**9**
Bulk Deformation Processes – Hot Working and Cold Working Processes – Forging Process: Open Die Forging – Closed Die Forging – Upsetting - Swaging – Radial forging – Roll Forging. Extrusion Process – Direct Extrusion – Indirect Extrusion – Hydrostatic Extrusion. Drawing Process – Wire Drawing – Deep Drawing – Rod Drawing – Tube Drawing. Sheet Metal Operations: Shearing – Blanking - Punching – Slotting – Perforating – Notching –Trimming – Shaving – Bending Operations: Flanging – Hemming – Seaming – Curling – Ironing – Coining - Embossing.									
Unit – V	**Plastic Processing**								**9**
Introduction – Properties of Plastics – Plastic Materials – Thermoplastics –Thermosetting materials – Extrusion of plastics – Injection moulding – Types – Blow Moulding – Thermoforming – Types – Compression moulding – Transfer Moulding – Plastic Product Design.									
TEXT BOOK:									
1.	Serope Kalpakjian, Steven R. Schmid. "Manufacturing Engineering and Technology", 8th Edition, Pearson Education Limited, New Delhi, 2023.								
REFERENCES:									
1.	Rao P.N. "Manufacturing Technology - Foundry, Forming and Welding", Volume - 1, 5th Edition, McGraw Hill Education Pvt Ltd., New Delhi, 2019.								

*includes Term Work(TW) & Online / Certification course hours

COURSE OUTCOMES: On completion of the course, the students will be able to		BT Mapped (Highest Level)
CO1	Make use of metal casting processes for product manufacturing	Applying (K3)
CO2	Select suitable special casting process for specific application	Applying (K3)
CO3	Experiment different principles involved in various welding techniques	Applying (K3)
CO4	Compare the mechanisms involved in different kinds of metal forming processes	Analyzing (K4)
CO5	Identify the principles and processes involved in plastic moulding methods.	Applying (K3)

Mapping of COs with POs and PSOs

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	1				2					1		1
CO2	3	1				2					1	2	1
CO3	3	1				2					1	3	1
CO4	3	1				2					1		1
CO5	3					2					1	3	1

1 – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom's Taxonomy

ASSESSMENT PATTERN - THEORY

Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %
CAT1		60	40				100
CAT2		60	40				100
CAT3		60	40				100
ESE		60	40				100

* ±3% may be varied (CAT 1, 2 & 3 – 50 marks & ESE – 100 marks)

Signature of the Chairman
Board of Studies -

ACADEMIC CELL
KONGU ENGINEERING COLLEGE

R Gulcandran

24GET31- UNIVERSAL HUMAN VALUES									
(Common to All Engineering and Technology Branches)									
Programme & Branch	**All B.E & B.Tech Branches**	**Sem.**	**Category**	**L**	**T**	**P**	**SL***	**Total**	**Credit**
Prerequisites	**Nil.**	**3 / 6**	**HS**	**30**	**0**	**0**	**30**	**60**	**0**

Preamble	To make the student to know what they 'really want to be' in their life and profession, understand the meaning of happiness and prosperity for a human being. Also to facilitate the students to understand about harmony at all the levels of human living, and live accordingly	
Unit – I	**Introduction**	**6**
Need and Basic Guidelines of Value Education – Content and Process of Value Education – Self Exploration – purpose of self-Exploration – Content and Process of Self exploration – Natural Acceptance – Realization and Understanding – Basic Human Aspirations – Continuous Happiness and Prosperity – Exploring Happiness and Prosperity – Basic Requirement for Fulfillment of Human Aspirations – Relationships – Physical Facilities – Right Understanding.		
Unit – II	**Harmony in the Self and Body**	**6**
Human Being and Body – Understanding Myself as Co–existence of Self ('I') and Body, Needs of the Self and Body, Activities in the Self and Body, Self ('I') as the Conscious Entity, the Body as the Material Entity – Exercise – Body as an Instrument– Harmony in the Self ('I) – Understanding Myself – Harmony with Body.		
Unit – III	**Harmony in the Family and Society**	**6**
Harmony in the Family – Justice – Feelings (Values) in Human Relationships – Relationship from Family to Society – Identification of Human Goal – Five dimensions of Human Endeavour.		
Unit – IV	**Harmony in Nature and Existence**	**6**
Order of Nature – Interconnectedness – Understanding the Four order – Innateness – Natural Characteristic – Basic Activity – Conformance – Introduction to Space – Co–existence of units of Space – Limited and unlimited – Active and No–activity – Existence is Co–existence.		
Unit – V	**Implications of the above Holistic Understanding of Harmony on Professional Ethics**	**6**
Values in different dimensions of Human Living – Definitiveness of Ethical Human Conduct –Implications of Value based Living – Identification of Comprehensive Human Goal – Humanistic Education – Universal Human Order – Competence and Issues in Professional Ethics.		

TEXT BOOK:

1.	Gaur R.R., Sangal R., Bagaria G.P., "A Foundation Course in Human Values and Professional Ethics", 1st edition, Excel Books Pvt. Ltd., New Delhi, 2009.

REFERENCES:

1.	Ivan Illich, "Energy & Equity", The Trinity Press, USA, 1974.
2.	Schumacher E.F., "Small is Beautiful: a study of economics as if people mattered", 1st Edition, Britain, 1973.

*includes Term Work(TW) & Online / Certification course hours

COURSE OUTCOMES: On completion of the course, the students will be able to		BT Mapped (Highest Level)
CO1	identify the meaning of happiness and prosperity and do a correct appraisal of the current scenario in the society	Applying (K3)
CO2	interview between the Self and the Body, understand the meaning of Harmony in the Self, the Co–existence of Self and Body	Applying (K3)
CO3	build harmonious relationship based on trust, respect and other naturally acceptable feelings in human–human relationships and explore their role in ensuring a harmonious society	Applying (K3)
CO4	experiment with themselves to co-exist with nature by realising interconnectedness and the four orders of nature	Applying (K3)
CO5	identify the differences between ethical and unethical practices, and apply ethical and moral practices for a better living	Applying (K3)

Mapping of COs with POs and PSOs

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	2	2		1	2				2	3	2
CO2	3	2	2	2		1	2				2	3	2
CO3	3	2	2	2		1	2				2	3	2
CO4	3	2	2	2		1	2				2	3	2
CO5	3	2	2	2		1	2				2	3	2

1 – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom's Taxonomy

ASSESSMENT PATTERN – THEORY

Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %
CAT1		80	20				100
CAT2		80	20				100
CAT3		80	20				100
ESE	NA						

* ±3% may be varied (CAT 1, 2 & 3 – 50 marks)

Signature of the Chairman
Board of Studies -

ACADEMIC CELL * KONGU ENGINEERING COLLEGE *

24MEL31 - MANUFACTURING TECHNOLOGY AND MATERIAL PROPERTY TESTING LABORATORY									
Programme & Branch	**B.E. & Mechanical Engineering**	**Sem.**	**Category**	**L**	**T**	**P**	**SL***	**Total**	**Credit**
Prerequisites	**Nil**	**3**	**HS**	**0**	**0**	**30**	**0**	**30**	**1**

Preamble	This course provides hands-on training in various metal joining and forming processes, as well as the determination of essential mechanical properties of different materials.

LIST OF EXPERIMENTS / EXERCISES:

MANUFACTURING TECHNOLOGY LABORATORY

1.	Prepare a Mold by using Solid /Split/Loose-piece Patterns and Mold for Hollow Objects with the help of Core.
2.	Produce Different Weld by Gas Tungsten Arc Welding (GTAW) / Gas Metal Arc Welding (GMAW) Operations.
3.	Perform Gas Cutting and Produce Different Weld by Gas Welding and Spot Welding Operations.
4.	Make a Square/Rectangular Rod by Hand Forging Operation.
5.	Demonstrate the Injection Molding Operation by Producing Different Plastic Components.

MATERIAL PROPERTY TESTING LABORATORY

1.	Tension Test of Mild Steel and Aluminium Specimens.
2.	Double Shear Test of Mild Steel and Aluminium Specimens.
3.	Torsion Test of metallic materials.
4.	Deflection Test of Cantilever Beam and Simply Supported Beam (Metals / Woods).
5.	Testing of open and closed coil helical Springs.

REFERENCES/ MANUAL /SOFTWARE:

1.	Rajput R.K. "Strength of Materials". 7th Edition, S.Chand & Co., New Delhi, 2018.
2.	Laboratory Manual.

COURSE OUTCOMES: On completion of the course, the students will be able to		**BT Mapped (Highest Level)**
CO1	perform metal forming operations using foundry, forging and injection moulding.	Applying (K3) Manipulation (S2)
CO2	produce welding joints using Arc, Gas and Spot-welding principles	Applying (K3) Manipulation (S2)
CO3	test the strength of two materials with the help of standard procedures	Applying (K3) Manipulation (S2)

Mapping of COs with POs and PSOs

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	1	2		3	3			2				2	
CO2	1	2		3	3			2				2	
CO3	1	2		3	3			2				2	

1 – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom's Taxonomy

*includes Term Work(TW) & Online / Certification course hours

Signature of the Chairman
Board of Studies - Mechanical

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24MEL32 - MACHINE DRAWING USING AUTOCAD LABORATORY

Programme & Branch	B.E. & Mechanical Engineering	Sem.	Category	L	T	P	SL*	Total	Credit
Prerequisites	Nil	3	PC	0	0	30	0	30	1

Preamble	This course imparts the knowledge on National and International Standard of drawing and to communicate the necessary technical information required for manufacture and assembly of machine components.

LIST OF EXPERIMENTS / EXERCISES:

1.	Study of GD&T Systems with BIS Standards and Types of Keys, Pins used in Machines.
2.	Draw the Conversion of Isometric View to Orthographic View of Simple Machine Components.
3.	Draw Orthographic views of Square and Hexagonal Bolt and Nut.
4.	Draw the Assembled Sectional views of Gib and Cotter Joint.
5.	Draw the Assembled Sectional views of Knuckle Joints.
6.	Draw the Assembled Sectional views of Flange coupling.
7.	Draw the Assembled Sectional views of Simple Eccentric.
8.	Draw the Assembled Sectional views of Machine Vice.
9.	Draw the Flange Coupling front view, side view and top view using AutoCAD.
10.	Draw the Knuckle Joint front view, side view and top view using AutoCAD.

REFERENCES/ MANUAL /SOFTWARE:

1.	Narayana K. L., Kannaiah P., and Reddy K.Venkata "Machine Drawing", 6th Edition, New Age International Publishers Limited, NewDelhi, 2019.

COURSE OUTCOMES: On completion of the course, the students will be able to		**BT Mapped (Highest Level)**
CO1	demonstrate BIS conventions in machine drawing practice.	Applying (K3) Manipulation (S2)
CO2	draw the projections and sectional views of machine components with limits, fits and tolerance.	Applying (K3) Manipulation (S2)
CO3	construct assembled views of mechanical components conforming to BIS conventions.	Applying (K3) Manipulation (S2)

Mapping of COs with POs and PSOs

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3				3				2				3
CO2	3				3				2				3
CO3	3				3				2				3

1 – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom's Taxonomy

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