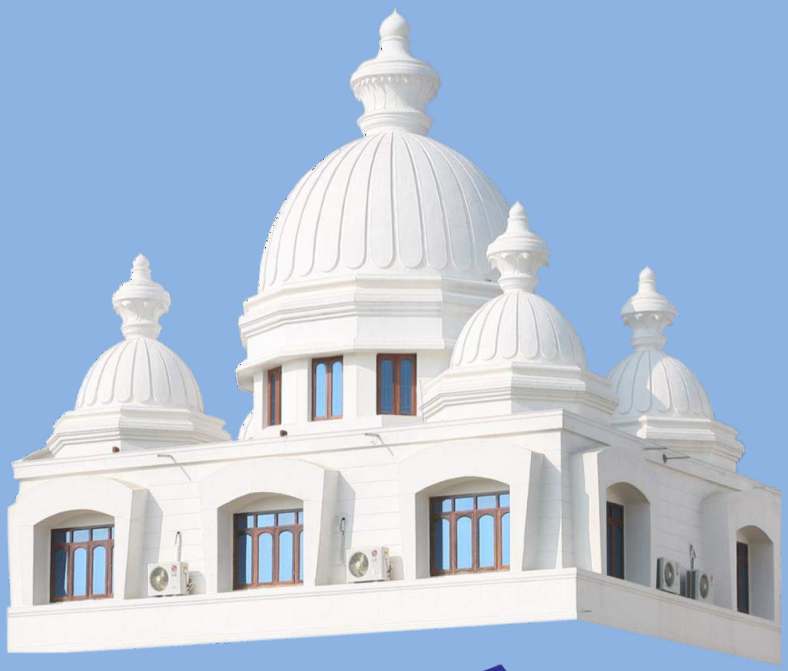
Department of Aeronautical Engineering

CURRICULUM AND SYLLABI
Regulation - 2023
Syllabus I to IV semester



ENGINEERING COLLEGE

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KOMARAPALAYAM – 637303

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KOMARAPALAYAM – 637303

B.E. AERONAUTICAL ENGINEERING
REGULATION – 2023
CHOICE BASED CREDIT SYSTEM
I TO VIII SEMESTERS CURRICULUM AND SYLLABI

I SEMESTER									
Code No.	Course	Category	Periods / Week			Credits	Maximum Marks		
			L	T	P		CA	FE	Total
Theory Courses									
23MA102	Matrices and Calculus	BS	3	1	0	4	40	60	100
23AE101	Fundamentals of Aeronautics	ES	3	0	0	3	40	60	100
23EE103	Basics of Electrical and Electronics Engineering	ES	3	0	0	3	40	60	100
23LET07	Heritage of Tamils (தமிழர்மரபு)	HSS	1	0	0	1	100	0	100
Theory with Practical Courses									
23LEEXX	Language Elective – I*	HSS	2	0	2	3	50	50	100
23CH102	Chemistry for Material Sciences	BS	3	0	2	4	50	50	100
23ME101	Engineering Graphics	ES	1	0	4	3	50	50	100
Mandatory Course									
23MC001	Induction Programme	MC	2 Weeks			0	100	0	100
TOTAL			**16**	**1**	**8**	**21**	**470**	**330**	**800**

*Language Electives – I									
Code No.	Course	Category	Periods/Week			Credits	Maximum Marks		
			L	T	P		CA	FE	Total
23LEE01	Communicative English	HSS	2	0	2	3	50	50	100
23LEE02	Advanced Communicative English	HSS	2	0	2	3	50	50	100

II SEMESTER									
Code No.	Course	Category	Periods / Week			Credits	Maximum Marks		
			L	T	P		CA	FE	Total
Theory Courses									
23MA202	Mathematical Foundations for Engineering	BS	3	1	0	4	40	60	100
23ME201	Engineering Mechanics	ES	3	1	0	4	40	60	100

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23LET08	Tamils & Technology *(தமிழரும் தொழில்நுட்பமும்)*	HSS	1	0	0	1	100	0	100
Theory with Practical Courses									
23LEXXX	Language Elective – II**	HSS	2	0	2	3	50	50	100
23PH202	Materials Physics	BS	3	0	2	4	50	50	100
23CS203	Problem Solving using Python	ES	3	0	2	4	50	50	100
Practical Course									
23ME202	Mechanical Engineering Practices Laboratory	ES	0	0	2	1	60	40	100
Mandatory Course									
23MC002	Environmental Sciences	MC	2	0	0	0	100	0	100
Total			**17**	**2**	**8**	**21**	**490**	**310**	**800**

****Language Electives - II**

Code No.	Course	Category	Periods / Week			Credits	Maximum Marks		
			L	T	P		CA	FE	Total
23LEE02	Advanced Communicative English	HSS	2	0	2	3	50	50	100
23LEH03	Hindi	HSS	2	0	2	3	50	50	100
23LEF04	French	HSS	2	0	2	3	50	50	100
23LEG05	German	HSS	2	0	2	3	50	50	100
23LEJ06	Japanese	HSS	2	0	2	3	50	50	100

III SEMESTER

Code No.	Course	Category	Periods / Week			Credits	Maximum Marks		
			L	T	P		CA	FE	Total
Theory Courses									
23AE301	Aero Engineering Thermodynamics	PC	3	0	0	3	40	60	100
23AE302	Aircraft Materials	PC	3	0	0	3	40	60	100
23UH001	Universal Human Values	HSS	3	0	0	3	100	0	100
Theory with Practical Courses									
23MA301	Transforms and Boundary Value Problems	BS	3	0	2	4	50	50	100
23AE303	Solid Mechanics	ES	3	0	2	4	50	50	100
23AE304	Fluid Mechanics and Machinery	ES	3	0	2	4	50	50	100
Practical Course									
23AE305	Applied Thermodynamics Laboratory	ES	0	0	2	1	60	40	100

Mandatory Course									
23MC00X	Mandatory Course -III	MC	0	0	2	0	100	0	100
Total			**18**	**0**	**10**	**22**	**490**	**310**	**800**

IV SEMESTER

Code No.	Course	Category	Periods / Week			Credits	Maximum Marks		
			L	T	P		CA	FE	Total
Theory Courses									
23AE401	Air Breathing Propulsion	PC	3	0	0	3	40	60	100
23AE402	Aircraft Structural Mechanics	PC	3	0	0	3	40	60	100
23AE403	Mechanics of Machinery	PC	3	0	0	3	40	60	100
23AE404	Manufacturing Technology	ES	3	0	0	3	40	60	100
Theory with Practical Courses									
23MA402	Statistical and Numerical Methods	BS	3	0	2	4	50	50	100
23AE405	Aerodynamics	PC	3	0	2	4	50	50	100
Practical Course									
23AE406	Propulsion Laboratory	PC	0	0	2	1	60	40	100
Mandatory Course									
23MC00X	Mandatory Course -IV	HSS	2	0	0	0	100	0	100
Total			**20**	**0**	**6**	**21**	**420**	**380**	**800**

V SEMESTER

Code No.	Course	Category	Periods / Week			Credits	Maximum Marks		
			L	T	P		CA	FE	Total
Theory Courses									
23AE501	Flight Dynamics	PC	3	1	0	4	40	60	100
23AE502	Rocket and Space Propulsion	PC	3	0	0	3	40	60	100
23AE503	Compressible Flow Aerodynamics	PC	3	0	0	3	40	60	100
23AEEXX	Professional Elective-I	PE	3	0	0	3	40	60	100
23YYOXX	Open Elective - I	OE	3	0	0	3	40	60	100
Theory with Practical Courses									
23AE504	Aircraft Structural Analysis	PC	3	0	2	4	50	50	100
Practical Courses									
23AE505	Aero Engine & Airframe Laboratory	PC	0	0	2	1	60	40	100

23AE506	CAD Laboratory	PC	0	0	2	1	60	40	100
Total			**18**	**1**	**6**	**22**	**370**	**430**	**800**

VI SEMESTER

Code No.	Course	Category	Periods / Week			Credits	Maximum Marks		
			L	T	P		CA	FE	Total
Theory Courses									
23AE601	Composite Materials and Structures	PC	3	0	0	3	40	60	100
23AE602	Aircraft Systems and Instruments	PC	3	0	0	3	40	60	100
23AEEXX	Professional Elective – II	PE	3	0	0	3	40	60	100
23YYOXX	Open Elective-II	OE	3	0	0	3	40	60	100
Theory with Practical Courses									
23AE603	UAV Systems	PC	3	0	2	4	50	50	100
23AE604	Finite Element Methods and Analysis	PC	3	0	2	4	50	50	100
Practical Courses									
23AE605	Design Thinking and Mini Project	EEC	1	0	2	2	50	50	100
23AE606	Internship	EEC	2 Weeks			1	100	0	100
Total			**19**	**0**	**6**	**23**	**450**	**390**	**800**

VII SEMESTER

Code No.	Course	Category	Periods / Week			Credits	Maximum Marks		
			L	T	P		CA	FE	Total
Theory Courses									
23AE701	Computational Fluid Dynamics	PC	3	0	0	3	40	60	100
23AE702	Innovation & Entrepreneurship	EEC	3	0	0	3	40	60	100
23AE703	Aircraft Design	PC	3	0	0	3	40	60	100
23AEEXX	Professional Elective – III	PE	3	0	0	3	40	60	100
23AEEXX	Professional Elective – IV	PE	3	0	0	3	40	60	100
23YYOXX	Open Elective - III	OE	3	0	0	3	40	60	100
Practical Courses									
23AE704	Aircraft Systems Laboratory	PC	0	0	2	1	60	40	100
23AE705	Design Project	EEC	0	0	2	2	50	50	100
Total			**18**	**0**	**4**	**21**	**330**	**470**	**800**

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VIII SEMESTER									
Code No.	**Course**	**Category**	**Periods / Week**			**Credits**	**Maximum Marks**		
			L	**T**	**P**		**CA**	**FE**	**Total**
Theory Courses									
23AEEXX	Professional Elective – V	PE	3	0	0	3	40	60	100
23AEEXX	Professional Elective – VI	PE	3	0	0	3	40	60	100
Practical Course									
23AE801	Major Project	EEC	0	0	16	8	50	50	100
Total			**6**	**0**	**16**	**14**	**130**	**170**	**300**

MANDATORY COURSES (MC)									
Code No.	**Course**	**Category**	**Periods / Week**			**Credits**	**Maximum Marks**		
			L	**T**	**P**		**CA**	**FE**	**Total**
23MC001	Induction Programme	MC	2 Weeks			0	100	-	100
23MC002	Environmental Sciences	MC	2	0	0	0	100	-	100
23MC003	Interpersonal Skills	MC	2	0	0	0	100	-	100
23MC004	Indian Constitution	MC	2	0	0	0	100	-	100
23MC005	Yoga and Values for Holistic Development	MC	0	0	2	0	100	-	100
23MC006	Soft Skills	MC	0	0	2	0	100	-	100

PROFESSIONAL ELECTIVE

SL. NO	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
STREAM – 1 AERODYNAMICS								
1	23AEE01	Low speed Aerodynamics	PE	3	3	0	0	3
2	23AEE02	High speed Aerodynamics	PE	3	3	0	0	3
3	23AEE03	Boundary Layer Theory	PE	3	3	0	0	3
4	23AEE04	Viscous Flow Theory	PE	3	3	0	0	3
5	23AEE05	Industrial Aerodynamics	PE	3	3	0	0	3
6	23AEE06	Aero Acoustics	PE	3	3	0	0	3
7	23AEE07	Flight Instrumentation	PE	3	3	0	0	3
8	23AEE08	Air Traffic Control and Planning	PE	3	3	0	0	3
9	23AEE09	Behavior of Material at High Temperature	PE	3	3	0	0	3
10	23AEE10	Experimental Aerodynamics	PE	3	3	0	0	3
11	23AEE11	Helicopter Aerodynamics	PE	3	3	0	0	3

12	23AEE12	Civil Aviation Requirements	PE	3	3	0	0	3
13	23AEE13	Aircraft Rules and Regulations	PE	3	3	0	0	3
14	23AEE14	Artificial Intelligence in Aerospace Engineering	PE	3	3	0	0	3
15	23AEE15	Aviation weather and Metrology	PE	3	3	0	0	3
16	23AEE16	Avionics	PE	3	3	0	0	3
STREAM – 2 PROPULSION								
16	23AEE21	Space Mechanics	PE	3	3	0	0	3
17	23AEE22	Cryogenic Engineering	PE	3	3	0	0	3
18	23AEE23	Heat Transfer	PE	3	3	0	0	3
19	23AEE24	Aircraft Cooling Systems	PE	3	3	0	0	3
20	23AEE25	Combustion Modeling	PE	3	3	0	0	3
21	23AEE26	Micro Propulsion System	PE	3	3	0	0	3
22	23AEE27	Aero Engine Control System	PE	3	3	0	0	3
23	23AEE28	Rockets and Missiles	PE	3	3	0	0	3
24	23AEE29	High Temperature Gas Dynamics	PE	3	3	0	0	3
25	23AEE30	Wind Tunnel Techniques	PE	3	3	0	0	3
26	23AEE31	Missiles Guidance	PE	3	3	0	0	3
27	23AEE32	High Temperature Materials	PE	3	3	0	0	3
28	23AEE33	Safety in Engineering	PE	3	3	0	0	3
STREAM – 3 AIRCRAFT STRUCTURE AND DESIGN								
29	23AEE41	Optimization and its Applications	PE	3	3	0	0	3
30	23AEE42	Fatigue and Fracture	PE	3	3	0	0	3
31	23AEE43	Failure Analysis	PE	3	3	0	0	3
32	23AEE44	Aircraft Structural Testing and Qualification	PE	3	3	0	0	3
33	23AEE45	Experimental Technology for Aircraft Structures	PE	3	3	0	0	3
34	23AEE46	Vibration and Rotor Dynamics	PE	3	3	0	0	3
35	23AEE47	Experimental Stress Analysis	PE	3	3	0	0	3
36	23AEE48	Aircraft Structural health Monitoring Systems	PE	3	3	0	0	3
37	23AEE49	Nano Composite Materials	PE	3	3	0	0	3
38	23AEE50	Hyper Mesh	PE	3	3	0	0	3
39	23AEE51	Helicopter Theory and Maintenance	PE	3	3	0	0	3
40	23AEE52	Airframe Maintenance and Repair	PE	3	3	0	0	3
41	23AEE53	Aero Engine Maintenance and Repair	PE	3	3	0	0	3
42	23AEE54	Theory of Elasticity	PE	3	3	0	0	3
43	23AEE55	Advanced Manufacturing Process	PE	3	3	0	0	3
44	23AEE56	Design for Manufacture and Assembly	PE	3	3	0	0	3
45	23AEE57	Total Quality Management	PE	3	3	0	0	3
46	23AEE58	Production Planning and Control	PE	3	3	0	0	3

47	23AEE59	Six Sigma and Lean Concepts	PE	3	3	0	0	3
48	23AEE60	Nondestructive Testing	PE	3	3	0	0	3
49	23AEE61	Computer Integrated Manufacturing	PE	3	3	0	0	3
50	23AEE62	Additive Manufacturing	PE	3	3	0	0	3
51	23AEE63	Lean Manufacturing	PE	3	3	0	0	3
52	23AEE64	Professional Ethics in Engineering	PE	3	3	0	0	3
53	23AEE64	Principles of Managements	PE	3	3	0	0	3

OPEN ELECTIVES

SL. NO	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
OPEN ELECTIVE								
1	23AEO01	Drone Design and Development	OE	3	3	0	0	3
2	23AEO02	Nondestructive Testing	OE	3	3	0	0	3
3	23AEO03	Air Traffic Control	OE	3	3	0	0	3
4	23AEO04	Automobile Aerodynamics	OE	3	3	0	0	3
5	23AEO05	Space Engineering	OE	3	3	0	0	3
6	23AEO06	Aircraft Power Plant	OE	3	3	0	0	3
7	23AEO07	Basics of Aeronautical Science	OE	3	3	0	0	3
8	23AEO08	Airport Management	OE	3	3	0	0	3
9	23AEO09	Rocket and Space Science	OE	3	3	0	0	3
10	23AEO10	Aircraft Maintenances	OE	3	3	0	0	3

ONE CREDIT COURSES

S. NO	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1	23AEA01	Wind Turbine Design and Testing	EEC	15	1	0	0	1
2	23AEA02	Real Time Industrial Applications in CFD	EEC	15	1	0	0	1
3	23AEA03	Failure Analysis of Advanced Composites	EEC	15	1	0	0	1
4	23AEA04	Technical Documentation for Aerospace Engineering Services	EEC	15	1	0	0	1
5	23AEA05	Introduction to Aerospace Navigation	EEC	15	1	0	0	1
6	23AEA06	Disruptive Innovation Based Startup Activities	EEC	15	1	0	0	1

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CREDITS DISTRIBUTION – SEMESTER WISE

S. No	CATEGORY	CREDITS PER SEMESTER								TOTAL CREDIT (AICTE)	CREDITS in %
		I	II	III	IV	V	VI	VII	VIII		
1	**HSS**	4	4	3						**11 (10-14)**	**6.67 %**
2	**BS**	8	8	4	4					**24 (22-28)**	**14.55%**
3	**ES**	9	9	9	3					**30 (24)**	**18.18 %**
4	**PC**			6	14	16	14	7		**57 (48)**	**34.54%**
5	**PE**					3	3	6	6	**18 (18)**	**10.91%**
6	**OE**					3	3	3		**9**	**5.45%**
7	**EEC**						3	5	8	**16 (12-16)**	**9.70%**
8	**MC**	0	0	0						**0**	**0**
Total		21	21	22	21	22	23	21	14	**165**	**100.00 %**

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

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23MA102	MATRICES AND CALCULUS (Common to all B.E/B.Tech Programmes)	L	T	P	C
		3	1	0	4
Nature of Course	Basic Sciences				
Pre requisites	Nil				

Course Objectives

The course is intended to

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

Course Outcomes

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

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

Course Contents

Module – I MATRICES 9+3

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

Module – II DIFFERENTIAL CALCULUS 9+3

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

Module – III FUNCTIONS OF TWO VARIABLES 9+3

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

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Module – IV **MULTIPLE INTEGRALS** 9+3

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

Module – V **VECTOR CALCULUS** 9+3

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

Total : 60 Periods

Text Books

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

Reference Books

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

Additional References

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

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

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

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

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23AE101	Fundamentals of Aeronautics	L	T	P	C
		3	0	0	3
Nature of Course	Engineering Sciences				
Pre requisites	Nil				

Course Objectives

The course is intended to

1. Realize the historical evolution of Airplanes
2. Study the different component systems and instruments functions
3. Emphasize the basic properties and principles behind the flight
4. Examine the various types of power plants used in aircrafts
5. Identify the different Structures & Construction .

Course Outcomes

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

CO. No.	Course Outcome	Bloom's Level
CO1	Learn the history of aircraft & developments over the years.	Understand
CO2	Identify the types & classifications of components and control systems.	Understand
CO3	Enhance the basic concepts of flight & Physical properties of Atmosphere.	Understand
CO4	Demonstrate the various propulsion units used to achieve thrust in the atmosphere and space operated vehicles.	Apply
CO5	Differentiate the types of fuselage and constructions.	Understand

Course contents:

Module - I Evolution and History of Flights 9

History and classifications of airplanes-Balloon flight- ornithopters - Early Airplanes by Wright Brothers-biplanes-monoplanes-Anatomy of Helicopters and Rockets Developments in aerodynamics-materials-Structures and Propulsion over the years

Module - II Aircraft Configurations and Instruments 9

Components of an airplane and their functions -Conventional control-powered control- Flight Instruments and Navigation Instruments – Gyroscope - Accelerometers, Air speed Indicators – TAS, EAS- Mach Meters - Altimeters - Principles and operation

Module - III Basics of Aerodynamics 9

Study of Atmospheres Temperature, pressure and altitude relationships -Aerodynamic Forces of aircraft-Lift- Drag- Moment - Classifications of aerofoils, Mach number

Module - IV Basics of Propulsion 9

Basic ideas about Piston-Turboprop and jet engines – Use of propeller and jets for thrust production- Principle of Operation of rocket- types of rocket and typical applications- Introduction Space vehicles operations.

Module - V Basics of Aircraft Structures and Materials 9

General types of construction, Monocoque, semi-Monocoque and geodesic constructions, typical wing and fuselage structure-Metallic and non-metallic materials- Use of Aluminium Alloy- titanium-stainless steel and composite materials

Total: 45 Periods

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Text books

1. Anderson, J.D., "Introduction to Flight", McGraw-Hill; 8th edition, 2015.
2. Stephen. A. Brandt, "Introduction to Aeronautics": A design perspective, 2nd edition, AIAA Education Series, 2004.

References

1. Kermode, A.C., "Mechanics of Flight", Himalayan Book, 11th edition, 1997.
2. "Flight without Formulae", McGraw Hill, 4th Edition, 1997.
3. Mathur, M.L. and Sharma, R.P., "Gas Turbine, Jet and Rocket Propulsion", 2nd Edition, Standard Publishers Distributors, Delhi, 2008.
4. Pallet, E.H.J., "Aircraft Instruments & Principles", Pitman & Co., 2nd Edition, 1992.

Web References

1. https://nptel.ac.in/content/storage2/courses/101106035/003_Chapter%201_L3_(04-10-2013).pdf
2. https://nptel.ac.in/content/storage2/courses/101106035/002_Chapter%201_L2_(01-10-2013).pdf
3. https://nptel.ac.in/courses/101/101/101101079/
4. https://nptel.ac.in/courses/101/101/101101083/
5. https://nptel.ac.in/courses/101/105/101105084/

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

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

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

Summative Assessment				
Bloom's Category	Internal Assessment Examinations			Final Examination (60)
	IAE 1 (5)	IAE 2 (10)	IAE 3 (10)	
Remember	20	20	20	40
Understand	30	30	20	40
Apply			10	20
Analyze				
Evaluate				
Create				

Passed in Board of studies Meeting

Approved in Academic Council Meeting

CHAIRMAN - BOARD OF STUDIES

23EE103	BASICS OF ELECTRICAL AND ELECTRONICS ENGINEERING (Common to Aero, Mech, SFE)	L	T	P	C
		3	0	0	3
Nature of Course	Professional Core				
Pre requisites	Engineering Science				

Course Objectives

The course is intended to

1. Learn the basic concepts of electrical elements and measuring instruments.
2. Introduce the basics of electric circuits and analysis
3. Impart knowledge in the basics of working principles and application of electrical machines.
4. Identify the analog devices and their characteristics
5. Educate on the fundamental concepts of digital electronics.

Course Outcomes

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

CO.No	Course Outcome	Bloom's Level
CO 1	Express the operating principles of electrical elements and measuring instruments	Understand
CO 2	Compute the electric circuit parameters for simple problems.	Apply
CO 3	Examine the working principle and applications of electrical machines	Understand
CO 4	Explain the characteristics of analog electronic devices	Understand
CO 5	Discuss the basic concepts of digital electronics	Understand

Course Contents

Module – I	ELECTRICAL ELEMENTS AND MEASURING INSTRUMENTS	9
Resistance, Inductance, Capacitance, Wires and Cables Ammeter, Voltmeter, Wattmeter, Energymeter, Thermistor and Anemometer		
Module – II	**ELECTRICAL CIRCUITS**	9
Ohm's Law, Kirchhoff's Laws, Mesh and Nodal analysis, Introduction to AC Circuits, Waveforms, Average value, RMS Value, Instantaneous power, real power, reactive power and apparent power, power factor.		
Module – III	**ELECTRICAL MACHINES**	9
Construction and operating characteristics: DC Motor, DC Generator, Single Phase Transformer, Three phase Induction motor, Three phase Alternator, Synchronous Motor.		
Module – IV	**ANALOG ELECTRONICS**	9
Semiconductor Materials: Silicon &Germanium ,Construction and operating characteristics of PN Junction Diodes, Zener Diode , Half wave and Full wave Rectifiers , Bipolar Junction Transistor ,CB, CE, CC Configurations and Characteristics.		

Module – V	DIGITAL ELECTRONICS	9
Number System ,Logic Gates ,Boolean algebra ,Adders, Subtractors, SOP and POS forms, K-map representations, minimization using K maps (Simple Problems only)		
		Total : 45 Periods

Text Books

1. Kothari DP and I.J Nagrath, "Basic Electrical and Electronics Engineering", Second Edition, McGraw Hill Education, 2020
2. S.K. Bhattacharya "Basic Electrical and Electronics Engineering", Pearson Education, Second Edition, 2017.
3. A.K. Sawhney, Puneet Sawhney 'A Course in Electrical & Electronic Measurements & Instrumentation', Dhanpat Rai and Co, 2015.

Reference Books

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

Additional References

1. **NPTEL** - https://nptel.ac.in/courses/108105017
2. **NPTEL** -https://onlinecourses.nptel.ac.in/noc21_ee55/preview

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

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

Passed in Board of Studies Meeting (12-04-2023)

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

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

Passed in Board of Studies Meeting (12-04-2023)

CHAIRMAN - BOARD OF STUDIES

Approved in Academic Council Meeting (26-04-2023)

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

UNIT I LANGUAGE AND LITERATURE 3

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

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

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

UNIT III FOLK AND MARTIAL ARTS 3

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

UNIT IV THINAI CONCEPT OF TAMILS 3

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

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

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

TOTAL : 15 PERIODS

TEXT BOOKS

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

REFERENCE BOOKS

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

CHAIRMAN - BOARD OF STUDIES

23LET07 **தமிழர் மரபு** LTPC 1 0 0 1

அலகு I **மொழி மற்றும் இலக்கியம்:** 3

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

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

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

அலகு III நாட்டுப்புறக் கலைகள் மற்றும் வீர விளையாட்டுகள்: 3

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

அலகு IV **தமிழர்களின் திணைக் கோட்பாடுகள்:** 3

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

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

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

TOTAL : 15 PERIODS

TEXT BOOKS

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

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REFERENCE BOOKS

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

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

Course Objectives

The course is intended to

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

Course Outcomes

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

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

Course Contents

Module – I WATER ANALYSIS AND WATER TREATMENT 9

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

Module – II NANOCHEMISTRY 9

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

Module – III CORROSION AND ITS CONTROL 9

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

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

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Module – IV SOIL CHEMISTRY& FERTILIZER 9

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

Module – V FUELS AND COMBUSTION 9

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

Total : 45 Periods

Laboratory Component

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

Total Periods: 30

Text Books

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

Reference Books

1. S S. Dara. "A Text Book of Engineering Chemistry", S. Chand Publishing, 12th Edition, 2018
2. B.S Murty, P. Shankar, Baldev Raj, B. B. Rath and James Murday, "Text book of nanoscience and nanotechnology", Universities Press-IIM Series in Metallurgy and Materials Science, 2018.
3. Murthy, V.N S. "Soil Mechanics and Foundation Engineering", UBS Publishers and Distributors, New Delhi, 2017

Additional References

1. https://nptel.ac.in/downloads/122101001
2. https://nptel.ac.in/courses/103103033/module9/lecture1.pdf
3. https://nptel.ac.in/courses/102103044/3
4. https://www.youtube.com/watch?v=jFOeDef6bug

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

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

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

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

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

Course Objectives:

The course is intended to

1. Understand visualization concepts, layouts and pictorial views in various fields of engineering
2. Imagine and visualize the principal planes of engineering objects.
3. Translate the geometric information of engineering objects into projections of solids.
4. Develop the graphical skills for communication of concepts, ideas and design of engineering products through sectional technical drawings.
5. Visualize and draw isometric views

Course Outcomes

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

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

Course Contents

Concepts and Conventions (Not for Examination) 1

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

Module -I Plane Curves and Free Hand Sketching (3+12)

Basic Geometrical constructions, Curves used in engineering practices: Conics – Construction of ellipse, parabola and hyperbola by eccentricity method – Construction of cycloid – construction of involutes of square and circle – Drawing of tangents and normal to the above curves. Visualization concepts and Free Hand sketching: Visualization principles –Representation of Three- Dimensional objects – Layout of views- Free hand sketching of multiple views from pictorial views of objects

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

Orthographic projection- principles-Principal Planes-First angle projection- Projection of points - Projection of straight lines (only First angle projections) inclined to both the principal planes -

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Determination of true lengths and true inclinations by rotating line method. Projection of planes (polygonal and circular surfaces) inclined to both the principal planes by rotating object method.

Module –III Projection of Solids (3+12)

Projection of simple solids like prisms, pyramids, cylinder and cone when the axis is inclined to one of the principal planes by rotating object method.

Module - IV Projection of Sectioned Solids and Development of Surface (3+12)

Sectioning of above solids in simple vertical position when the cutting plane is inclined to the one of the principal planes and perpendicular to the other – obtaining true shape of section, Development of lateral surfaces of simple and sectioned solids – Prisms, pyramids cylinders and cones. Development of lateral surfaces of solids with cut-outs and holes

Module -V Isometric Projections (3+12)

Principles of isometric projection – isometric scale –Isometric projections of simple solids and truncated solids - Prisms, pyramids, cylinders, cones- combination of two solid objects in simple vertical positions and miscellaneous problems.

TOTAL: (15+60) Periods

TEXT BOOKS

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

REFERENCE BOOKS

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

Web References

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

Publication of Bureau of Indian Standards

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

Special points applicable only to Final Examinations of Engineering Graphics:

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

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

Summative assessment						
Bloom's Level	**Continuous Assessment**					**Final Examination (Theory) [50 marks]**
	Theory				**Practical**	
	IAE-I [7.5]	**IAE-II [7.5]**	**IAE-III [10]**	**Attendance [5]**	**Rubric based CIA [20 Marks]**	
Remember	10	10	10		20	20
Understand	20	20	20		40	40
Apply	20	20	20		40	40
Analyse						
Evaluate						
Create						

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

Course Objectives

The course is intended to

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

Course Outcomes

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

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

Course Contents

PHYSICAL ACTIVITY

Yoga, Sports

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

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

UNIVERSAL HUMAN VALUES

Enhancing soft skills

LITERARY AND PROFICIENCY MODULES

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

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LECTURES BY EMINENT PEOPLE

Guest lecture by subject experts

VISIT TO LOCAL CITIES

Meditation centers / Industry

FAMILARIZATION TO DEPARTMENT / BRANCH INNOVATION

Lectures by Departments Head and senior faculty members

Total Hours: 45

Mapping of COs with POs and PSOs

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

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

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Passed in Board of Studies Meeting 17.03.23 *Passed in Academic Council Meeting27.04.23*

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

Course Objectives

The course is intended to

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

Course Outcomes

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

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

Course Contents:

MODULE I BASIC GRAMMAR AND USAGE 9

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

MODULE II APPLICATIONS OF LANGUAGE SKILLS 9

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

MODULE III CONVERSATIONAL SKILLS 9

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

MODULE IV GRAMMATICAL ACCURACY COMPETENCE 9

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

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

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

Total: 45 Periods

Laboratory Components

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

Text Books

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

Reference Books:

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

Web References:

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

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

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

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

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

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

Course Objectives

The course is intended to

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

Course Outcomes

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

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

Course Contents

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

Module – IV	LANGUAGE FOR BUSINESS CORRESPONDENCE	9
Grammar: Idioms and Phrases – Single line definitions Phrasal verbs **Listening:** Listening to informal communication **Speaking:** Narrating personal experience **Reading:** Speed reading – reading passage within the time limit **Writing:** Project writing – Report writing (Accident and Survey) – Preparing welcome address and vote of thanks.		
Module – V	**VERBAL ABILITY FOR WRITING**	**9**
Grammar: Verbal Analogy – Cause and effect expressions **Listening:** Listening to Iconic Speeches - debate and reviewing the performance **Speaking:** Group communication skills – Discussing social issues and current affairs **Reading:** Short story – critical reading **Writing:** Itinerary –Interpretation of charts (Flow chart and Pie chart) - Essay Writing and Paragraph.		
		Total : 45 Periods

Laboratory Components:

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

Text Books

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

Reference Books

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

Web References:

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

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

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

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

Course Objectives

The course is intended to

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

Course Outcomes

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

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

Course Contents:

Module – I	APPLICATION OF DIFFERENTIAL CALCULUS	12
Curvature – Curvature in Cartesian co-ordinates - Centre and Radius of curvature- Circle of curvature- Evolutes and Involutes.		
Module – II	**ORDINARY DIFFERENTIAL EQUATION**	**12**
Higher order linear differential equations with constant coefficients – Method of variation of parameters – non-Homogenous equation - Euler and Legendre Equations.		
Module – III	**LAPLACE TRANSFORMS**	**12**
Laplace transform –Transform of elementary functions –Properties –Transforms of derivatives and integrals -Transform of periodic functions. Inverse Laplace transform –Statement and applications of Convolution theorem - Method of solving second order ordinary differential equations with constant coefficients by using Laplace transform technique.		

Module – IV	ANALYTIC FUNCTIONS	12
Analytic functions – Necessary and sufficient conditions for analyticity in Cartesian and polar coordinates – Properties – Harmonic conjugates – Construction of analytic function – Conformal mapping : w = a+z, az, 1/z – Bilinear transformation.		
Module – V	**COMPLEX INTEGRATION**	**12**
Line integral - Cauchy's integral theorem –Cauchy's integral formula – Taylor's and Laurent's series — Singularities — Residues — Residue theorem — Application of residue theorem for evaluation of real integrals.		
		Total: 60 Periods

Text Books:

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

Reference Books:

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

Additional References:

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

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

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

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

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

23ME201	Engineering Mechanics (Common to Mechanical, Aeronautical, Agriculture, Civil, Safety and Fire Engineering)	L	T	P	C
		3	2	0	4
Nature of course	Engineering Science				
Pre requisites	Fundamentals of Physics and Mathematics				

Course Objectives

The course is intended to

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

Course Outcomes

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

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

Course Contents

Unit –I Statics of Particles **12**

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

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

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

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

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

Unit– IV Dynamics of Particles **12**

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

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Unit –V Friction and Elements of Rigid Body Dynamics **12**

Friction force - Laws of sliding friction - equilibrium analysis of simple systems with sliding friction wedge friction- Rolling resistance -Translation and Rotation of Rigid Bodies - General Plane motion of simple rigid bodies - cylinder and fly wheel dynamics. **Total : 60 Periods**

Text Books

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

Reference Books

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

Online Resources

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

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

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

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

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

Nature of Course	Humanities and Sciences
Pre requisites	Tamil

Course Objectives

The course is intended to

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

Course Outcomes

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

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

Course Contents (in Tamil)

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

அலகு - III	உற்பத்தித் தொழில் நுட்பம்	2
கப்பல் கட்டும் கலை – உலோகவியல் – இரும்புத் தொழிற்சாலை – இரும்பை உருக்குதல், எஃகு – வரலாற்றுச் சின்றுகளாக செம்பு மற்றும் தங்க நாணயங்கள் -நாணயங்கள் அச்சடித்தல் – மணி உருவாக்கும் தொழிற்சாலைகள் – கல்மணிகள், கண்ணாடி மணிகள் – சுடுமண் மணிகள் – சங்கு மணிகள் – எலும்புத்துண்டுகள் – தொல்லியல் சான்றுகள் – சிலப்பதிகாரத்தில் மணிகளின் வகைகள்.		
அலகு - IV	வேளாண்மை மற்றும் நீர்ப்பாசனத் தொழில் நுட்பம்	2
அணை, ஏரி, குளங்கள், மதகு – சோழர்காலக் குமுழிகள் முக்கியத்துவம் – கால்நடை பராமரிப்பு – கால்நடைகளுக்காக வடிவமைக்கப்பட்ட கிணறுகள் – வேளாண்மை மற்றும் வேளாண்மை சார்ந்த செயல்பாடுகள் – கடல்சார் அறிவு – மீன்வளம் – முத்து மற்றும் முத்துக்குளித்தல் – பெருங்கடல் குறித்த பண்டைய அறிவு – அறிவுசார்.		
அலகு - V	அறிவியல் தமிழ் மற்றும் கணினித்தமிழ்	2
அறிவியல் தமிழின் வளர்ச்சி – கணினித்தமிழ் வளர்ச்சி – தமிழ் நூல்களை மின் பதிப்பு செய்தல் – தமிழ் மென்பொருட்கள் உருவாக்கம் – தமிழ் இணையக் கல்விக் கழகம் - தமிழ் மின் நூலகம் – இணையத்தில் தமிழ் அகராதிகள் – சொற்குவைத் திட்டம்.		
		Total : 10 Periods

Course Contents (in English)

Module – I	WEAVING AND CERAMIC TECHNOLOGY	2
Weaving Industry during Sangam Age – Ceramic technology – Black and Red Ware Potteries (BRW) – Graffiti on Potteries.		
Module – II	DESIGN AND CONSTRUCTION TECHNOLOGY	2
Designing and Structural construction House & Designs in household materials during Sangam Age - Building materials and Hero stones of Sangam age – Details of Stage Constructions in Silappathikaram - Sculptures and Temples of Mamallapuram - Great Temples of Cholas and other worship places - Temples of Nayaka Period - Type study (Madurai Meenakshi Temple)- Thirumalai Nayakar Mahal - Chetti Nadu Houses, Indo - Saracenic architecture at Madras during British Period.		
Module – III	MANUFACTURING TECHNOLOGY	2
Art of Ship Building - Metallurgical studies - Iron industry - Iron smelting, steel -Copper and gold Coins as source of history - Minting of Coins – Beads making-industries Stone beads –Glass beads - Terracotta beads -Shell beads/ bone beats - Archeological evidences - Gem stone types described in Silappathikaram.		
Module – IV	AGRICULTURE AND IRRIGATION TECHNOLOGY	2
Dam, Tank, ponds, Sluice, Significance of Kumizhi Thoompu of Chola Period, Animal Husbandry - Wells designed for cattle use - Agriculture and Agro Processing - Knowledge of Sea – Fisheries – Pearl - Conche diving - Ancient Knowledge of Ocean - Knowledge Specific Society.		
Module – V	SCIENTIFIC TAMIL & TAMIL COMPUTING	2

Development of Scientific Tamil - Tamil computing – Digitalization of Tamil Books – Development of Tamil Software – Tamil Virtual Academy – Tamil Digital Library – Online Tamil Dictionaries – Sorkuvai Project.
Total : 10 Periods

பார்வை நூல்கள் (TEXT-CUM-REFERENCE BOOKS)

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

23PH202	MATERIALS PHYSICS (Common to Aero, Agri, Civil, FT, Mech, PCT & SF)	L	T	P	C
		3	0	2	4
Nature of Course	Basic Sciences				
Pre requisites	Fundamentals of Basic Physics				

Course Objectives

The course is intended to

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

Course Outcomes

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

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

Course Contents

Module – I	LASER PHYSICS	9
Lasers: Introduction- characteristics of laser - population of energy levels, Einstein's A and B coefficients derivation - resonant cavity - semiconductor lasers: homojunction and heterojunction - Applications of lasers - particle size determination and holography.		
Module – II	**PROPERTIES OF MATTER**	**9**
Elasticity - stress-strain diagram and its uses - factors affecting elastic modulus and tensile strength - torsion pendulum: theory and experiment - bending of beams - bending moment – cantilever - uniform and non-uniform bending - I-shaped girders.		
Module – III	**CRYSTAL PHYSICS**	**9**
Single crystalline, polycrystalline and amorphous materials – single crystals: unit cell, crystal systems, Bravais lattices, directions and planes in a crystal, Miller indices – inter-planar distances - coordination number and packing factor for SC, BCC, FCC, HCP and diamond structures.		

Module – IV	THERMAL PHYSICS	9
Transfer of heat energy - thermal expansion of solids and liquids - expansion joints - bimetallic strips - thermal conductivity - Forbe's and Lee's disc method: theory and experiment – thermal insulation - applications: heat exchangers in refrigerators, ovens and solar water heaters.		
Module – V	**MODERN ENGINEERING MATERIALS**	**9**
Metallic glasses – preparation, properties and applications – Shape memory alloys – Types, characteristics and applications – Nanomaterials – preparation– Physical Vapour Deposition (PVD) - sol gel method, properties and applications. Carbon Nano Tube (CNT) –properties and applications.		
		Total : 45 Periods

Laboratory Components (Any Five)

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

Text Books

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

Reference Books

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

Web References:

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

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

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

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

23CS203	PROBLEM SOLVING USING PYTHON (Common to AERO, CIVIL, FT, MECH, PCT, S&F)	L	T	P	C
		3	0	2	4
Nature of Course	Engineering Sciences				
Prerequisites	Mathematical and Logical Knowledge				

Course Objectives

The course is intended

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

Course Outcomes

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

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

Course Contents

MODULE – I Basics of Computers & Problem solving 9

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

MODULE – II Introduction of Python Programming 9

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

MODULE – III Control statements and Functions 9

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

MODULE – IV Strings, Lists 9

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

MODULE – V Tuples, Dictionaries, Files and Packages 9

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

Total : 45 Periods

Laboratory Components

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

Text Books

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

Reference Books

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

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Additional References

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

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

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

Passed in Board of Studies

Approved in Academic Council

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23ME202	MECHANICAL ENGINEERING PRACTICES LABORATORY	L	T	P	C
		0	0	2	1
Nature of Course	Engineering Sciences				
Prerequisites	Fundamentals of Science				

Course Objectives

The course is intended to

1. To practice butt joints, lap joints, and T-joints by metal arc welding.
2. To fabricate models using sheet metal
3. To make joints using carpentry tools.
4. To provide hands-on training in drilling practice
5. To build pipeline as per location and functional requirements.

Course Outcomes

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

CO. No	Course Outcome	Bloom's Level
CO 1	Experiment with arc welding equipment to join the structures	**Apply**
CO 2	Make the models using sheet metal	**Apply**
CO 3	Fabricate joints in carpentry components	**Apply**
CO 4	Construct the methods of a drilling operation	**Apply**
CO 5	Carry out basic types of pipe connections including plumbing works	**Apply**

List of Exercises

S.No	Exercises	CO Mapping	RBT Level
Welding			
1	Lab Joint Using Arc Welding		
2	Butt Joint Using Arc Welding		
3	Tee Joint Using Arc Welding		
Sheet Metal			
4	Fabrication of Tray Using Sheet Metal		
5	Fabrication of Cone Using Sheet Metal		
Carpentry			
6	Cross Lab Joint Using Wood		
7	Tee Lab Joint Using Wood		
8	Dove-Tail Joint Using Wood		
Special Machines			
9	Drilling of Hole in The Given Work Piece		
Plumbing			
10	External Thread Cutting		
11	Domestic Water Pipe Line Connection.		

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

Summative Assessment based on continuous and Final Examination		
Bloom's Category	**Rubrics-based continuous assessment [60 Marks]**	**Final Examination [40 Marks]**
Remember		
Understand	**30**	20
Apply	30	**20**
Analyse		
Evaluate		
Create		

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23MC002	ENVIRONMENTAL SCIENCES (Common for all branches)	L	T	P	C
		2	0	0	0
Nature of Course	Mandatory, Non Credit				
Pre requisites	Nil				

Course Objectives

The course is intended to

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

Course Outcomes

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

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

Course Contents

Module – I	ECOSYSTEM	6
Eco system - Food chains, Food webs and Ecological pyramids. Ecosystem (a) Forest eco system, (b) Aquatic eco system (pond ecosystem and marine ecosystem).		
Module – II	**BIODIVERSITY**	**6**
Introduction to Bio diversity, Values of Bio diversity, Threads to Bio diversity, Endangered and Endemic species of India, Hotspots of biodiversity. Conservation of Biodiversity: In-Situ and Ex-Situ conservation of biodiversity.		
Module – III	**ENVIRONMENTAL POLLUTION**	**6**
Definition, Causes, Effects and Control of (a) Air pollution (b) Water pollution (c) Soil pollution. Electrostatic Precipitator for controlling air pollution.		
Module – IV	**NON-CONVENTIONAL ENERGY RESOURCES**	**6**
Introduction, Types, Working and Applications of: Solar Energy- Photovoltaic (PV) solar energy, Wind Energy-Onshore wind power- and Geo Thermal Energy-Geo thermal power plant.		

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

Activity Components

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

Text Books

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

Reference Books

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

Web References:

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

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

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

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

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

Course Objectives

The course is intended to

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

Course Outcomes

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

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

Course Contents

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

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

Text Books

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

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

23AE301	Aero Engineering Thermodynamics	L	T	P	C
		3	0	0	3
Nature of Course	Professional Core				
Pre requisites	Nil				

Course Objectives

The course is intended to

1. Impart knowledge on the basics and application of zeroth and first law of thermodynamics.
2. Apply the knowledge on the second law of thermodynamics in analysing the performance of thermal devices.
3. Learn the concepts and laws of thermodynamics to predict the operation of thermodynamic cycles.
4. Teach the various properties of steam through steam tables and Mollier chart.

Course Outcomes

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

CO. No	Course Outcome	Bloom's Level
CO 1	Solve engineering problems using first laws of thermodynamics	Apply
CO 2	Implement second law of thermodynamics for various engineering systems	Apply
CO 3	Derive and compute the efficiency of different air standard cycles	Apply
CO 4	Compute the properties of pure substance	Apply
CO 5	Comprise the knowledge of Rankine cycle and methods for improving efficiency	Evaluate

Course Contents

Module – I **Fundamental Concept and First Law** **9**

Concept of continuum, macroscopic approach, thermodynamic systems - closed, open and isolated. Property, state, path and process, quasi-static process, work, internal energy, enthalpy, specific heat capacities and heat transfer. SFEE, application of SFEE to jet engine components. First law of thermodynamics, relation between pressure, volume and temperature for various processes, Zeroth law of thermodynamics.

Module – II **Second Law and Entropy** **9**

Second law of thermodynamics-Kelvin Planck and Clausius statements of second law – Heat engine, Heat pump and Refrigerator, Reversibility and Irreversibility, Carnot theorem, Carnot cycle, efficiency, COP, Clausius inequality and Concept of entropy.

Module – III **Air Standard Cycles** **9**

Otto, Diesel, Dual, and Brayton cycles - Air standard efficiency - Mean effective pressure.

Module – IV **Introduction and Properties of Pure Substance** **9**

Steam - formation and its thermodynamic properties - p-v, p-T, T-v, T-s, h-s diagrams, PVT surface. Determination of dryness fraction. Calculation of work done and heat transfer in non-flow and flow processes using Steam Table and Mollier Chart.

Module – V Vapour Power Cycles 9

Problems on Ideal and actual Rankine cycles, Cycle Improvement Methods - Reheat and Regenerative cycles

Total : 45 Periods

(Use of Standard and approved Steam Table and Mollier Chart permitted)

TEXT BOOKS:

1. Nag.P.K. "Engineering Thermodynamics", Tata McGraw-Hill, New Delhi 6th Edition 2017.
2. Yunus A. Cengel and Michael A. Boles, "Thermodynamics: An Engineering Approach" McGraw-Hill Science/Engineering/Math. 9th Edition 2017.

REFERENCES:

1. Borgnakke & Sonntag, "Fundamental of Thermodynamics", 8th Edition, 2016.
2. Chattopadhyay. P, "Engineering Thermodynamics", Oxford University Press. 2016.
3. Michael J. Moran, Howard N. Shapiro, "Fundamentals of Engineering Thermodynamics", 8th Edition.
4. Holman J.P "Thermodynamics", 3rd Edition, McGraw-Hill, 2007.

ADDITIONAL REFERENCES:

1. https://nptel.ac.in/courses/112/105/112105123/
2. https://www.youtube.com/watch?v=94kWpTURhVJ
3. https://www.youtube.com/watch?v=b5SPb6NHna4

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

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

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

CHAIRMAN - BOARD OF STUDIES

23AE302	Aircraft Materials	L	T	P	C
		3	0	0	3
Nature of Course	Professional Core				
Pre requisites	Chemistry, Physics for Mechanical Sciences				

Course Objectives

The course is intended to

1. Acquire knowledge of different Aircraft materials & their properties
2. Understand the Heat Treatment processes of aircraft metals and alloys
3. Characteristics and Applications of Aluminium alloys, Ceramics, Composites and High Temperature Materials.

Course Outcomes

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

CO. No	Course Outcome	Bloom's Level
CO 1	Illustrate the mechanical behaviour of different aircraft & aerospace materials	Understand
CO 2	Learn the importance of heat treatment of materials and their characterization	Understand
CO 3	Relate about the Ferrous and Nonferrous materials with aircraft applications	Understand
CO 4	Infer about the applications of steel alloys, cast-iron alloys and Ceramics	Understand
CO 5	Develop materials properties through various testing	Apply

Course Contents

Module – I **Behaviors of Engineering Materials** 9

Introduction to aircraft and aerospace materials, selection criteria and their classification, Linear and non-linear elastic properties- Stress and Strain Curves-Yielding and strain Hardening. Toughness-Modules of resilience –Thermal properties of materials at elevated temperatures. High temperature material characterization.

Module – II **Heat Treatment of Steel** 9

Definition – Full annealing, stress relief, recrystallization and spheroidising – normalising, hardening and Tempering of steel, Hardenability-Jominy end quench test - Austempering, martempering – case hardening carburizing, nitriding and cyaniding Flame and Induction hardening.

Module – III **Ferrous and Nonferrous materials** 9

Effect of alloying additions on steel - Stainless and tool steels – HSLA, Maraging steels, Classification of steel and cast iron - White, Malleable, Grey, Spheroidal, microstructure, properties and applications.

Module – IV **Alloys and Ceramics** 9

Copper alloys – Al-Cu alloys – precipitation strengthening treatment – Bearing alloys, Mg-alloys, Ni-based super alloys and Titanium alloys, Engineering Ceramics - Al_2O_3, SiC, Si3N4 and SIALON, Introduction to smart materials

Module – V Mechanical Properties and Testing **9**

Mechanisms of plastic deformation, slip and twinning – Types of fracture – Testing of materials under tension, compression and shear loads – Brinnel and Vickers Hardness tests, Impact test - Izod and Charpy, fatigue and creep tests.

Total : 45 Periods

Text Books

1. Williams D Callister, "Material Science and Engineering" 2nd edition Wiley India Pvt Ltd, Revised Indian Edition 2014.
2. H Buhl, Advanced Aerospace Materials, Springer, Berlin 1992, ISBN-13: 978-3540558880.
3. Titterton G F, Aircraft Material and Processes, English Book Store, New Delhi, 5 th edition, 1998, ISBN-13: 978-8175980136

Reference Books

1. BalramGupta, AerospacematerialVol 1,2,3,4 ARDB, S Chand & Co, 2009. ISBN-13: 978-8121922005.
2. Parker E R, Materials for Missites and Space, McGraw-Hill Inc., US, 1963, ISBN-13: 978 0070485013
3. Hill E T, The Materials of Aircraft Construction, Pitman London

Additional References

1. https://nptel.ac.in/courses/112/108/112108150/#
2. http://www.issp.ac.ru/ebooks/books/open/Materials_Science_and_Technology.pdf
3. https://drive.google.com/file/d/11ZisK2pKpkUCHzg4Pboo7Kf5lKyjwa/view

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

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

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

CHAIRMAN-BOARD OF STUDIES

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

Course Objectives

The course is intended to

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

Course Outcomes

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

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

Course Contents

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

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

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A critical appraisal of the current scenario – Method to fulfil the above human aspirations: understanding and living in harmony at various levels.		
Module – II	**UNDERSTANDING HARMONY IN THE HUMAN BEING - HARMONY IN MYSELF!**	**9**
Understanding human being as a co-existence of the sentient 'I' and the material 'Body' – Understanding the needs of Self ('I') and 'Body'- happiness and physical facility – Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer) – Understanding the characteristics and activities of 'I' and harmony in 'I' – Understanding the harmony of I with the Body : Sanyam and Health; correct appraisal of Physical needs, meaning of Prosperity in detail Programs to ensure Sanyam and Health.		
Module – III	**UNDERSTANDING HARMONY IN THE FAMILY AND SOCIETY- HARMONY IN HUMAN- HUMAN RELATIONSHIP**	**9**
Understanding values in human - human relationship; meaning of Justice (nine universal values in relationships) and program for its fulfilment to ensure mutual happiness; Trust and Respect as the foundational values of relationship – Understanding the meaning of Trust; Difference between intention and competence - Understanding the meaning of Respect, Difference between respect and differentiation; the other salient values in relationship – Understanding the harmony in the society (society being an extension of family): Resolution, Prosperity, fearlessness (trust) and co-existence as comprehensive Human Goals – Visualizing a universal harmonious order in society-Undivided Society, Universal Order- from family to world family.		
Module – IV	**UNDERSTANDING HARMONY IN THE NATURE AND EXISTENCE-WHOLE EXISTENCE AS COEXISTENCE**	**9**
Understanding the harmony in the Nature – Interconnectedness and mutual fulfilment among the four orders of nature- recyclability and self regulation in nature – Understanding Existence as Co-existence of mutually interacting units in all- pervasive space Holistic perception of harmony at all levels of existence.		
Module – V	**IMPLICATIONS OF THE ABOVE HOLISTIC UNDERSTANDING OF HARMONY ON PROFESSIONAL ETHICS**	**9**
Natural acceptance of human values – Definitiveness of Ethical Human Conduct – Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order - Competence in professional ethics – Case studies of typical holistic technologies, management models and production systems – Strategy for transition from the present state to Universal Human Order: **a.** At the level of individual: as socially and ecologically responsible engineers, technologists and managers **b.** At the level of society: as mutually enriching institutions and organizations		
		Total : 45 Periods

Text Books

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

Reference Books

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

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Web References

1. https://www.studocu.com/in/document/i-k-gujral-punjab-technical-university/universal-human-values/uhv-complete-notes/46743542.
2. https://www.youtube.com/watch?v=NhFBzn5qKIM&list=PLWDeKF97v9SO8vvjC1KyqteziTbTjN1So
3. https://www.youtube.com/watch?v=Ff0LUTOCuLE&list=PLWDeKF97v9SO8vvjC1KyqteziTbTjN1So&index=16

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

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

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

CHAIRMAN - BOARD OF STUDIES

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

Course Objectives

The course is intended to

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

Course Outcomes

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

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

Course Contents:

Module – I	PARTIAL DIFFERENTIAL EQUATIONS	9
Solution of standard types of first order non-linear partial differential equations: (i) f(p,q)=0, (ii) Clairaut's type - Lagrange's linear equation - linear partial differential equations of second order with constant coefficients of homogeneous equations.		
Module – II	**FOURIER ANALYSIS**	**9**
Dirichlet's Conditions - Fourier series for periodic functions - Expansion of periodic functions with period $(0, 2\pi)$ and period $(-\pi, \pi)$ – Half Range Series - Root mean square value - Parseval's identity – Harmonic Analysis.		

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Module – III	FOURIER TRANSFORMS	9
Statement of Fourier integral theorem – Fourier transforms pair: Fourier transforms and Inverse Fourier transforms – Fourier sine transforms -Fourier cosine transforms – Transforms of simple functions – Convolution Theorem - Parseval's identity.		
Module – IV	**Z - TRANSFORMS AND DIFFERENCE EQUATIONS**	**9**
Z-transforms - Properties – Inverse Z-transform: Partial fraction method and Convolution theorem - Formation of difference equations –Solution of difference equations using Z – transform.		
Module – V	**APPLICATIONS TO PARTIAL DIFFERENTIAL EQUATIONS**	**9**
Classification of second order Partial differential equations – Method of separation of variables – Solutions of one dimensional wave equation – Solutions of one dimensional heat equation – Application to Boundary value problems.		
		Total: 45 Periods

Text Books:

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

Reference Books:

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

Additional References:

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

Laboratory Components using MATLAB:

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

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

Total: 30 Periods

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

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

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

CHAIRMAN-BOARD OF STUDIES

23AE303	Solid Mechanics	L	T	P	C
		3	0	2	4
Nature of Course	Engineering Science				
Pre requisites	Engineering Mechanics				

Course Objectives

The course is intended to

1. Summarize the theoretical foundation of the stress strain and elastic modulus concepts in various compunents.
2. Assess shear forces and bending moments using mathematical models for beams under different types of transverse loads.
3. Investigate the principles behind the bending and deflection of beams under various loading conditions.
4. Utilize fundamental mechanical concepts to solve practical problems involving springs and shafts under loading condition
5. Impart the Knowledge of bi-axial loading, stresses in cylinder and principal stresses.

Course Outcomes

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

CO. No	Course Outcome	Bloom's Level
CO 1	Describe the properties of materials and their elastic constants for axial bar subjected to various loads.	Understand
CO 2	Examine shear force and bending moment diagrams to evaluate the resistance of beams and solve practical problems.	Apply
CO 3	Estimate the bending of beams and deflection of beams under various loading conditions	Analyze
CO 4	Demonstrate the behaviour of materials upon normal external loads on springs and shafts	Apply
CO 5	Articulate the concept of stresses on cylinders and assess principal stresses.	Apply

Course Contents

Module – I **Stress Strain Relations** **9**

Simple stress and Strain - Tension, Compression and Shear Stresses - Mechanical Properties of Materials. Stress-strain relationship - Hooke's law - Deformation of simple and compound bars - Thermal stress - Elastic constants.

Module – II **Shear Force and Bending Moment** **9**

Beams, types of beams - Transverse loading on beams - Shear force and bending moment in beams - Cantilevers - Simply supported beams and over-hanging beams.

Module – III **Beam Bending and Beam Deflection** **9**

Theory of pure bending - Bending of beam with symmetrical cross section, Deflection of Beams – Macaulay's Method and Moment area method.

Module – IV **Torsion** **9**

Torsion formulation, Stresses and deformation in circular and hollows shafts - Stresses in helical springs - Deflection of helical springs.

Module – V **Thin Cylinders and Principal Stresses** 9

Stresses in thin cylindrical shell due to internal pressure - circumferential and longitudinal stresses and deformation in thin and thick cylinders. Stresses on inclined planes - Principal stresses and principal planes - Mohr's circle.

Total : 45 Periods

Laboratory Components

S. No.	Exercises	CO Mapping	Blooms Level
1	Tension Test on Mild Steel Rod	CO1	Evaluate
2	Rockwell Hardness Test	CO1	Analyze
3	Brinell Hardness Test	CO1	Analyze
4	Double Shear Test	CO2	Evaluate
5	Deflection Test on Beams	CO3	Analyze
6	Test on Open Coiled Helical Spring	CO4	Evaluate
7	Torsion Test on Mild Steel Rod	CO4	Evaluate
8	Charpy Impact Test	CO5	Evaluate
9	Izod Impact Test	CO5	Analyze

TOTAL: 30PERIODS

Text Books

1. Egor P Popov, Mechanics of Materials, Pearson, 2015
2. James M. Gere, Mechanics of Materials, Sixth Edition, Thomson Learning, 2004.
3. Ferdinand Beer, E. Russell Johnston Jr., John Dewolf, David Mazurek, Mechanics of Materials, McGraw Hill Education,2014
4. Russell C Hibbeler, Mechanics of Materials, Pearson, 2013.

Reference Books

1. Subramanian R , "Strength of Materials", Oxford University Press, Oxford Higher Education series, 2010.
2. Timoshenko and Gere, "Mechanics of Materials", Tata McGraw Hill, 1993.
3. Mechanics of Materials, R C Hibeler, Pearson Education, Tenth Edition (2022). ISBN-10-9354492258.

Additional References

1. https://ocw.mit.edu/courses/mechanical-engineering/2-001-mechanics-materials-i-fall-2006/index.htm
2. NPTEL - http://nptel.ac.in/courses/112107146/
3. MOOC Courses - https://www.coursera.org/courses?query=mechanics%20of%20materials

CHAIRMAN-BOARD OF STUDIES

Mapping of Course Outcomes (CO's) with Programme Outcomes (PO's) and Programme Specific Outcomes (PSO's)														
COs	PO's												PSO's	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO 1	3	3	2	1	1	-	-	-	-	-	-	1	2	-
CO 2	3	3	2	1	1	-	-	-	-	-	-	1	3	-
CO 3	3	3	3	2	1	-	-	-	-	-	-	1	3	-
CO 4	3	3	3	2	0	-	-	-	-	-	-	2	3	-
CO 5	3	3	3	2	0	-	-	-	-	-	-	2	3	-
	3- High				2- Medium				1- Low					

Summative Assessment						
Bloom's Category	Continuous Assessment					Final Examinations (Theory) (50)
	Theory				Practical	
	IAE – I (5)	IAE – II (10)	IAE – III (10)	Attendance (5)	Rubric based CIA (20)	
Remember	10	10	10			20
Understand	30	10	10			30
Apply	10	20	30			30
Analyse		10			50	20
Evaluate					50	
Create						

23AE304	Fluid Mechanics and Machinery	L	T	P	C
		3	0	1	4
Nature of Course	Engineering Science				
Pre requisites	Engineering Mechanics				

Course Objectives

The course is intended to

1. Correlate the properties of fluids and the concept of control volume.
2. Examine the applications of the conservation laws to flow through pipes.
3. Comment on the importance of dimensional analysis
4. Summarize the importance of various types of flow in pumps.
5. Infer the importance of various types of flow in turbines.

Course Outcomes

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

CO. No	Course Outcome	Bloom's Level
CO 1	Estimate mathematical knowledge to predict the properties and characteristics of a fluid.	Apply
CO 2	Calculate the operational parameters required for pipe flow in piping networks	Analyse
CO 3	Predict the nature of physical quantities related to flow parameters.	Apply
CO 4	Integrate the key factors influencing pump selection to determine the most suitable pump for specific industrial applications	Apply
CO 5	Act out the fundamental concepts and principles of turbine performance in various applications.	Apply

Course Contents

Module – I Fluid Properties and Flow Characteristics **9**

Introduction - units and dimensions - properties of fluids - flow characteristics - concept of control volume - application of continuity, momentum and energy equations.

Module – II Flow through Circular Conduits **9**

Flow through circular pipes - Hagen poiseuille's equation - boundary layer concepts - types of boundary layer thickness - Darcy Weisbach equation - friction factor: commercial pipes.

Module – III Dimensional Analysis **9**

Need for dimensional analysis - methods of dimensional analysis - dimensionless parameters - application of dimensionless parameters - model analysis similitude - types of similitude.

Module – IV Pumps **9**

Introduction - classification - working principle of centrifugal pumps, reciprocating pump and rotary pumps – Simple problems.

Module – V Turbines **9**

Introduction - classification of turbines - Pelton wheel, Francis turbine and Kaplan turbines - Simple problems.

Total : 45 Periods

Laboratory Components

S. No.	Exercises	CO Mapping	Blooms Level
1	Determination of the Coefficient of discharge of a given Orifice meter.	1	Apply
2	Determination of the Coefficient of discharge of a given Venturi meter.	2	Apply
3	Calculation of the rate of flow using Rotameter.	2	Apply
4	Conducting experiments and drawing the characteristic curves of centrifugal pump / submergible pump.	3	Apply
5	Conducting experiments and drawing the characteristic curves of reciprocating pumps.	3	Apply
6	Conducting experiments and drawing the characteristic curves of Gear pump.	3	Apply
7	Conducting experiments and drawing the characteristic curves of the Pelton wheel.	4	Apply
8	Conducting experiments and drawing the characteristics curves of Francis turbine.	4	Apply
9	Conducting experiments and drawing the characteristic curves of Kaplan turbines.	4	Apply
			Total : 30 Periods

Text Book

1. Modi P.N. and Seth. S.M. Hydraulics and Fluid Mechanics, Standard Book House, New Delh , 22nd edition (2019)
2. Jain A. K. Fluid Mechanics including Hydraulic Machines, Khanna Publishers, New Delhi. 2014.

Reference Books

1. Kumar K. L., "Engineering Fluid Mechanics", Eurasia Publishing House (p) Ltd., New Delhi,2016
2. Graebel, W.P, "Engineering Fluid Mechanics", Taylor & Francis, Indian Reprint, 2011.
3. Robert W. Fox Alan T. McDonald, Philip J Pritchard, "Fluid Mechanics and Machinery", 2011.

Additional References

1. http://www.springer.com/materials/mechanics/book/978-3-540-25141-5
2. https://nptel.ac.in/courses/105/103/105103192/

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

Summative Assessment						
Bloom's Category	Continuous Assessment					Final Examinations (Theory) (50)
	Theory				Practical	
	IAE – I (5)	IAE – II (10)	IAE – III (10)	Attendance (5)	Rubric based CIA (20)	
Remember	10	10	10			20
Understand	30	10	10			30
Apply	10	20	30			30
Analyse		10			50	20
Evaluate					50	
Create						

CHAIRMAN-BOARD OF STUDIES

23AE305	Applied Thermodynamics Laboratory	L	T	P	C
		0	0	2	1
Nature of Course	Engineering Science				
Pre requisites	-				

Course Objectives

The course is intended to

1. Identify the characteristics of fuels / lubricates used in IC Engines.
2. Sketch the valve timing diagrams and performance of IC Engines.
3. Measure the performance of refrigeration cycle / components.
4. Calculate the heat transfer phenomena predict the relevant coefficient using implementation

Course Outcomes

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

CO. No.	Course Outcome	Bloom's Level
CO 1	Perform test on diesel / petrol engine.	Evaluate
CO 2	Evaluate the performance of parallel / counter heat flow heat exchanger apparatus	Analyze
CO 3	Determine the properties of the fuels and solids.	Analyze
CO 4	Determine the thermal properties of composite walls.	Analyze
CO 5	Evaluate the performance of refrigeration and Air-conditioning testing	Evaluate

Laboratory Components

S. No.	Exercises	CO Mapping	Blooms Level
1.	Performance test on a 4-stroke engine	CO1	Analyze
2.	Valve timing of a 4 - stroke engine	CO1	Understand
3.	Port timing of a 2 stroke engine	CO1	Understand
4.	Determination of effectiveness of a parallel flow heat exchanger	CO2	Analyze
5.	Determination of effectiveness of a counter flow heat exchanger	CO2	Analyze
6.	Determination of Flash point and Fire point of various fuels.	CO3	Understand
7.	Determination of thermal conductivity of solid.	CO4	Analyze
8.	Determination of thermal resistance of a composite wall.	CO4	Analyze
9.	COP test on a vapour compression refrigeration test rig	CO5	Analyze
10.	COP test on a vapour compression air-conditioning test rig	CO5	Analyze

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS

S. No.	Name of the equipment	Quantity	Experiment No.
1.	4 stroke twin cylinder diesel engine	1	1
2.	Cut section model of 4 stroke diesel engine and cut section model of 2 stroke petrol engine	1	2
3.	Parallel and counter flow heat exchanger test rig	1	3,4
4.	Bomb Calorimeter	1	5,6
5.	Conductive heat transfer set up	1	7
6	Composite wall	1	8
7.	Vapour compression refrigeration test rig	1	9
8.	Vapour compression air-conditioning test rig	1	10

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

Assessment based on Continuous and Final Examination			
Bloom's Level	Continuous Assessment (60 marks) (Attendance – 5 marks)		Final Examination [40 marks]
	Rubric based Continuous Assessment [30 marks]	Model Examination [25 marks]	
Remember			
Understand	40	40	40
Apply			
Analyze			
Evaluate	60	60	60
Create			

CHAIRMAN-BOARD OF STUDIES

23AE401	Air Breathing Propulsion	L	T	P	C
		3	0	0	3
Nature of Course	Professional Core				
Pre requisites	Aero Engineering Thermodynamics				

Course Objectives

The course is intended to

1. Learn about the basic about piston and gas turbine engines
2. Study the functions of intakes and nozzles
3. Infer the working of combustion chamber
4. Implement the knowledge about compressor and turbine principles and performance
5. Learn about the Ramjet operation and limitations

Course Outcomes

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

CO. No	Course Outcome	Bloom's Level
CO1	Elaborate the basics of air breathing engines	Understand
CO2	Relate the aircraft intakes and engine nozzles	Understand
CO3	Analyze the performance of combustion chamber	Apply
CO4	Evaluate the purpose of compressor and turbine designs	Apply
CO5	Examine the Ramjet working concept and implementation	Understand

Course Contents

Module – I **Basics of Air Breathing Engines** 9

Introduction to piston engines - Illustration of working of gas turbine engines – various gas turbine engines and its characteristics - thrust equation - factors affecting thrust – methods of thrust augmentation

Module – II **Intakes and Nozzles** 9

Ram effect, Internal flow and Stall in subsonic inlets – relation between minimum area ratio and external deceleration ratio – diffuser performance - supersonic inlets – starting problem on supersonic inlets – shock swallowing by area variation – types of nozzles - losses in nozzles – thrust reversal

Module – III **Combustion Chambers** 9

Classification of combustion chambers –factors affecting – combustion chamber performance – effect of operating variables on performance – flame holders - flame stabilization - cooling process.

Module – IV **Compressors and Turbines** 9

Principle operation of centrifugal and axial flow compressors – Work done and pressure rise – velocity diagrams – degree of reaction - Impulse and reaction blading of gas turbines – Velocity triangles and

power output – Vortex theory – Choice of blade profile, pitch and chord – blade cooling – Matching of turbine and compressor

Module – V Ramjet Propulsion **9**

Operating principle – Sub critical, critical and supercritical operation – Combustion in ramjet engine – Ramjet performance – limitations - Simple ramjet design calculations – Introduction to scramjet.

Total : 45 Periods

Text Books

1. Ganesan V, "Gas Turbines" Tata McGraw-Hill, 3rd edition (2017).
2. 2. Hill, P.G. & Peterson, C.R. "Mechanics & Thermodynamics of Propulsion" Pearson education (2009).

Reference Books

1. Mathur, M.L, and Sharma, R.P., "Gas Turbine, Jet and Rocket Propulsion", Standard Publishers & Distributors, Delhi, 2nd edition 2014.

2. Cohen, H. Rogers, G.F.C. and Saravanamuttoo, H.I.H "Gas Turbine Theory", Pearson Education Canada; 6th edition 2008.

3. "Principles of Turbomachinery in Air-Breathing Engines" (2nd Edition) by Erian A. Baskharone and D. Lee Hill, Cambridge Aerospace Series, 2023

4. "Aerothermodynamics and Jet Propulsion" by Paul G. A. Cizmas, Cambridge University Press, 2021.

Web References:

1. https://nptel.ac.in/courses/112/103/112103281/
2. https://ocw.mit.edu/courses/aeronautics-and-astronautics/16-50-introduction-to-propulsion-systems-spring-2012/lecture-notes/
3. https://www.coursera.org/lecture/thermodynamics-intro/07-06-lets-look-inside-a-jet-engine-dLUOI

Mapping of Course Outcomes (CO's) with Programme Outcomes (PO's) and Programme Specific Outcomes (PSO's)

COs	PO's												PSO's	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO 1	3	3	2	2	3	-	-	-	1	-	2	1	3	2
CO 2	3	3	2	2	3	-	-	-	1	-	2	1	3	2
CO 3	3	3	2	2	3	-	-	-	1	-	2	1	3	2
CO 4	3	3	2	2	3	-	-	-	1	-	2	1	3	2
CO 5	3	3	2	2	3	-	-	-	1	-	2	1	3	2
	3-High				2-Medium				1- Low					

CHAIRMAN - BOARD OF STUDIES

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

Summative Assessment				
Bloom's Category	**Internal Assessment Examinations (IAE) (40)**			**Final Examinations (FE)**
	IAE – I (5)	**IAE – II (10)**	**IAE – III (10)**	**(60)**
Remember	20	10	10	14
Understand	30	20	30	22
Apply		20	20	24
Analyse				
Evaluate				
Create				

CHAIRMAN-BOARD OF STUDIES

23AE402	Aircraft Structural Mechanics	L	T	P	C
		3	0	0	3
Nature of Course	Professional Core				
Pre requisites	Engineering Mechanics and Strength of Materials				

Course Objectives

The course is intended to

1. Understand the students on the linear static analysis of determinate aircraft structural components
2. Understand the students on the linear static analysis of indeterminate aircraft structural components.
3. Analyse the structure to carry the given loads.
4. Understand the design process using different failure theories.
5. Learn about linear elasticity and analyze the components subjected to typical aircraft loading conditions.

Course Outcomes

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

CO. No	Course Outcome	Bloom's Level
CO 1	Examine statically determinate structures.	Apply
CO 2	Examine statically indeterminate structures with different methods	Apply
CO 3	Compare beam column with various end conditions by Euler's theory and south well plot method.	Analyze
CO 4	Illustrate different failure theories in aircraft structural problems.	Understand
CO 5	Discuss about induced stresses in aircraft	Understand

Course Contents

Module – I **Statically Determinate Structures** 9

Types of Frames - Assumptions Made in Finding Out the Forces in a Frame - Reactions of Supports of a Frame - Analysis of a Frame - method of joints – method of sections

Module – II **Statically Indeterminate Structures** 9

Fixed Beams - Bending Moment Diagram for Fixed Beams - Slope and Deflection for a Fixed Beam Carrying a Point Load at the Centre. Carrying an Eccentric Point Load &amp. Carrying a Uniformly Distributed Load over the Entire Length - Advantages of Fixed Beams - Continuous Beams - Bending Moment Diagram for Continuous Beams – Clapeyron s Three Moment Equation

Module – III **Columns** 9

Euler's column curve – inelastic buckling – effect of initial curvature – Southwell plot – columns with eccentricity – use of energy methods – theory of beam columns – beam columns with different end conditions – stresses in beam columns.

Module – IV **Failure Theories** 9

Ductile and brittle materials – maximum principal stress theory - maximum principal strain theory - maximum shear stress theory - distortion energy theory – octahedral shear stress theory.

Module – V Induced Stresses 9

Thermal stresses – impact loading – Fatigue – Creep - Stress Relaxation

Total : 45 Periods

Text Books

1. 'Mechanics of Materials' by James M. Gere & Barry J Goodno, cengage Learning Custom Publishing; 8th edition, 2012.
2. Megson T M G, 'Aircraft Structures for Engineering students' Butterworth-Heinemann publisher, 5th edition. 2012.
3. N.C. Pandya, C.S. Shah, "Elements of Machine Design", Charotar Publishing House, 15th edition, 2009.

Reference Books

1. Bruhn E F, 'Analysis and Design of Flight Vehicle Structures', Tri-State Off-set Company, USA,1985
2. Donaldson, B.K , 'Analysis of Aircraft Structures - An Introduction' Cambridge University Press publishers, 2 nd edition, 2008
3. Peery, D.J., and Azar, J.J., Aircraft Structures, 2nd edition. McGraw – Hill, N.Y., 1999.

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

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

Summative Assessment				
Bloom's Category	Internal Assessment Examinations (IAE) (40)			Final Examinations (FE)
	IAE – I (5)	IAE – II (10)	IAE – III (10)	(60)
Remember	08	08	10	10
Understand	10	10	40	48
Apply	32	16		26
Analyse		16		16
Evaluate				
Create				

CHAIRMAN-BOARD OF STUDIES

23AE403	Mechanics of Machinery	L	T	P	C
		3	0	0	3
Nature of Course	Professional Core (PC)				
Pre requisites	Engineering Mechanics and Engineering Graphics				

Course Objectives

The course is intended to

1. Understand the principles in the formation of mechanisms and their kinematics.
2. learn the basic concepts of toothed gearing and kinematics of gear trains
3. Study the effect of friction in different machine elements.
4. analyse the forces and torque acting on simple mechanical systems
5. understand the importance of balancing and vibration

Course Outcomes

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

CO. No	Course Outcome	Bloom's Level
CO 1	Comment on the principles behind the formation of mechanisms and their kinematics	Understand
CO 2	Illustrate the mechanisms of the CAM and follower.	Understand
CO 3	Judge the various terminologies in gears and gear trains.	Apply
CO 4	Interpret the knowledge of friction to different machine elements.	Apply
CO 5	Discuss the significance of balancing in various mechanical applications.	Understand

Course Contents

Module – I Kinematics of Machines **9**

Mechanisms – terminology and definitions – kinematics inversions of four bar and slide crank chain – kinematics analysis in simple mechanisms – velocity and acceleration diagram.

Module – II Kinematics of CAM **9**

Cam and followers - classifications - displacement diagrams - layout of cam profiles - derivatives of follower's motion.

Module – III Gears and Gear Trains **9**

Spur gear - law of toothed gearing - involute gearing - interchangeable gears - gear tooth action interference and undercutting - nonstandard teeth - gear trains - parallel axis gears trains - epicyclic gear trains.

Module – IV Friction **9**

Types of friction - friction drives - friction in screw threads - bearings - clutches - belt drives - rope drives.

Module – V Balancing **9**

Static and dynamic balancing - single and several masses in planes - balancing of revolving and reciprocating masses - primary balancing and concepts of secondary balancing – single and multi cylinder inline engines.

Total : 45 Periods

Text Books

1. Uicker, J.J., Pennock G.R and Shigley, J E., "Theory of Machines and Mechanisms", Oxford University Press, 2017
2. Cleghorn. W. L., Nikolai Dechev, "Mechanisms of Machines", Oxford University Press, 2015.

Reference Books

1. Amitabha Ghosh and Asok Kumar Mallick , - "Theory of Mechanisms and Machines", Affiliated East-West Pvt. Ltd., New Delhi, Third edition 2008.
2. "Theory of Machines and Mechanisms" by John J. Uicker Jr., Gordon R. Pennock, and Joseph E. Shigley. Published in August 2023.
3. "Mechanics of Machines" by Mohammad A. Omar, published in 2023

Additional References

1. https://nptel.ac.in/courses/112/104/112104121/
2. https://nptel.ac.in/courses/112/101/112101096/

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

Formative Assessment			
Blooms Taxonomy	Assessment Component	Marks	Total marks
Remember	Quiz	5	15
Understand	Assignment	5	
Apply			
	Attendance	5	

CHAIRMAN - BOARD OF STUDIES

Summative Assessment				
Bloom's Category	Internal Assessment Examinations (IAE) (40)			Final Examinations (FE)
	IAE – I (5)	IAE – II (10)	IAE – III (10)	(60)
Remember	20	10	10	14
Understand	30	20	20	50
Apply		20	20	36
Analyse				
Evaluate				
Create				

CHAIRMAN-BOARD OF STUDIES

23AE404	Manufacturing Technology	L	T	P	C
		3	0	0	3
Nature of Course	Engineering Science				
Pre requisites	NIL				

Course Objectives

The course is intended to

1. Study the sand mould casting and special casting processes
2. Learn various metal joining processes and applications.
3. Provide the information on machine tools and machining operations.
4. Rendering information on types of plastic and their forming processes.
5. Give knowledge on metal forming processes and powder metallurgy.

Course Outcomes

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

CO. No	Course Outcome	Bloom's Level
CO 1	Apply the knowledge on metal casting processes in the industry.	Understand
CO 2	Discuss the practices on welding equipment and its processes to join metals.	Understand
CO 3	Classify and explain the machine tools and machining operations.	Understand
CO 4	Explain the various types of plastics in industrial applications.	Understand
CO 5	Make out the principle of metal forming process and powder metallurgy.	Understand

Course Contents

Module – I Casting 9

Procedure to make sand mould, types of core making, special moulding processes - CO_2 moulding, shell moulding, investment moulding - Pressure die casting, centrifugal casting, continuous casting - casting defects

Module – II Welding 9

Classifications - Principles of Oxy-acetylene gas welding, Metal arc welding, resistance welding, submerged arc welding, tungsten inert gas welding, metal inert gas welding, plasma arc welding, Electron beam welding, laser beam welding - defects in welding - soldering and brazing.

Module – III Machining 9

Principles and operations - Lathe, Shaper, Milling, Drilling and Grinding machines, Capstan and Turret lathe, Basics of CNC machines. Principles and applications - Abrasive jet machining, Ultrasonic machining, Electric discharge machining Electro chemical machining, Plasma arc machining, Electron beam machining and Laser beam machining

Module – IV Forming and Shaping of Plastics 9

Classifications and characteristics of plastics. Moulding of Thermoplastics. Principles and applications - Injection moulding, Blow moulding Rotational moulding, Film blowing, Thermoforming, Processing of Thermosets. Principles and applications - Compression and Transfer moulding.

Module – V Metal Forming and Powder Metallurgy 9

Principles and applications - Forging, Rolling Extrusion, Wire drawing and Spinning, Powder metallurgy – 3D printing, advantages and limitations

Total : 45 Periods

Text Books

1. Hajra Choudhury, "Elements of Workshop Technology", Vol. I and II. Media Promoters and Publishers Pvt., Ltd., Mumbai, 2005.
2. Nagendra Parashar B.S. and Mittal R.K., "Elements of Manufacturing Processes", Prentice-Hall of India Private Limited, 2007.

Reference Books

1. Adithan. M and Gupta. A.B., "Manufacturing Technology", New Age, 2006.
2. "H.M.T. Production Technology – Handbook", Tata McGraw-Hill 2000
3. Jain. R K and S C Gupta, "Production Technology", Khanna Publishers. 16th Edition, 2001.
4. Roy. A. Linberg, "Process and Materials of Manufacture", PHI, 2000.
5. Serope Kalpajian, Steven R.Schmid, "Manufacturing Processes for Engineering Materials", Fourth Edition, Pearson Education, Inc. 2007.

Additional References

1. https://nptel.ac.in/content/storage2/courses/112105127/pdf/LM-02.pdf
2. http://home.iitk.ac.in/~vkjain/Lecture%205_AMP_MM_NF-200914.pdf
3. https://nptel.ac.in/courses/112/107/112107144/

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

Formative Assessment			
Blooms Taxonomy	Assessment Component	Marks	Total marks
Remember	Quiz	5	15
Understand	Assignment	5	
Apply			
	Attendance	5	

Summative Assessment				
Bloom's Category	Internal Assessment Examinations (IAE) (40)			Final Examinations (FE)
	IAE – I (5)	IAE – II (10)	IAE – III (10)	(60)
Remember	18	18	18	36
Understand	32	32	32	64
Apply				
Analyse				
Evaluate				
Create				

CHAIRMAN-BOARD OF STUDIES

23MA402	STATISTICAL AND NUMERICAL METHODS (Common to Aero, Agri, Civil, Food, Mech, PCT & S&F)	L	T	P	C
		3	0	2	4
Nature of Course	Basic Sciences				
Pre requisites	Foundations of Mathematics				

Course Objectives

The course is intended to

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

Course Outcomes

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

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

Course Contents:

Module – I	**TESTING OF HYPOTHESIS**	**9**
Sampling distributions – Estimation of parameters – Statistical hypothesis – Large sample tests based on Normal distribution for single mean and difference of means - Tests based on t for single mean and difference of means, Chi-square - Contingency table (test for independent) -Goodness of fit.		
Module – II	**DESIGN OF EXPERIMENTS**	**9**
One way and two way classifications – completely randomized design – Randomized block design – Latin square design.		
Module – III	**SOLUTION OF EQUATIONS AND EIGEN VALUE PROBLEMS**	**9**
Solution of linear system of equations – Gauss elimination method – Gauss Jordan method - Iterative methods of Gauss Jacobi method and Gauss Seidel method– Eigen values of a matrix by Power method		

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Module – IV	INTERPOLATION AND NUMERICAL INTEGRATION	9
Lagrange's interpolations - Newton's divided difference interpolations – Newton's forward difference and backward difference formulae – Numerical integration using Trapezoidal and Simpson's 1/3 rules.		
Module – V	**NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS**	**9**
Single step methods: Euler's method – Modified Euler's method – Fourth order Runge-Kutta method for solving first order equations – Multi step methods: Milne's predictor corrector methods for solving first order equations.		
		Total: 60 Periods

Text Books:

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

Reference Books:

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

Additional References:

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

Laboratory Components using MATLAB:

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

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

Total: 30 Periods

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

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

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

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23AE405	Aerodynamics	L	T	P	C
		3	0	1	4
Nature of Course	Professional Core (PC)				
Pre requisites	Fluid Mechanics and Machinery				

Course Objectives

The course is intended to

1. Know about the continuity, momentum and energy equations.
2. Study the basic flows and theorems.
3. Apply the conformal transformation to symmetrical and unsymmetrical airfoil.
4. Demonstrate the concept of lifting line theory and thin aero foil theory.
5. Discover the Navier-stokes and boundary layer equations

Course Outcomes

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

CO. No	Course Outcome	Bloom's Level
CO 1	Summarize the importance of three fundamental governing equations in aerodynamics.	Understand
CO 2	Interpret two-dimensional flows in aerodynamics and its combination.	Apply
CO 3	Relate Joukowski transformation and its application to fluid flow problems, Kutta condition and Blasius theorem.	Understand
CO 4	Articulate airfoil and wing theory to practical problems.	Apply
CO 5	Enumerate the real time viscous flow and boundary layer behaviour.	Understand

Course Contents

Module – I **Fundamental Equation of Aerodynamics** 9

Euler equation, incompressible Bernoulli's equation - Continuity, momentum and energy equations, streamline, stream function, irrotational flow, potential function, equipotential lines.

Module – II **Potential Flows** 9

Elementary flows – uniform parallel flow, Source, Sink, Doublet, Vortex, Their combinations, Ideal flows over a circular cylinder, Kutta joukowski theorem D Alembert Paradox, Starting vortex, Magnus effects.

Module – III **Aerofoil and Wing Theory** 9

Low speed aerodynamic characteristics of symmetric and cambered airfoil, Cauchy-riemann relations, complex potential, kutta joukowski transformation, Kelvin Circulation theorem, thin airfoil theory and its applications.

Module – IV **Theory of Finite Wings** 9

Vortex filament, biot-savart law, bound vortex, trailing vortex, horse shoe vortex, Lifting line theory and its limitations, lift and induced drag coefficients for elliptic lift distribution

Module – V **Boundary Layer Theory** 9

Boundary layer and boundary layer thickness, displacement thickness, momentum thickness, energy thickness, boundary layer equations for a steady two dimensional incompressible flow, boundary layer growth over a flat plate .

Total : 45 Periods

Laboratory Components

S. No.	Exercises	CO Mapping	Blooms Level
1.	Calibration of a Subsonic Wind tunnel	1	Apply
2.	Determination of lift for the given airfoil section.	1	Apply
3.	Pressure distribution over a smooth circular cylinder	1	Apply
4.	Pressure distribution over a rough circular cylinder.	2	Apply
5.	Pressure distribution over a symmetric aero foil.	2	Apply
6.	Pressure distribution over a cambered aero foil.	3	Apply
7.	Force measurement using wind tunnel balancing set up	4	Apply
8.	Flow over a flat plate at different angles of incidence.	4	Apply
9.	Flow visualization studies in low speed flows over cylinders.	5	Understand
10.	Flow visualization studies in low speed flows over airfoil with different angle of incidence	5	Understand

TOTAL: 30 PERIODS

Text Books

1. Anderson, J.D., "Fundamentals of Aerodynamics", McGraw Hill Book Co., 2017, 06th Edition 2018.
2. Houghton, E.L., and Carruthers, N.B., "Aerodynamics for Engineering students", Edward Arnold Publishers Ltd., London, 1989.

Reference Books

1. Ethirajan Rathakrishnan, "Theoretical Aerodynamics", 1st Edition, Wiley Publications, 2013.
2. L. J. Clancey, "Aerodynamics", Shroff Publications, 2006.

Additional References

1. https://www.edx.org/course/introduction-to-aerodynamics
2. NPTEL – http://nptel.ac.in/courses/112105171/1
3. NPTEL – https://nptel.ac.in/courses/112104118

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

Summative Assessment						
Bloom's Category	Continuous Assessment					Final Examinations (Theory) (50)
	Theory				Practical	
	IAE – I (5)	IAE – II (10)	IAE – III (10)	Attendance (5)	Rubric based CIA (20)	
Remember	18	10	10			10
Understand	32	20	20		50	58
Apply		20	20		50	32
Analyse						
Evaluate						
Create						

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23AE408	Propulsion Laboratory	L	T	P	C
		0	0	2	1
Nature of Course	Professional Core				
Pre requisites	Aero Engineering Thermodynamics				

Course Objectives

The course is intended to

1. Make the students to learn about the engine components
2. Introduce velocity profiles for free and wall jet experiments
3. Familiarize the students with cascade method of visualization
4. Learn the convention process through natural and forced methods

Course Outcomes

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

CO. No.	Course Outcome	Bloom's Level
CO 1	Summarize the piston engine and aircraft compressor	Understand
CO 2	Extend study on combustion chamber and turbine of an aircraft engine	Understand
CO 3	Determine the free and wall jet velocity profiles	Evaluate
CO 4	Measure cascade testing in the compressor blade	Evaluate
CO 5	Determine convention through natural and forced methods	Evaluate

Laboratory Components

S. No.	Exercises	CO Mapping	Blooms Level
1.	Study of aircraft piston engine	CO1	Understand
2.	Study of jet engine compressor	CO2	Understand
3.	Study of jet engine combustion chamber	CO2	Understand
4.	Study of jet engine turbine	CO2	Understand
5.	Velocity profiles of free jets	CO3	Evaluate
6.	Velocity profiles of wall jets	CO3	Evaluate
7.	Cascade testing of compressor blades	CO4	Evaluate
8.	Determination of heat transfer coefficient under natural convection	CO5	Evaluate
9.	Determination of heat transfer coefficient under forced convection	CO5	Evaluate
10.	Performance test of propeller	CO5	Evaluate

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS

S. No.	Name of the equipment	Quantity	Experiment No.
1.	Piston engine	1	1
2.	Jet engine	1	2,3,4
3	Free jet apparatus	1	5
4.	Wall jet apparatus	1	6
5.	Subsonic wind tunnel	1	7
6.	Natural Convection apparatus	1	8
7.	Forced Convection apparatus	1	9
8.	Propeller test apparatus	1	10

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

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

Assessment based on Continuous and Final Examination

Bloom's Level	Continuous Assessment (60 marks) (Attendance – 5 marks)		Final Examination [40 marks]
	Rubric based Continuous Assessment [30 marks]	Model Examination [25 marks]	
Remember			
Understand	40	40	40
Apply			
Analyze			
Evaluate	60	60	60
Create			

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23MC003	INTERPERSONAL SKILLS (Common to all B.E. / B.Tech Programme)	L	T	P	C
		0	0	2	0
Nature of Course	Mandatory – Non Credit				
Pre requisites	Nil				

Course Objectives

The course is intended to

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

Course Outcomes

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

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

Course Contents

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

Module – V	**ESSENTIAL INTERPERSONAL COMPETENCIES**	6
Behaviour - understanding limiting behaviour - Interpersonal and small and lateral thinking-Win -Win attitude - Positive thinking - Stress feedback - Personal Evaluation of Interpersonal Relationship Skills group behavior - Critical management - Assertive		
		Total : 30 Periods

Text Books

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

Reference Books

1. Augsburger, David, “Caring Enough to Confront How to Understand and Express Your Deepest Feelings Towards Others”, updated ed Ventura, CA: Regal Books, 2nd Edition 2009.
2. Vohs, Kathleen D., and Eli J., Finkel, eds, “Self and Relationships: Connecting Intrapersonal and interpersonal Processes”. New York Guilford Press, 1st Edition, 2006.

Web References:

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

Laboratory Components:

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

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

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

23MC004	INDIAN CONSTITUTION (Common to all B.E. / B.Tech Programme)	L	T	P	C
		2	0	0	0
Nature of Course	Mandatory Course				
Pre requisites	Fundamentals of Indian Constitution				

Course Objectives

The course is intended to

1. Know about the basic structure with the key elements of the Indian Constitution.
2. Enable students to grasp the Fundamental Rights, Directive Principles of State Policy and Fundamental Duties of our constitution.
3. Promote the students about our Union Government, political structure and their functions.
4. Prepare the students with the Indian judiciary and Election systems.
5. Learn the State Legislature, State politics and State planning commission in India.
6. Study the powers and functions of various constitutional offices and institutions.

Course Outcomes

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

CO.No	Course Outcome	Bloom's Level
CO 1	Utilize the basic structure of Indian Constitution in real life situation.	Understand
CO 2	Relate their Fundamental Rights, DPSP's and Fundamental Duties (FD's) of our constitution.	Understand
CO 3	Compare the Union Government, political structure and their powers and functions.	Understand
CO 4	Outline about our Indian Judiciary, Election Commission and Amendments.	Understand
CO 5	Summarize the power and functions of State Legislature.	Understand
CO 6	Realise the significance of the constitution and appreciate the role of constitution and citizen oriented measures in a democracy.	Understand

Course Contents

Module – I	INTRODUCTION TO INDIAN CONSTITUTION	6
The Historical background - Meaning of the term Indian Constitution - Necessity of the Constitution - Societies before and after the Constitution adoption - Introduction to the Indian constitution - Making of the Constitution, Role of the Constituent Assembly.		
Module – II	**FUNDAMENTAL RIGHTS**	**6**
Salient features of India Constitution - Preamble of Indian Constitution & Key concepts of the Preamble - Fundamental Rights (FR's) - its Restriction and limitations in different Complex Situations - Directive Principles of State Policy - its present relevance in Indian society - Fundamental Duties - its Scope and significance in Nation.		

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Module – III	UNION GOVERNMENT	6
Union Government – Union legislature – Lok sabha – Rajya sabha (with powers and functions) -Union Executive – President (with powers and functions), Prime Minister (with powers and functions), Union Cabinet.		
Module – IV	**INDIAN JUDICIARY AND ELECTION COMMISSION**	**6**
Structure of Judicial System in India - Supreme Court - High Courts - District Courts - Role of Judiciary in India - Judicial Reviews and Judicial Activism. Elections & Electoral Process. Amendment to Constitution, and Important Constitutional Amendments till today.		
Module – V	**STATE LEGISLATURE**	**6**
Organization and Composition of State Legislature - Legislative Council - Composition of the Council - Composition of the Assembly - Qualifications for the Houses - Legislative Assembly - Duration of State Legislature - Duration of Assembly - Duration of Council.		
		Total : 30 Periods

Text Books

1. Durga Das Basu, Introduction to the Constitution of India, Gurgaon; LexisNexis, (23rd edn.) 2018
2. J.N. Pandey, The Constitutional Law of India, Allahabad; Central Law Agency,(55th edn.) 2018.
3. P.M Bakshi, Constitution of India, Universal Law Publishing House, NewDelhi, 1999.

Reference Books

1. Constitution of India, Professional Ethics and Human Rights" by Shubham Singles, Charles E. Haries, and et al: published by Cengage Learning India, Latest Edition – 2019.
2. KB Merunandan, Bharatada Samvidhana Ondu Parichaya, Bangalore, Meragu Publications, 2015
3. K.Sharma, Introduction to the Constitution of India, Prentice Hall of India, NewDelhi, 2002.

Web References:

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

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

Formative assessment			
Bloom's Level	Continuous Assessment (IAE)		Total marks
	Assessment component	Marks	
Remember	Online Quiz	20	50
Understand	Tutorial class/Assignment	25	
	Attendance	5	

Summative assessment			
Bloom's Level	Continuous Assessment (IAE)		
	Theory Marks		
	IAE-I [10]	IAE-II [20]	IAE-III [20]
Remember	20	10	10
Understand	30	20	20
Apply		20	20
Analyse			
Evaluate			
Create			

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

Course Objectives

The course is intended to

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

Course Outcomes

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

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

Course Contents

Module – I	INTRODUCTION TO YOGA	6
Foundations of Yoga - History and Development of Yoga - Etymology and Definitions, Misconceptions, Aim and Objectives of Yoga, True Nature and Principles of Yoga - Introduction to Vedas – Upanishads - Prasthanatrayee - Purushartha Chatushtaya.		
Module – II	**POSTURES (ASANA)**	**6**
Trikonasana - Ardha-Kati – Chakrasana – Tadasana - Vrikshasana - Padmasana, Simhasana - Paschimottanasana, Uttanpadasana – Salabhasana - Shavasana Pawanmuktasana - Anti-Rheumatic Series - Digestive / Abdominal Group - Energy Bock Series - Back Strengthening Exercises - Sun Salutation (Surya Namaskar) - Classical Sequence.		
Module – III	**BREATHING**	**6**
The Foundations - Abdominal Breathing - Thoracic (mid-chest) breathing - Clavicular (upper chest breathing) - The Complete Yoga Breath. Pranayama Techniques - Breathing Ratios - Nadi Shodhana (Alternate Nostril Breathing) - Ujjayi (the 'whispering breath' or the 'psychic breath') - Bhramari (Humming Bee breath).		

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

Text Books

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

Reference Books

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

Web References:

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

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

CHAIRMAN-BOARD OF STUDIES

23MC006	SOFT SKILLS (Common to all B.E. / B.Tech Programme)	L	T	P	C
		0	0	2	0
Nature of Course	Mandatory Course				
Pre requisites	Nil				

Course Objectives

The course is intended to

1. Improve language skills in personal and professional life.
2. Equip students with the vital communication and soft skills to succeed in the highly competitive international arena.
3. Focus on the fundamental soft skills and of their practical social and work place usage.
4. Learn to identify and overcome the barriers in interpersonal relationships.
5. Enhance employability skills and ensure career success.

Course Outcomes

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

CO.No	Course Outcome	Bloom's Level
CO 1	Relate the significance and fundamental nature of soft skills.	Remember
CO 2	Take part in a wide range of Public speaking and professional group discussions.	Understand
CO 3	Plan one's time effectively and productively, especially at work.	Apply
CO 4	Make use of leadership skills to manage stress &conflict.	Apply
CO 5	Organize presentation effectively and participate in interview with confidence.	Apply

Course Contents

Module – I	INTRODUCTION TO SOFT SKILLS AND INTERPERSONAL COMMUNICATION	6
An Introduction – Definition and Significance of Soft Skills; Interpersonal communication-types of interpersonal communication.		
Module – II	**PUBLIC SPEAKING AND ORAL COMMUNICATION SKILLS**	**6**
Public Speaking: Skills, Methods, Strategies Group Discussion: Importance, Planning, Elements.		
Module – III	**TIME MANAGEMENT AND PERSONALITY DEVELOPMENT**	**6**
Time Management – concepts and essentials tips. Personality-development – meaning, SWOT analysis & goal setting- Stress and conflict management.		
Module – IV	**LEADERSHIP SKILLS AND EMOTIONAL INTELLIGENCE**	**6**
Leadership skills: Concept of Leadership and honing Leadership Skills- Problem-Solving Skills - Group and Ethical Decision-Making. Emotional Intelligence: Strategies to enhance Emotional Intelligence.		

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Module – V	INTERVIEW SKILLS	6
Interviewer - Interviewee perspectives - Self Introduction and Presentation: Types. Content and Essential Tips–before, during and after a presentation, Overcoming Nervousness - Mock Interview.		
		Total : 30 Periods

Text Books

1. Managing Soft Skills for Personality Development–edited by B.N.Ghosh, McGraw Hill India, 2018.
2. Petes S. J., Francis. Soft Skills and Professional Communication. New Delhi: Tata McGraw-Hill Education, 2011.
3. English and Soft Skills–S.P. Dhanavel, Orient Black swan India, 2017.

Reference Books

1. Soft Skill Business and Professional Communication Book by Sutapa Banerjee,2016.
2. Communication Skills Book by PushpLata and Sanjay Kumar,2015.
3. Klaus, Peggy, Jane Rohman & Molly Hamaker. The Hard Truth about Soft Skills. London: HarperCollins E-books, 2007

Web References:

1. https://nptel.ac.in/courses/109/107/109107121/
2. https://onlinecourses.nptel.ac.in/noc22_hs77/preview
3. https://onlinecourses.nptel.ac.in/noc21_hs76/preview

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

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

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

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