MAHENDRA ENGINEERING COLLEGE
Autonomous| Accredited by NAAC with 'A++' Grade (Cycle-2)
Accredited by NBA Tier-I (WA) UG : CSE, ECE, EEE
Mahendhirapuri, Mallasamudram (W), Namakkal (Dt) - 637 503, Tamil Nadu
04288-288 500 / 521 / 522 | www.mahendra.info

DEPARTMENT OF MECHATRONICS ENGINEERING

B.E. MECHATRONICS ENGINEERING

CURRICULUM

REGULATION-2024

CHOICE BASED CREDIT SYSTEM (CBCS)

MAHENDRA ENGINEERING COLLEGE

(AUTONOMOUS)

MALLASAMUDRAM WEST, TAMIL NADU – 637503.

DEPARTMENT OF MECHATRONICS ENGINEERING

Regulation 2024							
I Semester							
Sl. No.	**Course Code**	**Course Title**	**Category**	**L**	**T**	**P**	**C**
THEORY							
1	24MA12101	Engineering Mathematics–I	BS	3	1	0	4
2	24CY12001	Engineering Chemistry	BS	3	0	0	3
3	24HS11001	Communicative English	HS	3	0	0	3
4	24GE13101	Engineering Graphics	ES	3	0	0	3
5	24HS11002	Heritage of Tamils	HS	1	0	0	1
		Induction Program	MC	-	-	-	-
PRACTICAL							
6	24CY22001	Chemistry Laboratory	BS	0	0	3	1.5
7	24HS21001	Personality Development Practice Laboratory	HS	0	0	3	1.5
8	24GE23101	Computer Aided Drafting and Modeling Laboratory	ES	0	0	3	1.5
		TOTAL		**13**	**1**	**9**	**18.5**

Dr. T.JESUDAS, M.E., Ph.D
Professor and Head
Department of Mechatronics
Mahendra Engineering College
Mallasamudram, Namakkal

DEPARTMENT OF MECHATRONICS ENGINEERING

Regulation 2024							
II Semester							
Sl. No.	**Course code**	**Course Title**	**Category**	**L**	**T**	**P**	**C**
THEORY							
1	24MA12201	Engineering Mathematics– II	BS	3	1	0	4
2	24PY12001	Engineering Physics	BS	3	0	0	3
3	24CS13001	Problem Solving Techniques using C	ES	3	0	0	3
4	24EE13001	Basics of Electrical & Electronics Engineering	ES	3	0	0	3
5	24GE13201	Engineering Mechanics	ES	3	0	0	3
6	24HS11003	Tamils and Technology	HS	1	0	0	1
PRACTICAL							
7	24PY22001	Physics Laboratory	BS	0	0	3	1.5
8	24CS23001	Problem Solving Techniques using C Laboratory	ES	0	0	3	1.5
9	24GE23201	Engineering Practices Lab	ES	0	0	3	1.5
		TOTAL		**16**	**1**	**9**	**21.5**

Dr. T.JESUDAS, M.E., Ph.D
Professor and Head
Department of Mechatronics
Mahendra Engineering College
Mallasamudram, Namakkal

DEPARTMENT OF MECHATRONICS ENGINEERING

Regulation 2024							
III Semester							
Sl. No.	**Course code**	**Course Title**	**Category**	**L**	**T**	**P**	**C**
THEORY							
1	24MA12301	Transforms and Partial Differential Equations	BS	3	1	0	4
2	24MT14301	Strength of Materials for Mechatronics	PC	3	0	0	3
3	24MT14302	Kinematics of Machinery	PC	3	0	0	3
4	24MT14303	Fundamentals of Fluid Mechanics and Machinery	PC	3	0	0	3
5	24MT14304	Electrical Drives and Controls	PC	3	0	0	3
5		Open Elective - 1	OE	3	0	0	3
6	24CY11001	Environmental Science and Sustainability	MC	3	-	-	-
PRACTICAL							
7	24MT24301	Strength of Materials Laboratory	PC	0	0	3	1.5
8	24MT24302	Fluid Mechanics and Machinery Laboratory	PC	0	0	3	1.5
9	24MT24303	Electrical Machines and Drives Laboratory	PC	0	0	3	1.5
		TOTAL		**18**	**1**	**9**	**23.5**

Dr. T.JESUDAS, M.E., Ph.D
Professor and Head
Department of Mechatronics
Mahendra Engineering College
Mallasamudram, Namakkal

DEPARTMENT OF MECHATRONICS ENGINEERING

Regulation 2024							
IV Semester							
Sl. No.	**Course code**	**Course Title**	**Category**	**L**	**T**	**P**	**C**
THEORY							
1	24MA12401	Numerical Methods	BS	3	1	0	4
2	24MT14401	Dynamics of Machinery	PC	3	0	0	3
3	24MT14402	Applied Hydraulics and Pneumatics	PC	3	0	0	3
4		Open Elective – 2	OE	3	0	0	3
5		Open Elective – 3	OE	3	0	0	3
6	24SH11006	Universal Human Values	HS	2	1	0	3
PRACTICAL							
7	24MT24401	Dynamics Laboratory	PC	0	0	3	1.5
8	24MT24402	Automation Laboratory	PC	0	0	3	1.5
9	24HS21002	Professional Communication Skills	EEC	0	1	2	2
		TOTAL		**17**	**3**	**8**	**24**

Dr. T.JESUDAS, M.E., Ph.D
Professor and Head
Department of Mechatronics
Mahendra Engineering College
Mallasamudram, Namakkal

DEPARTMENT OF MECHATRONICS ENGINEERING

Regulation 2024							
V Semester							
Sl. No.	**Course code**	**Course Title**	**Category**	**L**	**T**	**P**	**C**
THEORY							
1	24MT14501	Micro Electro Mechanical Systems	PC	3	0	0	3
2	24MT14502	Microprocessor and Microcontroller	PC	3	0	0	3
3		Professional Elective – 1	PE	3	0	0	3
4		Open Elective – 4	OE	3	0	0	3
5		Open Elective – 5	OE	3	0	0	3
6	24MC60001	Constitution of India	MC	3	-	-	-
PRACTICAL							
7	24MT24501	Microprocessor and Microcontroller Laboratory	PC	0	0	3	1.5
8	24EN60002	Interview Skills and Soft Skills	EEC	0	1	2	2
9	24MT34501	Internship	EEC	0	0	2	1
		TOTAL		**18**	**1**	**7**	**19.5**

Dr. T.JESUDAS, M.E., Ph.D
Professor and Head
Department of Mechatronics
Mahendra Engineering College
Mallasamudram, Namakkal

DEPARTMENT OF MECHATRONICS ENGINEERING

Regulation 2024							
VI Semester							
Sl. No.	**Course code**	**Course Title**	**Category**	**L**	**T**	**P**	**C**
THEORY							
1	24MT14601	Design of Mechatronics System	PC	3	0	0	3
2	24MT14602	Programmable Logic Controller	PC	3	0	0	3
3	24MT14603	Control System	PC	3	0	0	3
4	24MT14604	Virtual Instrumentation	PC	3	0	0	3
5		Professional Elective –2	PE	3	0	0	3
6	24MBAT6S06	Managerial Skills and Quality Management	EEC	3	0	0	3
PRACTICAL							
7	24MT24601	PLC Laboratory	PC	0	0	3	1.5
8	24MT24602	Virtual Instrumentation Laboratory	PC	0	0	3	1.5
9	24MT34601	Mini Project	EEC	0	0	4	2
		TOTAL		**18**	**0**	**10**	**23**

Dr. T.JESUDAS, M.E., Ph.D
Professor and Head
Department of Mechatronics
Mahendra Engineering College
Mallasamudram, Namakkal

DEPARTMENT OF MECHATRONICS ENGINEERING

Regulation 2024							
VII Semester							
Sl. No.	**Course code**	**Course Title**	**Category**	**L**	**T**	**P**	**C**
THEORY							
1	24MT14701	Industrial Robotics	PC	3	0	0	3
2	24MT14702	Embedded Systems	PC	3	0	0	3
3	24MT14703	CNC Technology	PC	3	0	0	3
4		Professional Elective – 3	PE	3	0	0	3
5		Professional Elective– 4	PE	3	0	0	3
PRACTICAL							
6	24MT24701	Robotics Laboratory	PC	0	0	3	1.5
7	24MT24702	CAD / CAM Laboratory	PC	0	0	3	1.5
8	24MT34701	Project work Phase – I	EEC	0	0	6	3
		TOTAL		**15**	**0**	**12**	**21**

Dr. T.JESUDAS, M.E., Ph.D
Professor and Head
Department of Mechatronics
Mahendra Engineering College
Mallasamudram, Namakkal

DEPARTMENT OF MECHATRONICS ENGINEERING

Regulation 2024							
VIII Semester							
Sl. No.	**Course code**	**Course Title**	**Category**	**L**	**T**	**P**	**C**
THEORY							
1		Professional Elective - 5	PE	3	0	0	3
2		Professional Elective - 6	PE	3	0	0	3
PRACTICAL							
3	24MT34801	Project work Phase – II	EEC	0	0	12	6
		TOTAL		**6**	**0**	**12**	**12**

Dr. T.JESUDAS, M.E., Ph.D
Professor and Head
Department of Mechatronics
Mahendra Engineering College
Mallasamudram, Namakkal

DEPARTMENT OF MECHATRONICS ENGINEERING

SUBJECT CATEGORY	CREDITS AS PER SEMESTER								Credit Total	% of Credits (Actual Credits / Total Credits)
	I	II	III	IV	V	VI	VII	VIII		
HS	5.5	1	-	3	-	-	-	-	9.5	**5.83**
BS	8.5	8.5	4	4	-	-	-	-	25	**15.34**
ES	4.5	12	-	-	-	-	-	-	16.5	**10.12**
PC	-	-	16.5	9	7.5	15	12	-	60	**36.81**
PE	-	-	-	-	3	3	6	6	18	**11.04**
OE	-	-	3	6	6	-	-	-	15	**9.20**
EEC	-	-	-	2	3	5	3	6	19	**11.66**
Total	**18.5**	**21.5**	**23.5**	**24**	**19.5**	**23**	**21**	**12**	**163**	**100**

Legends Used:

1. HS-Humanities and Social Sciences
2. BS-Basic Sciences
3. ES- Engineering Sciences
4. PC-Professional Core
5. PE-Program Elective
6. OE-Open Elective
7. EEC – Employability Enhancement Course
8. MC– Mandatory Course

Dr. T.JESUDAS, M.E., Ph.D
Professor and Head
Department of Mechatronics
Mahendra Engineering College
Mallasamudram, Namakkal

DEPARTMENT OF MECHATRONICS ENGINEERING

S. No.	Category of courses		No. of credits
1	Humanities and Social Sciences including Management courses	HS	9.5
2	Basic Science courses	BS	25
3	Engineering Science courses including workshop, drawing, basics of electrical / mechanical / computer etc	ES	16.5
4	Professional core courses	PC	60
5	Program Elective courses relevant to chosen specialization/branch	PE	18
6	Open subjects – Electives from other technical and /or emerging subjects	OE	15
7	Project work, seminar and internship in industry or elsewhere	EEC	19
	Total		**163**

Dr. T.JESUDAS, M.E., Ph.D
Professor and Head
Department of Mechatronics
Mahendra Engineering College
Mallasamudram, Namakkal

DEPARTMENT OF MECHATRONICS ENGINEERING

PROFESSIONAL ELECTIVES

Sl. No.	Subject Code	Subject Name	Category	Contact Periods	L	T	P	C
1	24MT15001	Additive Manufacturing	PE	3	3	0	0	3
2	24MT15002	Digital Electronics	PE	3	3	0	0	3
3	24MT15003	Sensors and Signal Processing	PE	3	3	0	0	3
4	24MT15004	Computer Aided Design	PE	3	3	0	0	3
5	24MT15005	Agriculture in Automation	PE	3	3	0	0	3
6	24MT15006	Machine Vision and Image Processing	PE	3	3	0	0	3
7	24MT15007	Artificial Intelligence	PE	3	3	0	0	3
8	24MT15008	Engineering Economics and Cost Analysis	PE	3	3	0	0	3
9	24MT15009	Engineering Materials and Metallurgy	PE	3	3	0	0	3
10	24MT15010	Product Design and Development	PE	3	3	0	0	3
11	24MT15011	Safety Engineering	PE	3	3	0	0	3
12	24MT15012	Power Electronics	PE	3	3	0	0	3
13	24MT15013	Smart Manufacturing	PE	3	3	0	0	3
14	24MT15014	Computer Integrated Manufacturing	PE	3	3	0	0	3
15	24MT15015	Automotive Electronics	PE	3	3	0	0	3
16	24MT15016	Industrial Automation	PE	3	3	0	0	3
17	24MT15017	Medical Mechatronics	PE	3	3	0	0	3
18	24MT15018	Mobile Robotics	PE	3	3	0	0	3
19	24MT15019	Maintenance Engineering	PE	3	3	0	0	3
20	24MT15020	Entrepreneurship Development	PE	3	3	0	0	3
21	24MT15021	Quality Control and Reliability	PE	3	3	0	0	3

Dr. T.JESUDAS, M.E., Ph.D
Professor and Head
Department of Mechatronics
Mahendra Engineering College
Mallasamudram, Namakkal

DEPARTMENT OF MECHATRONICS ENGINEERING

		Engineering						
22	24MT15022	Renewable and Non-Renewable Energy Resources	PE	3	3	0	0	3
23	24MT15023	Building Automation	PE	3	3	0	0	3
24	24MT15024	Modeling and Simulation	PE	3	3	0	0	3

Dr. T.JESUDAS, M.E., Ph.D
Professor and Head
Department of Mechatronics
Mahendra Engineering College
Mallasamudram, Namakkal

DEPARTMENT OF MECHATRONICS ENGINEERING

Regulation 2024							
I Semester							
Sl. No.	**Course Code**	**Course Title**	**Category**	**L**	**T**	**P**	**C**
THEORY							
1	24MA12101	Engineering Mathematics– I	BS	3	1	0	4
2	24CY12001	Engineering Chemistry	BS	3	0	0	3
3	24HS11001	Communicative English	HS	3	0	0	3
4	24GE13101	Engineering Drawing	ES	3	0	0	3
5	24HS11002	Heritage of Tamils	HS	1	0	0	1
		Induction Program	MC	-	-	-	-
PRACTICAL							
6	24CY22001	Chemistry Laboratory	BS	0	0	3	1.5
7	24HS21001	Personality Development Practices Laboratory	HS	0	0	2	1
8	24GE23101	Computer Aided Drafting and Modeling Laboratory	ES	0	0	3	1.5
		TOTAL		**13**	**1**	**8**	**18**

Dr. T.JESUDAS, M.E., Ph.D
Professor and Head
Department of Mechatronics
Mahendra Engineering College
Mallasamudram, Namakkal

DEPARTMENT OF MECHATRONICS ENGINEERING

Syllabus						Regulations 2024	
Department	**MATHEMATICS**		**Programme Code**			**1101**	
I SEMESTER							
Course code	**Course Name**	**Hours/week**				**Credit**	**Maximum marks**
		L	**T**	**P**		**C**	
24MA12101	**ENGINEERING MATHEMATICS-I (Common to all Branches)**	3	1	0		4	**100**
Objectives	To enable the students to: • Learn the types of matrices and linear algebra in a comprehensive manner. • Familiarize with functions of several variables and its applications to engineering. • Define the geometric aspects of curvature, radius of curvature, evolutes and envelopes as application of differential calculus. • Explain various techniques of integration. • Learn double and triple integrals and give their representation as area and volume.						
Outcomes	At the end of the course the students will be able to: • Determine the rank of a matrix, eigen values, eigen vectors and inverse of a given matrix and diagonalize symmetric matrix by orthogonal transformations, solve system of linear equations. • Determine maxima and minima of functions of several variables. • Apply the concepts of differential calculus in physical problems. • Apply different methods of integration in solving practical problems. • Compute the area and volume by using multiple integrals.						
UNIT – I	**MATRICES**						**9+3**
Matrix and its types – Rank of matrix –Solving system of linear equations - Characteristic equation – Eigen values and Eigenvectors of the matrix - Cayley-Hamilton Theorem, Diagonalization of real and symmetric matrices by Orthogonal transformation– Reduce the quadratic form to canonical form.							
UNIT – II	**DIFFERENTIAL CALCULUS OF SEVERAL VARIABLES**						**9+3**
Differentiation of implicit functions – Partial derivatives – Total derivative – Euler's theorem – Jacobian and properties – Taylor's series for functions of two variables – Maxima and minima of functions of two variables – Lagrange's method of undetermined multipliers.							

Dr. T.JESUDAS, M.E., Ph.D
Professor and Head
Department of Mechatronics
Mahendra Engineering College
Mallasamudram, Namakkal

UNIT – III	**APPLICATIONS OF DIFFERENTIAL CALCULUS**	**9+3**
Curvature in Cartesian co-ordinates – Centre and radius of curvature – Circle of curvature – Evolutes – Envelopes – Evolute as envelope of normals and their properties.		
UNIT – IV	**INTEGRAL CALCULUS**	**9+3**
Definite and Indefinite integrals – Substitution rule – Techniques of Integration: Integration by parts, Trigonometric integrals, Trigonometric substitutions, Integration of rational functions by partial fraction, Integration of irrational functions - Improper integrals – Applications to Engineering problems.		
UNIT – V	**MULTIPLE INTEGRALS**	**9+3**
Double integrals in Cartesian co-ordinates – Change of order of integration – Area as double integral – Triple integral in Cartesian co-ordinates – Volume as triple integral – Change of variables in double integrals. Applications to Engineering problems.		
	Total	**(L:45+T:15):60Periods**

TEXT BOOK:	
1	B.S.Grewal, Higher Engineering Mathematics, Khanna Publishers, 2017.
2	James Stewart, Calculus with Early Transcendental function, Cengage, 2013.
REFERENCES:	
1	Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons, 2016.
2	RayWylie, Louis C.Barrett, Advanced Engineering Mathematics, Mc Graw-Hill, 2013.
3	Ben Or lin, Change is the Only Constant: The Wisdom of Calculus in a Madcap World, Pearson 2018.

Dr. T.JESUDAS, M.E., Ph.D
Professor and Head
Department of Mechatronics
Mahendra Engineering College
Mallasamudram, Namakkal

DEPARTMENT OF MECHATRONICS ENGINEERING

I SEMESTER						
COURSE CODE	**COURSE NAME**	**HOURS/WEEK**			**CREDIT**	**MAXIMUM MARKS**
		L	**T**	**P**	**C**	
24CY12001	**ENGINEERING CHEMISTRY**	3	0	0	3	**100**
Objectives	To make the students familiar with: 1. The treatment of water used for domestic and industrial purpose. 2. Various types of polymers in our day today life. 3. The basic principle and preparation methods of Nano materials. 4. The Construction and applications of different types of batteries. 5. The preparation, properties and combustion method of fuels.					
Outcomes	At the end of the course the student will be able to 1. Explain the various water quality parameters and their treatments for domestic and industrial applications. 2. Classify the reaction mechanism, synthesis and application of polymers. 3. Develop the essential concepts of nano science and nanotechnology in designing the nano material for Engineering. 4. Compare the working principles of batteries and super capacitors. 5. Illustrate the suitable fuels for engineering processes and applications.					
UNIT-I	**WATER TECHNOLOGY**					9 Hrs
Types of water- Alkalinity, types and determination- Hardness, types and Estimation by EDTA method. Domestic water treatment – disinfection methods (Chlorination, ozonation, UV treatment) – Boiler feed water – requirements – Decreased efficiency of using hard water in boilers – external conditioning – demineralization process, Electro dialysis process, reverse osmosis - Internal conditioning (phosphate, calgon and carbonate conditioning methods) – Conservation of Water using 3R method– WHO and BIS guidelines for drinking water.						
UNIT-II	**POLYMER CHEMISTRY**					9 Hrs
Introduction - Classification of polymers – Natural and synthetic - Thermoplastic and Thermosetting - Functionality – Degree of polymerization - Types and mechanism of polymerization: Addition (Free Radical); condensation and copolymerization - Preparation, properties & applications of selected commodity and engineering polymers (Polyester, Polystyrene, PVC, Nylon, Teflon, Bakelite and Epoxy resin).						

Dr. T.JESUDAS, M.E., Ph.D
Professor and Head
Department of Mechatronics
Mahendra Engineering College
Mallasamudram, Namakkal

UNIT-III	**NANOCHEMISTRY**	9 Hrs
Basic - Distinction between molecules, nano particles and bulk materials - size-dependent properties (optical, electrical, mechanical and magnetic) - Types of nano materials: Definition, properties and uses of –nano particles , nano cluster, nano rod, nano tube and nano wire - Synthesis of nano materials: laser ablation, Sol gel, Synthesis of Carbon nano tubes by CVD Method- SWCNT and MWCNT- Applications (Medicine, Agriculture and Electronics).		
UNIT-IV	**ENERGY STORAGE DEVICE**	9 Hrs
Types of batteries - Primary battery - dry cell - Secondary battery - Construction and application of lead acid battery and Lithium ion batteries – Battery used in EV application – Nuclear energy – Fission and Fusionreactions –Light water nuclear reactor for power generation(block diagram only) - Fuel cell (H_2-O_2) - Super Capacitors.		
UNIT-V	**FUELS AND COMBUSTION**	9 Hrs
Introduction - classification of fuels - Coal - analysis of coal (proximate and ultimate) - carbonization - manufacture of metallurgical coke (Otto Hoffmann method) - Petroleum - manufacture of synthetic petrol (Bergius process) - calorific value - higher and lower calorific values- theoretical calculation of calorific value - ignition temperature - spontaneous ignition temperature - flue gas analysis (ORSAT Method).		
	TOTAL	**45 Hrs**

TEXT BOOK :

1.	Jain P.C. and Monica Jain, “Engineering Chemistry”, Dhanpat Rai Publishing Company (P) Ltd., New Delhi, 2022.
2.	Kannan P., Ravikrishnan A., “Engineering Chemistry”, Sri Krishna Hi-tech Publishing Company Pvt. Ltd. Chennai, 2021.
3.	Dara S.S, Umare S.S, “Engineering Chemistry”, S. Chand & Company Ltd., New Delhi 2019.
4.	Lindsay S.M., “Introduction to Nano science” Oxford University, 2009.

REFERENCES

1.	Dr.C.K.Charles and Dr.G.Ramachandran, “Applied Chemistry”, CARS Publishers, Chennai,2015.
2.	Sivasankar B., “Engineering Chemistry”, Tata McGraw-Hill Publishing Company, Ltd., New Delhi, 2012.
3.	Linden’s “Handbook of Batteries”, Thomas B. Reddy, Fourth Edition McGraw-Hill, New York, 2011.
4.	Shikha Agarwal, ”Engineering Chemistry-Fundamental and Application”, Cambridge University press, Delhi, Second Edition,2019.

Dr. T.JESUDAS, M.E., Ph.D
Professor and Head
Department of Mechatronics
Mahendra Engineering College
Mallasamudram, Namakkal

DEPARTMENT OF MECHATRONICS ENGINEERING

SYLLABUS - REGULATION - 2024

SEMESTER – I (Non-Circuit Branches)

Course Code	Course Name	Hours / Week			Credit	Maximum Marks
		L	T	P	C	
24HS11001	**COMMUNICATIVE ENGLISH** (Common to all B.E/B.Tech Degree Programmes)	3	0	0	3	100

Objectives	➢ To help learners to improve their knowledge of grammar ➢ To enable them to use vocabulary appropriately in different academic and professional contexts ➢ To support learners to acquire listening and speaking skills ➢ To facilitate them to develop their reading skills by familiarizing different types of reading strategies ➢ To equip them with writing skills needed for academic as well as professional context
Outcomes	At the end of the course, the learners will be able to • Develop listening and reading skills and comprehend the academic articles in English • Develop vocabulary skills and use words appropriately in different academic contexts. • Analyze and interpret the data with correct usage of grammar • Demonstrate effective LSRW skills with emerging technology • Create strong communication skills in both personal and professional life

UNIT I	**9 Hrs**

stening- Listening to Short Conversations (Formal and Informal)
eaking – Introducing Oneself and Others
ading – Skimming and Scanning-Reading Comprehension Passages and Answering Multiple Choice Questions
riting - Leave/On Duty application, Bonafide Certificate-requisition, Check list, Instructions
rammar & Vocabulary – Parts of Speech, Articles, Prefixes and Suffixes

UNIT II	**9 Hrs**

Listening – Listening to Telephonic Conversations
Speaking –Word Building Activity
Reading – Short stories
Writing- Recommendations, Composing E-Mail(Formal & Informal), Letter Writing- Letter to the Editor
Grammar & Vocabulary – Sentence Pattern, Tenses, British Terms and American Equivalents

Dr. T.JESUDAS, M.E., Ph.D
Professor and Head
Department of Mechatronics
Mahendra Engineering College
Mallasamudram, Namakkal

UNIT III	**9 Hrs**
Listening - Listening to TED Talks and Note taking **Speaking** – Role Play **Reading** –Cloze Reading and Fill up the Gaps **Writing** - Letter Writing – Permission Letter (In-Plant Training/Industrial Visit), Business letters- Calling for Quotation and Placing Order **Grammar & Vocabulary** – Modal Verbs, Voice- Active Voice, Passive Voice and Impersonal Passive, Numerical Expressions	
UNIT IV	**9 Hrs**
Listening - Listening to Audio Lectures **Speaking** – Taking part in Casual Conversation **Reading** - Reading Advertisements **Writing** – Poster Making, and Job Application **Grammar & Vocabulary** – Cause and Effect Expressions, Question tags, Gerunds and Infinitives, One word substitution	
UNIT V	**9 Hrs**
Listening – Listening to Academic lectures **Speaking** – Describing Objects **Reading** – Transcoding (Conversion of Flow Chart, Bar chart, Pie chart into a paragraph) **Writing** –Review writing (Films & Books), Essay Writing **Grammar & Vocabulary** – If Conditionals, Concord, Same Word used as Noun and Verb, Nominal Compounds	
Total Hours	**45**

Textbook:	
1	Murphy, Raymond, *English Grammar in Use*, Fifth Edition. Cambridge University Press, New Delhi, 2019
2	N.P.Sudharshana and C.Savitha, *English For Technical Communication*, Cambridge University Press, New Delhi, 2016
Reference Books:	
1	Lewis Norman, *Word Power Made Easy*, Goyal Publishers: New Delhi. 2020.
2	Ashraf Rizvi. *Effective Technical Communication*, Tata McGraw Hill, 2017.
3	Jack C. Richards with Jonathan Hull and Susan Proctor, *Interchange*. 4th Edition, Cambridge University Press, New Delhi, 2016
Extensive Reading:	
1	Khera, Shiv. *You can Win*. Macmillan, Delhi. 2014
Websites:	
1	http://www.englishclub.com
2	http://www.talkenglish.com
3	https:// www.ted.com/talks
4	https://nptel.ac.in/

Dr. T.JESUDAS, M.E., Ph.D
Professor and Head
Department of Mechatronics
Mahendra Engineering College
Mallasamudram, Namakkal

MAHENDRA ENGINEERING COLLEGE(Autonomous)						
Syllabus						
Department	**Mechanical Engineering**	**Programme Code**			**5082**	
I Semester						
Course code	**Course Name**	**Hours/week**			**Credit**	**Maximum marks**
		L	**T**	**P**	**C**	
24GE13101	**ENGINEERING GRAPHICS** (Common to Non circuit Branches)	3	0	0	3	**100**
Objective(s)	• Increase ability to communicate with people through drawing skills as per the BIS standard. • Learn to sketch and take field dimensions. • Learn to take data and transform it into graphic drawings. • Learn basic engineering drawing formats.					
UNIT-I	**Plane Curves and Free Hand Sketching**					**9**
Importance of drawing in engineering applications – Use of drafting instruments – BIS conventions and specifications – Size, layout and folding of drawing sheets – Lettering and dimensioning. 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, Scales: Construction of Diagonal and Vernier scales. 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.						
UNIT-II	**Projection of Points, Lines and Plane Surfaces**					**9**
Orthographic projection- principles-Principal planes-First angle projection-projection of points. Projection of straight lines (only First angle projections) inclined to both the principal planes -Determination of true lengths and true inclinations by rotating line method and traces Projection of planes (polygonal and circular surfaces) inclined to both the principal planes by rotating object method.						
UNIT-III	**Projection of Solids**					**9**
Projection of simple solids like prisms, pyramids, cylinder, cone and truncated solids when the axis is inclined to one of the principal planes by rotating object method and auxiliary plane method.						
UNIT-IV	**Projection of Sectioned Solids and Development of Surfaces**					**9**
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.						

Dr. T.JESUDAS, M.E., Ph.D
Professor and Head
Department of Mechatronics
Mahendra Engineering College
Mallasamudram, Namakkal

DEPARTMENT OF MECHATRONICS ENGINEERING

UNIT-V	**Isometric and Perspective Projections**	**9**
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. Perspective projection of simple solids-Prisms, pyramids and cylinders by visual ray method.		
	Total hours to be taught	**45Periods**
Outcome(s)	• Students' ability to indicate proper dimensions on drawings will improve • Students' ability to perform basic sketching techniques will improve. • Students will become familiar with office practice and standards. • Students will be able to improve their visualization skills so that they can apply these skills in developing new products.	

TEXT BOOK :	
1	S.Gowri&K.Jayapoovan, "Engineering Graphics" 6th Edition, Vikas Publication New Delhi
2	N S Parthasarathy and Vela Murali, "Engineering Drawing" Oxford University Press 2015.
3	K. Venugopal & V. Prabhu Raja, "Engineering Graphics", New Age International (P) Limited, 2011.
REFERENCES:	
1	M.B. Shah and B.C. Rana, "Engineering Drawing", Pearson Education 2005.
2	K. R. Gopalakrishnana, "Engineering Drawing" (Vol.I&II), Subhas Publications 1998.
3	Basant Agarwal and Agarwal C.M., "Engineering Drawing", Tata McGraw Hill Publishing Company Limited, New Delhi, 2008.
4	Dhananjay A.Jolhe, "Engineering Drawing with an introduction to AutoCAD" Tata McGraw Hill Publishing Company Limited 2008.

Dr. T.JESUDAS, M.E., Ph.D
Professor and Head
Department of Mechatronics
Mahendra Engineering College
Mallasamudram, Namakkal

MAHENDRA ENGINEERING COLLEGE
(Autonomous)

FS 68172

Regulations 2022

Batch 2022-2023 - II Semester
Batch 2023-2024 onwards - I Semester
(Common to all B.E./B.Tech. Programmes)

Course Code	Course Name	Periods/Week			Credit	Maximum Marks
		L	T	P	C	
22HS11001	தமிழர் மரபு	1	0	0	1	100

அலகு 1	மொழி மற்றும் இலக்கியம்	3

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

அலகு 2	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 3	நாட்டுப்புறக் கலைகள் மற்றும் வீர விளையாட்டுகள்	3

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

அலகு 4	தமிழர்களின் திணைக் கோட்பாடுகள்	3

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

அலகு 5	இந்திய தேசிய இயக்கம் மற்றும் இந்திய பண்பாட்டிற்குத் தமிழர்களின் பங்களிப்பு	3

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

Dr. T.JESUDAS, M.E., Ph.D
Professor and Head
Department of Mechatronics
Mahendra Engineering College
Mallasamudram, Namakkal

MAHENDRA ENGINEERING COLLEGE
(Autonomous)

FS 68172

Regulations 2022

Batch 2022-2023 - II Semester
Batch 2023-2024 onwards - I Semester
(Common to all B.E./B.Tech. Programmes)

Course code	Course Name	Periods/week			Credit	Maximum marks
		L	T	P	C	
22HS11001	Heritage of Tamils	1	0	0	1	100

UNIT-I	**LANGUAGE AND LITERATURE**	3

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

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

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

UNIT-III	**FOLK AND MARTIAL ARTS**	3

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

UNIT-IV	**THINAI CONCEPT OF TAMILS**	3

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

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

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

TOTAL HOURS	**15**

Dr. T.JESUDAS, M.E., Ph.D
Professor and Head
Department of Mechatronics
Mahendra Engineering College
Mallasamudram, Namakkal

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

Dr. T.JESUDAS, M.E., Ph.D
Professor and Head
Department of Mechatronics
Mahendra Engineering College
Mallasamudram, Namakkal

DEPARTMENT OF MECHATRONICS ENGINEERING

DEPARTMENT	SCIENCE & HUMANITIES	Programme Code & Name	CY & CHEMISTRY

SEMESTER – I (For Non Circuit Branches & ECE) & SEMESTER – II (For Circuit Branches (Except ECE))

COURSE CODE	COURSE NAME	HOURS/WEEK			CREDIT	MAX. MARKS
		L	T	P	C	
24CY22001	CHEMISTRY LABORATORY (Any eight experiments to be conducted)	0	0	3	1.5	100

Objectives	▪ To inculcate experimental skills to test basic understanding of water quality parameters, such as, alkalinity, hardness, DO and chloride. ▪ To induce the students to familiarize with electro analytical techniques such as, pH metry, potentiometry and conductometry in the determination of impurities in aqueous solutions. ▪ To design and plan the experimental procedure and to record and process the results.
Outcomes	On completion of this course, students will have the knowledge in ▪ Explain the essential principles and their analysis of water quality parameters, like hardness, alkalinity, DO, and chloride. ▪ Experiment with different types of instruments for analysis of materials using small quantities involved for quick and accurate results. ▪ Analyze the normality of different types of materials such as PVA and Ferrous ion.
1.	Determination of Total, Temporary & Permanent hardness of water using EDTA method.
2.	Determination of the Alkalinity level of a water sample.
3.	Determination of Chloride content of water sample by Argentometry.
4.	Determination of DO content of water sample using Winkler's method.
5.	Determination of molecular weight of polyvinyl alcohol using Viscometry.
6.	Estimation of Iron content of the given solution using Potentiometry.
7.	Determination of strength of given hydrochloric acid using pH meter.
8.	Conductometric titration of strong acid vs strong base.
9.	Determination of strength of acids in a mixture using Conductometry.
10.	Estimation of sulphate in a solution using Conductometry (precipitation).

TEXT BOOK

1.	Chemistry lab Manual, Department of Chemistry, Mahendra Engineering College, Mallasamudram, 2022.
2.	Chemistry lab Manual, Department of Chemistry, Mahendra Engineering College, Mallasamudram, 2020.

REFERENCES

1.	Applied chemistry theory and practice by O. P. Vermani and A. K. Narula, second edition.
2.	J. Mendham, R. C. Denney, J.D. Barnes, M. Thomas and B. Sivasankar, Vogel's Textbook of Quantitative Chemical Analysis (2009).
3.	Kolthoff I.M. and Sandell E.B. et al. Quantitative chemical analysis, Mcmillan, Madras 1980

Dr. T.JESUDAS, M.E., Ph.D
Professor and Head
Department of Mechatronics
Mahendra Engineering College
Mallasamudram, Namakkal

DEPARTMENT OF MECHATRONICS ENGINEERING

Department	English					
Course code	**Course Name**	**Hours/week**			**Credit**	**Maximum marks**
		L	**T**	**P**	**C**	
24HS21001	**Personality Development Practice**	0	0	2	1	**100**
Objectives	• To develop listening and speaking skills of students for a variety of purposes like making presentations, attending interviews and participating in discussions • To enhance the non-verbal and social interaction skills of students for becoming effective communicators • To enable learners to hone their linguistic (LSRW) skills with the help of Technology					
Outcomes	**At the end of the course, the students will be able to** • Understand the language proficiency and its techniques • Prepare the resume with organized details • Develop soft skills to excel in their career					

LIST OF EXERCISES

1.	Importance of Communication Skills
2.	Building Vocabulary (Basic level)
3.	Stage Dynamics (Group PPT Presentation)
4.	Predicting the Content of a Given Article (Newspaper, Magazine, etc.,)
5.	Common Errors in English
6.	Interview Skills
7.	Presentation skills
8.	Group Discussion
9.	Soft Skills (Self-Confidence, Team Work, Time Management, Adaptability, Openness to Criticism)
10.	Creative Writing – Any Essay type (Descriptive, Narrative etc.)
	Total Hrs : 15

REFERENCE BOOKS:

1. Joshi, Manmohan, ***Soft Skills***, 1st Edition. Bookboon, 2017
2. Raman, Meenakshi & Sangeeta Sharma. ***Technical Communication: Principles and Practice***, Ed.III, Oxford University Press, New Delhi. 2015

Online Websites:

https:// www.ted.com/talks
https://quizziz.com
www.pdfdrive.com
https://www.calameo.com/read/00072308558ed20d410e7/

Dr. T.JESUDAS, M.E., Ph.D
Professor and Head
Department of Mechatronics
Mahendra Engineering College
Mallasamudram, Namakkal

DEPARTMENT OF MECHATRONICS ENGINEERING

Syllabus						
Department	**Mechanical Engineering**			**Programme Code**		**1081**
I Semester						
Course code	**Course Name**	**Hours/week**			**Credit**	**Maximum marks**
		L	T	P	C	
24GE23101	**COMPUTER AIDED DESIGN AND DRAFTING LABORATORY**	0	0	3	1.5	**100**
Objective(s)	• Develop skill to use software to create 2D and 3D models. • Understanding the basic principles in drafting techniques • To get the knowledge and practicing the advanced drafting software.					

LIST OF EXPERIMENTS

1. INTRODUCTION to CAD
2. AutoCAD – Basics
   - Starting with AutoCAD
   - Layout and sketching
   - Drawing environment
   - Elements of drawing
   - Draw commands
   - 3D Functions
3. 2D – FIGURES for practice using Design Software
4. ISOMETRIC DRAWING for practice using Design Software
5. 3-D Solid Figures Using Design Software
   - Learning Different Operations like Threading, Sweep, Swept blend. Modeling

LIST OF EQUIPMENTS(forabatchof30 students)

1. Better hardware, with suitable graphics facility - 30No.
2. Licensed software for Drafting and Modeling. -30Licenses
3. Laser Printer or Plotter to print / plot drawings -1No

TOTALHOURS:45

Outcome(s)	• Ability to use the software packers for drafting and modeling • Ability to create 2D and 3D models of Engineering Components • Ability to understand the dimensioning and different fits and tolerance techniques.

Dr. T.JESUDAS, M.E., Ph.D
Professor and Head
Department of Mechatronics
Mahendra Engineering College
Mallasamudram, Namakkal

DEPARTMENT OF MECHATRONICS ENGINEERING

	Regulation 2024						
	II Semester						
Sl. No.	**Course code**	**Course Title**	**L**	**T**	**P**	**C**	**Cate-gory**
THEORY							
1	24MA12201	Engineering Mathematics-II	3	1	0	4	BS
2	24PY12001	Engineering Physics	3	0	0	3	BS
3	24CS13001	Problem Solving Techniques using C	3	0	0	3	ES
4	24EE13001	Basics of Electrical and Electronics Engineering	3	0	0	3	ES
5	24GE13201	Engineering Mechanics	3	0	0	3	ES
6	24HS11003	Tamils and Technology	1	0	0	1	SH
PRACTICAL							
7	24PY22001	Engineering Physics Laboratory	0	0	3	1.5	BS
8	24CS23001	Problem Solving Techniques Using C Lab	0	0	3	1.5	ES
9	24GE23001	Engineering Practices Laboratory	0	0	3	1.5	ES
		TOTAL	16	1	9	**21.5**	

Dr. T.JESUDAS, M.E., Ph.D
Professor and Head
Department of Mechatronics
Mahendra Engineering College
Mallasamudram, Namakkal

DEPARTMENT OF MECHATRONICS ENGINEERING

Course code	Course Name	Hours / week			Credit	Maximum marks
		L	T	P	C	
24MA12201	Engineering Mathematics - II	3	1	0	4	100

Objective(s)

To enable the students to:

- Define vector function, operators and working procedure to evaluate line, surface and volume integrals.
- Explain different types of higher order ordinary differential equations with variable coefficients and various methods to solve the equations.
- Learn Laplace transform, inverse Laplace transform and its properties to solve differential equations.
- Know about functions of complex variables, properties and problems involving conformal mapping.
- Learn about Taylor's and Laurent's series expansion of complex functions and the process of evaluating complex integrals.

UNIT-I **Vector Calculus** **9+3**

Gradient Divergence and Curl – Directional derivative – Irrotational and Solenoidal vector fields – Vector integration – Green's theorem in a plane, Gauss divergence theorem and Stokes' theorem (excluding proofs).Verification and application in evaluating line, surface and volume integrals.

UNIT-II **Ordinary Differential Equations of Higher Orders** **9+3**

Second and Higher order linear differential equations with constant coefficients– Method of variation of parameters – Cauchy Euler equation, Legendre's type differential equations – System of simultaneous linear differential equations with constant coefficients.

UNIT-III **Laplace Transform** **9+3**

Transform, Properties of Laplace Transform, Laplace transform of periodic functions. Finding inverse Laplace transform by different methods, convolution theorem, solving Initial value problems by Laplace Transform method.

UNIT-IV **Analytic Functions** **9+3**

Functions of a complex variable, Cauchy-Riemann equations – Analytic functions – Harmonic and orthogonal properties of analytic function – Harmonic conjugate – Construction of analytic functions –Conformal mapping: w= z+c, cz, 1/z, and Bilinear transformation.

UNIT-V **Complex Integration** **9+3**

Complex integration – Statement and applications of Cauchy's integral theorem and Cauchy's integral formula(without proof) – Taylor and Laurent expansions –Types of Singularities-Singular points – Residues – Residue theorem(without proof) – Application of residue theorem to evaluate real integrals –Contour integration.

Total hours **60**

Dr. T.JESUDAS, M.E., Ph.D
Professor and Head
Department of Mechatronics
Mahendra Engineering College
Mallasamudram, Namakkal

DEPARTMENT OF MECHATRONICS ENGINEERING

Outcome(s)	At the end of the course the students will be able to • Solve problems related to vector differentiation, line, surface and volume integrals and theorems involving them. • Solve higher order differential equations with variable coefficients. • Describe Laplace transform and its properties inverse Laplace transform and the solution of linear differential equation using Laplace transform techniques. • Solve Analytic functions, harmonic functions, conformal mapping and its applications. • Expand the functions as Taylor's and Laurent's series and evaluate the complex integrals.

TEXTBOOK:

1	B.S.Grewal, Higher Engineering Mathematics, Khanna Publishers, 2017.
2	Erwin Kreys zig, Advanced Engineering Mathematics, John Wiley & Sons, 2018.

REFERENCES:

1	Michael D.Greenberg Advanced Engineering Mathematics, Pearson 2013.
2	Lokenath Debnath and Dambaru Bhatta, "Integral Transforms and Their Applications, CRC Press 2015.
3	Dennis G.Zilland Warren S.Wright "Advanced Engineering Mathematics", Jones and Bartlett 2014.

Dr. T.JESUDAS, M.E., Ph.D
Professor and Head
Department of Mechatronics
Mahendra Engineering College
Mallasamudram, Namakkal

DEPARTMENT OF MECHATRONICS ENGINEERING

Course code	Course Name	Hours/week			Credit	Maximum marks
		L	T	P	C	
24PY12001	Engineering Physics (For all branches)	3	0	0	3	100
Objective(s)	• To provide fundamental knowledge about lasers, Ultrasonic's, Properties of Matter, Quantum Physics and different kinds of Engineering Materials. • To correlate the principles with application oriented Engineering studies.					
UNIT-I	LASER AND FIBER OPTICS					9
Introduction – Principle of spontaneous emission, stimulated absorption and emission – Einstein's coefficient (derivation) – Types of lasers - CO_2, Nd: YAG – Fiber optics: principle, numerical aperture and acceptance angle - types of optical fibers (material, refractive index and mode) – losses associated with optical fibers - fiber optic sensors: pressure and displacement.						
UNIT-II	ULTRASONICS					9
Introduction – Production – magnetostriction effect - magnetostriction generator – piezoelectric and inverse piezoelectric effect- piezoelectric generator – properties – Cavitations - Velocity measurement – acoustic grating – SONAR - Non Destructive Testing – pulse echo system through transmission and reflection modes - A,B and C –scan displays-Industrial Applications and medical applications-medical endoscope.						
UNIT-III	PROPERTIES OF MATTER					9
Elasticity – Stress-strain diagram and its uses - factors affecting elastic modulus and tensile strength – torsional stress and deformations – twisting couple - torsion pendulum: theory and experiment - bending of beams - bending moment – cantilever: theory and experiment – uniform and non-uniform bending: theory and experiment - I-shaped girders - stress due to bending in beams.						
UNIT-IV	QUANTUM PHYSICS					9
Black body radiation – Planck's theory (derivation) –wave particle duality – electron diffraction – concept of wave function and its physical significance – Schrödinger's wave equation – time independent and time dependent equations – particle in a one-dimensional rigid box– scanning tunneling microscope- electron tunneling microscope.						
UNIT-V	ADVANCED ENGINEERING MATERIALS					9
Smart materials: Shape-memory alloys: Martensite, Austenite, Two way shape memory, characteristics and applications – Metallic glasses – Origin – Preparation – Structure, mechanical and electrical properties. Biomaterials: First, second and third generation biomaterials – Classification – Metals and alloys – Polymers – Hydrogels – Applications in medicine: Skin and Blood interfacing implants.						
					Total hours	45
Outcome(s)	After completing the course the students • Understand the basics of Laser, Fiber Optics and its types with its applications in various fields. • Gain knowledge about Ultrasonic's their applications in various engineering fields. • Have the necessary understanding on Properties of materials and their uses. • Get Knowledge on basics concepts of Quantum Physics with their Applications. • Understand the properties of SMA, metallic glasses, bio materials and their applications.					

Dr. T.JESUDAS, M.E., Ph.D
Professor and Head
Department of Mechatronics
Mahendra Engineering College
Mallasamudram, Namakkal

DEPARTMENT OF MECHATRONICS ENGINEERING

TEXTBOOK:	
1	Dr. G. Senthil kumar- Engineering Physics-VRB Publication & Co, Chennai- Latest edition 2022.
2	Dr. P.K. Palanisamy , “Engineering Physics”, Scitech Publications, Chennai, 2022.
3	Biomaterial Science and Engineering- JB Park- Plenum Press, NewYork(2014).
4	M N Avadhanulu, A Textbook of Engineering Physics (2008), S. Chand Publishing, New Delhi.
5	Bhattacharya, D.K. & Poonam, T. —Engineering Physics. Oxford University Press, 2015.
REFERENCES:	
1	Pillai S O, “Engineering Physics” (2014), New Age International Publishers, New Delhi.
2	Karl F Renk, Basics of Laser Physics (2017)-Springer International Publishing, Switzerland.
3	Introduction to Quantum Mechanics- J Griffiths-2nd edition(2016).
4	Halliday.D, Resnick.R. &Walker.J, Principles of Physics (2020), Wiley.
5	Serway, R.A. & Jewett, J.W. —Physics for Scientists and Engineers. Cengage Learning, 2010.
6	William T. Silfvast, Laser Fundamentals (2014), Cambridge University Press.

Dr. T.JESUDAS, M.E., Ph.D
Professor and Head
Department of Mechatronics
Mahendra Engineering College
Mallasamudram, Namakkal

DEPARTMENT OF MECHATRONICS ENGINEERING

Course code	Course Name	Hours/week			Credit	Maximum marks
		L	T	P	C	
24CS13001	Problem Solving Techniques Using C	3	0	0	3	100

Objective(s)	The student should be made to: • Understand the basics of computer and algorithm • Learn the basic concepts of C Programming. • Know the arrays and functions in C • Be familiar with pointers and structures in C • Learn the file handling techniques and preprocessors in C

UNIT-I	**Problem Solving Aspects**	**9**
Computers: Hardware – Software – Processor – Memory – I/O devices – Interface – Programming Languages Problem Solving Aspects: Algorithms Pseudo code, Flowchart-Steps in Problem Solving – simple strategies for developing algorithms (iteration, recursion) – Steps for Creating and Running programs -Illustrative problems: Exchanging The Values – Find minimum in a list - Factorial Computation - Fibonacci Sequence		
UNIT-II	**C Programming Basics**	**9**
Introduction to C programming – Header files – Structure of a C program – compilation and linking processes – Constants, Variables – Data Types – Expressions-, Expression Evaluation, Type conversion Statements – operators – Input and Output operations – Decision Making and Branching – Looping statements- Programming Examples		
UNIT-III	**Arrays and Function**	**9**
Arrays: Introduction – One-Dimensional Arrays – Two and multi-Dimensional Arrays - Strings: Operations of Strings. Function – definition of function – Declaration of function – Function prototype – Types of functions- user defined functions – Pass by value – Pass by reference – Recursion - Programming Examples		
UNIT-IV	**Pointers and Structures**	**9**
Pointers - Definition – Initialization - Pointer variables, Pointer arithmetic, Pointers to Pointers, Pointers with Arrays, Pointers with Functions- Introduction to Structure – structure definition – Structure declaration – Structure within a structure-Structures fusion with Arrays- Unions – Storage classes		
UNIT-V	**File Processing**	**9**
Files: File modes – File functions – Types of file processing: Sequential access, Random access – Text and binary files - Command line arguments – C Preprocessor directives: Macros – Definition – Types of Macros - Creating and implementing user defined header files		
	Total hours	**45**

Dr. T.JESUDAS, M.E., Ph.D
Professor and Head
Department of Mechatronics
Mahendra Engineering College
Mallasamudram, Namakkal

DEPARTMENT OF MECHATRONICS ENGINEERING

Outcome(s)	Upon completion of this course , students will be able to • Illustrate algorithms for real time problems through various problem solving techniques • Explain the syntax of C Programming • Summarize the concept of arrays and functions in C • Apply the concepts of pointers and structure • Develop the concepts of files and preprocessors in C

TEXTBOOK:

1	Anita Goeland Ajay Mittal, "Computer Fundamentals and Programming in C", Dorling Kindersley (India)Pvt. Ltd. Pearson Education, 2016

REFERENCES:

1	Dromey R.G, "How to Solve it by Computer" Prentice Hall of India, Delhi., 2010.
2	E Balagurusamy, "Computer Programming", First Edition, Tata McGraw Hill Education (India) Private Ltd, New Delhi., 2013.
3	Pradip Dey, Manas Ghosh, "Computer Fundamentals and Programming in C", 2nd Edition, Oxford University Press. 2013.
4	M.Rajaram and P.Uma Maheshwari " Computer Programming with C", Pearson Education., 2013.
5	NPTEL course, Problem Solving Through Programming in C, https://nptel.ac.in/courses/106105171
6	NPTEL course, Introduction to Programming in C, https://nptel.ac.in/courses/106104128

Dr. T.JESUDAS, M.E., Ph.D
Professor and Head
Department of Mechatronics
Mahendra Engineering College
Mallasamudram, Namakkal

DEPARTMENT OF MECHATRONICS ENGINEERING

Course code	Course Name	Hours/week			Credit	Maximum marks
		L	T	P	C	
24EE13001	Basics of Electrical and Electronics Engineering	3	0	0	3	100
Objective(s)	• To study the basic concepts of electrical circuits and measuring instruments • To understand the operation of magnetic circuits and electrical machines • To study the concepts of semiconductor devices • To acquire knowledge on the concepts of integrated circuits • To impart knowledge on the basic concepts of communication systems					
UNIT-I	Electrical Circuits and Measurements					9
Ohm's Law – Kirchhoff's Law- Voltage and Current Sources- Basics of Resistance, Inductance, and Capacitance- Series and Parallel circuits- Average value and RMS value – Power and Power Factor- Classification of Instruments – Moving coil and Moving Iron Instruments – Energy Meter-Residential wiring - Earthing.						
UNIT-II	Electrical Machines					9
Introduction to Magnetic circuits, Faraday's law, Lenz's Law, Fleming's Left-Hand and Right-Hand Rule-Construction and Working Principle: DC Machines -Single phase Transformer – Three phase Squirrel Cage Induction motor- Single phase Induction motor (Qualitative treatment only).						
UNIT-III	Semiconductor Devices					9
PN Junction Diode –Characteristics – Half wave and Full wave Rectifiers –Zener diode- Characteristics-Voltage Regulator-Bipolar Junction Transistor, FET, JFET-Characteristics.						
UNIT-IV	Digital ICS and Microcontroller					9
Boolean Algebra - Logic gates - Demorgan's Theorem - Combinational circuits: Adder, Subtractor, Multiplexer, Demultiplexer - Pin Details and Architecture of Microprocessor (8086) and Microcontroller (8051).						
UNIT-V	Communication Systems					9
Types of Signals: Analog and Digital Signals – Modulation and Demodulation: Principles of Amplitude and Frequency Modulations (Qualitative Treatment). Communication Systems: TV, Modem, Microwave, Satellite and Mobile communication (Block Diagram Approach only)						
					Total hours	45
Outcome(s)	At the end of the course, students will be able to: • Summarize the concepts of electrical circuits and measuring instruments • Illustrate the constructional features and working principle of Electrical machines • Explain the operation of semiconductor devices • Interpret the concepts of integrated circuits • Discuss the basic concepts of Communications systems					

Dr. T.JESUDAS, M.E., Ph.D
Professor and Head
Department of Mechatronics
Mahendra Engineering College
Mallasamudram, Namakkal

DEPARTMENT OF MECHATRONICS ENGINEERING

TEXTBOOK:	
1	V.K Mehta and Rohit Mehta, "Principle of Electrical Engineering and Electronics" S Chand & Company, Third Edition, 2016.
2	S. Salivahanan, N. Suresh kumar and A. Vallavanraj, "Electronic Devices and Circuits", Tata McGraw Hill, Second Edition, 2011.
3	Edward Hughes, "Hughes Electrical and Electronic Technology", Pearson Education, tenth Edition 2008.
4	David A. Bell, "Electronic Devices and Circuits", Oxford University Press, Fifth Edition, 2008.
REFERENCES:	
1	Robert T. Paynter, "Introducing Electronics Devices and Circuits", Pearson Education, Seventh Education, 2006.
2	William H. Hayt, J.V. Jack, E. Kemmebly and steven M. Durbin, "Engineering Circuit Analysis", Tata McGraw Hill, Sixth, Edition, 2002.
3	J. Millman & Halkins, Satyebranta Jit, "Electronic Devices & Circuits", Tata McGraw Hill, Second Edition, 2008.
4	**NPTEL :** Prof. L. Umanand, Basic Electrical Technology, IISc Bangalorehttps://nptel.ac.in/courses/108108076 Prof. M.B. Patil Basic Electronics IIT Bombayhttps://onlinecourses.nptel.ac.in/noc21_ee55/preview

Dr. T.JESUDAS, M.E., Ph.D
Professor and Head
Department of Mechatronics
Mahendra Engineering College
Mallasamudram, Namakkal

DEPARTMENT OF MECHATRONICS ENGINEERING

Course code	Course Name	Hours/week			Credit	Maximum marks
		L	T	P	C	
24GE13201	Engineering Mechanics (Common to Non Circuit Branches)	3	0	0	3	100

Objective(s)	**Students should develop the ability to:** • Work comfortably with basic engineering mechanics concepts required for analyzing static structures. • Model the problem using good free-body diagrams and accurate equilibrium equations. • Apply pertinent mathematical, physical and engineering mechanical principles to the system to solve and analyze the problem. • Understand the meaning of centers of gravity (mass)/centroids and moment of inertia using integration methods. • Gain knowledge in basic design concepts of statics and dynamics of the particle.

UNIT-I	**Statics of Particle**	**9**
Introduction to Mechanics – Fundamental Principles -Units and Dimensions – Laws of Mechanics- Principle of transmissibility- Lame's theorem, Parallelogram and triangular Law of forces- Vectorial representation of forces and moments, Coplanar forces– Resolution and Composition of forces – Equilibrium of particles - Forces in space - Equilibrium of a particle in space - Equivalent systems of forces - Single equivalent force.		
UNIT-II	**Statics of Rigid Body**	**9**
Free body diagram – Types of supports and their reactions-requirements of stable equilibrium – Moments and Couples – Moment of a force about a point and about an axis– Vectorial representation of moments and couples – Scalar components of a moment- Varignon's theorem – Single equivalent force -Equilibrium of Rigid bodies in two dimensions.		
UNIT-III	**Properties of Sections**	**9**
Centroid – Rectangular, circular, triangular areas by integration – T section, I section, - Angle section, Hollow section by using standard formula – Theorems of Pappus and Guldinus – Second moment of area — Rectangular, circular, triangular areas by integration – T section, I section, Angle section, Hollow section by using standard formula –Parallel axis theorem - perpendicular axis theorem – Product of inertia of plane areas -Polar moment of inertia – Principal axes- Mass moment of inertia of thin rectangular section.		
UNIT-IV	**Dynamics of Particles**	**9**
Displacements, Velocity and acceleration, their relationship – Relative motion – Curvilinear motion – Newton's law- D'Alembert's principle – Work Energy Equation of particles – Impulse and Momentum – Impact of elastic bodies- Impact - direct and central impact – coefficient of restitution.		
UNIT-V	**Friction**	**9**
Friction force – Laws of sliding friction -Laws of Coloumb friction – equilibrium analysis of simple systems with sliding friction –wedge friction - equilibrium analysis of simple contact friction –ladder friction - Rolling resistance-Applications of screw jacks and belts.		
	Total hours	**45**

Dr. T.JESUDAS, M.E., Ph.D
Professor and Head
Department of Mechatronics
Mahendra Engineering College
Mallasamudram, Namakkal

DEPARTMENT OF MECHATRONICS ENGINEERING

Outcome(s)	End of the learning students will have an ability to: • Analyze the engineering problems in case of equilibrium conditions. • Calculate the reaction forces of various supports on the structural members. • Evaluate various geometrical properties like centroid, centre of gravity, moment of inertia of various surfaces and solids. • Solve the problems involving dynamics of particles and rigid bodies. • Define the effects of friction and its applications, also compute various frictional components.

TEXT BOOK :

1	R.C. Hibbeller, "Engineering Mechanics – Statics and Dynamics", 11th ed., Pearson Education Asia Pvt. Ltd., 2009.
2	Ferdinand P. Beer, E. Russell Johnston, Vector Mechanics for Engineers: Statics and Dynamics (9th Edition), Tata McGraw-Hill International Edition, 2010.
3	Dr.N.Koteeswaran, "Engineering Mechanics Statics and Dynamics", Sri Balaji Publications 9th Rv.Ed., S.Chand& Co Ltd, 2013.
4	Vela Murali, "Engineering Mechanics", Oxford University Press 2010.

REFERENCES:

1	M.S. Palanichamy and S. Nagam, "Engineering Mechanics – Statics & Dynamics", 3rd ed., Tata McGraw-Hill, 2004.
2	S. Rajasekaran, G. Sankara subramanian, "Fundamentals of Engineering Mechanics", 3rd ed., Vikas Publishing House Pvt. Ltd, 2009.
3	Kumar, K.L., "Engineering Mechanics", 3rd Revised Edition, Tata McGraw-Hill Publishing company, New Delhi 2008.
4	Irving H. Shames, "Engineering Mechanics – Statics and Dynamics", 4th ed., – Pearson Education Asia Pvt. Ltd., 2005.

Dr. T.JESUDAS, M.E., Ph.D
Professor and Head
Department of Mechatronics
Mahendra Engineering College
Mallasamudram, Namakkal

DEPARTMENT OF MECHATRONICS ENGINEERING

MAHENDRA ENGINEERING COLLEGE
Autonomous| Accredited by NAAC with 'A++' Grade (Cycle-2)
Accredited by NBA Tier-I (WA) UG : CSE, ECE, EEE
Mahendhirapuri, Mallasamudram (W), Namakkal (Dt) - 637 503, Tamil Nadu
04288-288 500 / 521 / 522 | www.mahendra.info

Regulations 2024

Semester - II
(Common to all B.E./B.Tech. Programmes)

Course Code	Course Name	Periods/Week			Credit	Maximum Marks
		L	T	P	C	
24HS11003	தமிழரும் தொழில்நுட்பமும்	1	0	0	1	100
அலகு 1	நெசவுமற்றும் பானைத் தொழில்நுட்பம்				3	

Dr. T.JESUDAS, M.E., Ph.D
Professor and Head
Department of Mechatronics
Mahendra Engineering College
Mallasamudram, Namakkal

MAHENDRA ENGINEERING COLLEGE
Autonomous| Accredited by NAAC with 'A++' Grade (Cycle-2)
Accredited by NBA Tier-I (WA) UG : CSE, ECE, EEE
Mahendhirapuri, Mallasamudram (W), Namakkal (Dt) - 637 503, Tamil Nadu
04288-288 500 / 521 / 522 | www.mahendra.info

Regulations 2024

Semester - II

(Common to all B.E./ B.Tech. Programmes)

Course code	Course Name	Periods/week			Credit	Maximum marks
		L	T	P	C	
24HS11003	TAMILS AND TECHNOLOGY	1	0	0	1	100

UNIT-I	**WEAVING AND CERAMIC TECHNOLOGY**	3

Weaving Industry during Sangam Age – Ceramic technology – Black and Red Ware Potteries (BRW) – Graffiti on Potteries.

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

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

UNIT-III	**MANUFACTURING TECHNOLOGY**	3

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

UNIT-IV	**AGRICULTURE AND IRRIGATION TECHNOLOGY**	3

Dam, Tank, ponds, Sluice, Significance of KumizhiThoompu of Chola Period, Animal Husbandry - Wells designed for cattle use - Agriculture and Agro Processing - Knowledge of Sea - Fisheries – Pearl - Conche diving - Ancient Knowledge of Ocean - Knowledge Specific Society.

UNIT-V	**SCIENTIFIC TAMIL & TAMIL COMPUTING**	3

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

TOTAL HOURS	**15**

Dr. T.JESUDAS, M.E., Ph.D
Professor and Head
Department of Mechatronics
Mahendra Engineering College
Mallasamudram, Namakkal

DEPARTMENT OF MECHATRONICS ENGINEERING

TEXT BOOK ANDREFERENCE BOOKS	
1.	தமிழகவரலாறு–மக்களும் பண்பாடும் – கே.கே. பிள்ளை (வெளியீடுதமிழ்நாடுபாடநூல்மற்றும் கல்வியியல்பணிகள்கழகம்)
2.	கணினித் தமிழ்–முனைவர் இல. சுந்தரம் (விகடன் பிரசுரம்)
3.	கீழடி–வைகைநதிக்கரையில்சங்ககாலநகரநாகரிகம் (தொல்லியல்துறைவெளியீடு)
4.	பொருநை–ஆற்றங்கரைநாகரிகம் (தொல்லியல்துறைவெளியீடு)
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.Subaramanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8.	The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
9.	Keeladi - 'Sangam City Civilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10	Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Publishedby: The Author)
11.	Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Bookand Educational Services Corporation, Tamil Nadu)
12.	Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

Dr. T.JESUDAS, M.E., Ph.D
Professor and Head
Department of Mechatronics
Mahendra Engineering College
Mallasamudram, Namakkal

DEPARTMENT OF MECHATRONICS ENGINEERING

Course Code	Course Name	Hours/Week			Credit	Maximum marks
		L	T	P	C	
24PY22001	**Physics Laboratory** (For All Branches)	0	0	3	1.5	**100**
Objective(s)	• To provide exposure to the students with hands on experience on various basic Physics practices for all branches.					

LISTOFEXPERIMENTS

1	(a) Determination of Wavelength, and particle size using Laser (b) Determination of acceptance angle in an optical fiber.
2	Determination of velocity of sound and compressibility of liquid – Ultrasonic interferometer.
3	Determination of Thickness of a thin wire-Air Wedge
4	Determination of wavelength of mercury spectrum – spectrometer grating
5	Determination of Young's modulus by Non uniform bending method
6	Determination of viscosity of liquid – Poiseuilles method
7	Determination of Rigidity modulus -Torsional Pendulum
8	Determination of Band gap of a semiconductor-PN Diode
9	Determination of Young's modulus by Uniform bending method (Choose Any 7 Experiments)
	Total hours 45

Outcome(s)	• Apply experimental techniques to measure fundamental physical properties such as wavelength, particle size, and material constants using optics and mechanical methods. • Analyze and interpret experimental data to determine mechanical properties like Young's modulus, rigidity modulus, and viscosity of fluids through appropriate instrumentation. • Demonstrate proficiency in performing semiconductor and ultrasonic experiments to evaluate electrical and acoustic properties of materials.

REFERENCES

1	Physics Laboratory Manual(2023), Department of Physics, Mahendra Engineering College, Namakkal.
2	Geeta Sanon, B.Sc Practical Physics, 5thEdn. (2015), R. Chand & Co.
3	C. L. AroraB.Sc. Practical Physics (2001), S. Chand and Company Limited, NewDelhi.
4	Indu Prakash and Ramakrishna, A. K. Jha(2012), A Text Book of Practical Physics, Kitab Mahal, NewDelhi.
5	D. P. Khandelwal, A Laboratory Manual of Physics: For Undergraduate Classes (1985), Vani Educational books, New Delhi.

Dr. T.JESUDAS, M.E., Ph.D
Professor and Head
Department of Mechatronics
Mahendra Engineering College
Mallasamudram, Namakkal

DEPARTMENT OF MECHATRONICS ENGINEERING

Course Code	Course Name	Hours/Week			Credit	Maximum marks
		L	T	P	C	
24CS23001	**Problem Solving Techniques Using C Laboratory** (Common to All Branches)	0	0	3	1.5	**100**

Objective(s)

The student should be made to:

- Understand developing applications using Office package.
- Formulate problems and implement algorithms using Scratch and Raptor tool
- Make use of arrays and functions in C.
- Learn how to use pointer concepts.
- Know the concepts of structures, unions and files

LIST OF EXPERIMENTS

1	Prepare A bio-data Using MS Word With Appropriate Page ,Text and Table Formatting Options And Send The Same To Recipients Using Mail Merge
2	Create budget planning of your family with cell referencing, formulae, conditional formatting using Excel
3	Create a Program flow to illustrate the use of Variables and Constants using Scratch Tool
4	Construct flowchart to find the Factorial for a given number Using Raptor
5	Students mark generation using decision statements
6	Calculator using switch statement
7	Prime number generation and to check whether the given number is armstrong or not using looping
8	Greatest number using array (one dimensional)
9	Matrix multiplication using array (two dimensional)
10	Check the given string is palindrome or not.
11	Write a C Program to swap two numbers using two functions one using pointer and other one without using pointer
12	Factorial calculation and Fibonacci series using function
13	Student mark sheet using structures
14	Copy text from one file to other File
	Total hours **30**

Outcome(s)

Upon completion of this course , students will be able to

- Demonstrate the applications of Office Packages
- Solve the real world problems using Scratch and Raptor Tool
- Develop programs using arrays and functions in C.
- Illustrate the working of pointers in C
- Develop the concepts using structures, unions and files in C

Dr. T.JESUDAS, M.E., Ph.D
Professor and Head
Department of Mechatronics
Mahendra Engineering College
Mallasamudram, Namakkal

DEPARTMENT OF MECHATRONICS ENGINEERING

Course code	Course Name	Hours/week			Credit	Maximum marks
		L	T	P	C	
24GE23001	ENGINEERING PRACTICES LABORATORY	0	0	3	1.5	100

Objective(s)

- To understand the fundamentals of various carpentry and plumbing tools and fabricate various carpentry joints.
- To understand the basic manufacturing processes and perform simple welding, sheet metal, lathe and drilling operations.
- To learn the concepts of electrical wiring and power measurements.
- To study the concepts of electronic devices.

LISTOFEXPERIMENTS

Civil and Mechanical Engineering Practices

1. Making of carpentry joints T-joint, Lap-joint, Dovetail Joint 2. Pipe connections with different joining components. 3. Connections of Two Galvanized Iron Pipe	CO1
4. Preparation of arc welding of butt joints, lap joints and tee joints. 5. Fabrication of sheet metal tray and funnel 6. Facing, plain turning and step turning using lathe 7. Drilling operations	CO2

Electrical and Electronic Engineering Practices

1. Residential House Wiring using Switches, Fuse, Indicator, Lamp and Energy meter 2. Two way, CFL and LED Lamp Wiring 3. Measurement of Voltage, Current and Power 4. Measurement of Energy using Single Phase Energy Meter	CO3
5. Soldering Practice –Assembly of Electronic Components 6. Verification of Logic Gates 7. V-I Characteristics of PN Junction and Zener Diode 8. Half Wave and Full Wave Rectifiers	CO4

Total hours:30

Outcome(s)

At the end of the course, students will be able to:

- Acquire the knowledge about Plumbing & Carpentry components Joining the two woods and pipes.
- Fabricate the models of sheet metal and welding joints and Perform facing, plain turning, step turning and drilling operations.
- Demonstrate the domestic wiring and power measurements.
- Demonstrate the operation of Electric Circuits and PN Junction Diode.

Dr. T.JESUDAS, M.E., Ph.D
Professor and Head
Department of Mechatronics
Mahendra Engineering College
Mallasamudram, Namakkal

DEPARTMENT OF MECHATRONICS ENGINEERING

Regulation 2024							
III Semester							
Sl. No.	**Course code**	**Course Title**	**Category**	**L**	**T**	**P**	**C**
THEORY							
1	24MA12301	Transforms and Partial Differential Equations	BS	3	1	0	4
2	24MT14301	Strength of Materials for Mechatronics	PC	3	0	0	3
3	24MT14302	Kinematics of Machinery	PC	3	0	0	3
4	24MT14303	Fundamentals of Fluid Mechanics and Machinery	PC	3	0	0	3
5	24MT14304	Electrical Drives and Controls	PC	3	0	0	3
5		Open Elective - 1	OE	3	0	0	3
6	24CY11001	Environmental Science and Sustainability	MC	3	-	-	-
PRACTICAL							
7	24MT24301	Strength of Materials Laboratory	PC	0	0	3	1.5
8	24MT24302	Fluid Mechanics and Machinery Laboratory	PC	0	0	3	1.5
9	24MT24303	Electrical Machines and Drives Laboratory	PC	0	0	3	1.5
		TOTAL		**18**	**1**	**9**	**23.5**

Dr. T.JESUDAS, M.E., Ph.D
Professor and Head
Department of Mechatronics
Mahendra Engineering College
Mallasamudram, Namakkal

DEPARTMENT OF MECHATRONICS ENGINEERING

Syllabus						Regulations2024
Department	**MATHEMATICS**		**Programme Code**			**1101**
III Semester						
Course code	**Course Name**	**Hours/week**			**Credit**	**Maximum marks**
		L	**T**	**P**	**C**	
24MA12301	**TRANSFORMS AND PARTIAL DIFFERENTIAL EQUATIONS**	**3**	**1**	**0**	**4**	**100**

Objective(s)	To enable students to • Acquire knowledge of Z- transform to solve difference equations. • Learn about Fourier transforms, inverse Fourier transform and its properties and apply convolution theorem and Parseval's identity to various functions. • Construct Fourier series of various functions and to compute harmonics of Fourier series. • Understand the partial differential equation concepts. • Study the method of separation of variables and solving boundary value problems using Fourier series.
Outcome(s)	At the end of the course, the students will be able to • Apply the knowledge of Z-transform to the analysis of digital filters and discrete signals. • Solve the problems using Fourier integral and convolution theorem technique. • Apply Fourier series techniques in solving heat flow problem used in various situations. • Formulate and solve first and higher order partial differential equations. • Solve real time Engineering problems using Partial differential equations.

UNIT-I	**Z -TRANSFORMS AND DIFFERENCE EQUATIONS**	**9+3**
Z-transforms - Elementary properties – Inverse Z-transform – Partial fraction and Residue method-Convolution theorem -Formation of difference equations – Solution of difference equations using Z-transform.		
UNIT-II	**FOURIER TRANSFORMS**	**9+3**
Fourier integral theorem (without proof) – Fourier transform pair – Sine and Cosine transforms – Properties – Transforms of simple functions – Convolution theorem – Parseval's identity.		
UNIT-III	**FOURIER SERIES**	**9+3**
Dirichlet's conditions – General Fourier series – Odd and even functions – Half range sine series– Half range cosine series – Parseval's identity – Harmonic Analysis.		

Dr. T.JESUDAS, M.E., Ph.D
Professor and Head
Department of Mechatronics
Mahendra Engineering College
Mallasamudram, Namakkal

DEPARTMENT OF MECHATRONICS ENGINEERING

UNIT-IV	PARTIAL DIFFERENTIAL EQUATIONS	9+3
Formation of partial differential equations – Solutions of standard types of first order partial differential equations – Lagrange's linear equation – Homogeneous linear partial differential equations of second and higher order with constant coefficients.		
UNIT-V	**APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS**	**9+3**
Solutions of one dimensional wave equation – One dimensional equation of heat conduction –Steady state solution of two-dimensional equation of heat conduction (Insulated edges excluded)– Fourier series solutions in Cartesian coordinates.		
	Total hours to be taught	**(L:45+T:15): 60PERIODS**

TEXT BOOK :	
1	Dr.P.Kandasamy , Dr.K.Thilagavathy and Dr.K.Gunavathy, " Engineering Mathematics Volume – III",S.Chand& company Ltd. New Delhi, 2012.
2	Ramana B.V, "Higher Engineering Mathematics", Tata McGraw Hill Publishing Company, New Delhi, 2008.
REFERENCES:	
1	Erwin Kreyszig, Advanced Engineering Mathematics.2011, John Wiley & Sons, 2010.
2	Bali N. Pand Manish Goyal, "A Text book of Engineering Mathematics", Laxmi Publications Pvt Ltd., 2012.
3	Veerarajan.T, "Transforms and Partial Differential Equations" , Tata McGraw Hill, 2011.

Dr. T.JESUDAS, M.E., Ph.D
Professor and Head
Department of Mechatronics
Mahendra Engineering College
Mallasamudram, Namakkal

DEPARTMENT OF MECHATRONICS ENGINEERING

MAHENDRAENGINEERINGCOLLEGE (Autonomous)						
Syllabus						
Department	**Mechatronics**	**Programme Code**			**1101**	
III Semester						
Course code	**Course Name**	**Hours/week**			**Credit**	**Maximum Marks**
		L	**T**	**P**	**C**	
24MT14301	**STRENGTH OF MATERIALS FOR MECHATRONICS**	3	0	0	3	**100**
Objective(s)	• To understand the concepts of stress, strain, principal stresses and principal planes • To study the concept of shearing force and bending moment due to external loads in determinate beams and their effect on stresses. • To determine stresses and deformation in circular shafts and helical spring due to torsion. • To compute slopes and deflections in determinate beams by various methods. • To study the stresses and deformations induced in thin and thick shells.					
Outcome(s)	At the end of the course the students would be able to 1. Apply the concepts of stress and strain in simple and compound bars, and explain the importance of principal stresses and principal planes. 2. Identify the load transferring mechanism in beams and calculate the stress distribution due to shearing force and bending moment. 3. Apply basic equation of torsion in designing of shafts and helical springs 4. Calculate slope and deflection in beams using different methods. 5. Analyze thin and thick shells for applied pressures.					
UNIT-I	**STRESS STRAIN DEFORMATION OF SOLIDS**					**(9)**
Rigid and Deformable bodies – Strength, Stiffness and Stability – Stresses; Tensile, Compressive and Shear –Deformation of simple and compound bars under axial load –Thermal stress – Elastic constants –Volumetric strains – Stresses on inclined planes – Principal stresses and principal planes – Mohr's circle of stress.						
UNIT-II	**TRANSVERSE LOADING ON BEAMS AND STRESSES IN BEAM**					**(9)**
Beams – Types - Transverse loading on beams – Shear force and Bending moment in beams – Cantilever, Simply supported and over hanging beams. Theory of simple bending – Bending stress distribution – Load carrying capacity – Proportioning of sections – Flitched beams– Shear stress distribution.						

Dr. T.JESUDAS, M.E., Ph.D
Professor and Head
Department of Mechatronics
Mahendra Engineering College
Mallasamudram, Namakkal

DEPARTMENT OF MECHATRONICS ENGINEERING

UNIT-III	**TORSION**	**(9)**
Analysis of torsion of circular bars – Shear stress distribution – Bars of Solid and hollow circular section – Stepped shaft – Twist and torsion stiffness – Compound shafts – Fixed and simply supported shafts– Application to close- coiled helical springs–Maximum shear stress in spring section including Wahl Factor – Deflection of helical coil springs under axial loads – Design of helical coil springs – stresses in helical coil springs under torsion loads.		
UNIT-IV	**BEAM DEFLECTION**	**(9)**
Elastic curve – Governing differential equation - Double integration method - Macaulay's method - Area moment method - Conjugate beam method for computation of slope and deflection of determinant beams.		
UNIT-V	**THIN CYLINDERS, SPHERES AND THICK CYLINDERS**	**(9)**
Stresses in thin cylindrical shell due to internal pressure - circumferential and longitudinal stresses - Deformation in thin cylinders – Spherical shells subjected to internal pressure – Deformation in spherical shells – Thick cylinders - Lame's theory.		
	Total hours to be taught	**45Periods**

TEXTBOOKS :

1	Popov E.P, "Engineering Mechanics of Solids", Prentice – Hall of India, New Delhi, 1997.
2	Beer F.P. and Johnston R, "Mechanics of Materials", McGraw-Hill Book Co,3rd Edition, 2002.

REFERENCE:

1	Nash W.A, "Theory and problems in Strength of Materials", Schaum Outline Series, McGraw-Hill Book Co, New York, 1995.
2	Kazimi S.M.A, "Solid Mechanics", Tata McGraw – Hill Publishing Co., New Delhi, 1981.
3	Ryder G.H, "Strength of Materials, Macmillan India Ltd"., Third Edition,2002.
4	Ray Hulse, Keith Sherwin & Jack Cain, "Solid Mechanics", Palgrave ANE Books, 2004.
5	Singh D.K "Mechanics of Solids" Pearson Education 2002.

Dr. T.JESUDAS, M.E., Ph.D
Professor and Head
Department of Mechatronics
Mahendra Engineering College
Mallasamudram, Namakkal

MAHENDRA ENGINEERING COLLEGE
(Autonomous)

Syllabus

Department	Mechatronics	Programme Code &Name	1101 & MCT

III Semester

Course code	Course Name	Hours/week			Credit	Maximum Marks
		L	T	P	C	
24MT14302	KINEMATICS OF MACHINERY	3	0	0	3	100

Objective(s)

- To understand the basic components and layout of linkages in the assembly of a system machine.
- To understand the principles in analyzing the assembly with respect to the displacement, velocity, and acceleration at any point in a link of a mechanism.
- To understand the motion resulting from a specified set of linkages, design few linkage mechanisms and cam mechanisms for specified output motions.
- To understand the basic concepts of toothed gearing and kinematics of gear trains.
- To understand the effects of friction in motion transmission and machine components.

Outcome(s)

The students will be able to

1. Discuss the basics of mechanism.
2. Calculate velocity and acceleration in simple mechanisms.
3. Develop CAM profiles.
4. Solve problems on gears and gear trains.
5. Examine friction in machine elements.

UNIT-I **BASICS OF MECHANISMS** **(9)**

Basic concepts of Link, Kinematic pair, Kinematic chain, Mechanism, Machine, Degree of Freedom, Kutzbach and Gruebler's criterion and Grashoff's law - Kinematic Inversions of four bar chain and slider crank chain - Mechanical Advantage - Transmission angle. Description of common Mechanisms – Single, Double and Offset slider mechanism. Straight line Mechanisms - Design of crank-rocker mechanisms.

UNIT-II **KINEMATIC ANALYSIS** **(9)**

Displacement, velocity and acceleration analysis of simple mechanisms – Graphical method, Klein's construction Analysis of velocity and acceleration of single slider crank mechanism, Coriolis component of acceleration.

Dr. T.JESUDAS, M.E., Ph.D.
Professor and Head
Department of Mechatronics
Mahendra Engineering College
Mallasamudram, Namakkal

DEPARTMENT OF MECHATRONICS ENGINEERING

UNIT-III	KINEMATICS OF CAMS	(9)
Classifications of cam and follower- Displacement diagrams – Uniform Velocity Motion, Simple Harmonic Motion, Uniform Acceleration and Retardation motion and Cycloidal motions – Graphical construction of displacement diagrams and layout of plate cam profiles – construction of cam profile for a radial cam - Pressure angle and undercutting.		
UNIT-IV	**GEARS**	**(9)**
Classification of gears – Gear tooth terminology - Fundamental Law of toothed gearing and involute gearing – Length of path of contact and contact ratio - Interference and undercutting – Non standard gear teeth – helical, bevel, worm, rack and pinion gears.(basics only) - Gear trains – Simple, compound and Epicyclic gear trains - Differentials.		
UNIT-V	**FRICTION**	**(9)**
Dry friction – Simple contact friction, wedge friction, ladder friction - Friction in screw jack – friction clutches, single plate clutches, multiple plate clutches and cone clutches - Block brakes, band brakes.		
	Total hours to be taught	**45 Periods**

TEXT BOOKS :

1	Ambekar A. G., Mechanism and Machine Theory, Prentice Hall of India, New Delhi, 2007.
2	UickerJ.J.,Pennock G.R., Shigley J.E., “Theory of Machines and Mechanisms”(Indian Edition), Oxford University Press, 2003.
3	S.S.Rattan- Theory of Machines & Mechanisms, Tata Mcgraw hill publishers.

REFERENCE:

1	Rao J.S and Dukkipati R.V, “Mechanism and Machine Theory”, Wiley-Eastern Ltd., New Delhi.
2	Ramamurti,V.,’ Mechanism and Machine Theory”, Second Edition, Narosa Publishing House, 2005.
3	Ghosh A and A.K.Mallick, “Theory of Mechanisms and Machines”, Affiliated East- West Pvt. Ltd., New Delhi, 1998.
4	Rao J.S and Dukkipati R.V, “Mechanism and Machine Theory”, Wiley-Eastern Ltd., New Delhi, 1992.
5	Thomas Bevan, “Theory of Machines”, CBS Publishers and Distributors, 1984.
6	John Hannah and Stephens R.C, “Mechanics of Machines”, Viva Low-Prices Student Edition, 1999.
7	Theory of Machines – PL. Balaney / Khanna publishers.

Dr. T.JESUDAS, M.E., Ph.D
Professor and Head
Department of Mechatronics
Mahendra Engineering College
Mallasamudram, Namakkal

DEPARTMENT OF MECHATRONICS ENGINEERING

III Semester						
Course code	**Course Name**	**Hours/week**			**Credit**	**Maximum Marks**
		L	**T**	**P**	**C**	
24MT14303	**FUNDAMENTALS OF FLUID MECHANICS AND MACHINERY**	**3**	**0**	**0**	**3**	**100**

Objective(s)	• To impart knowledge on the properties of fluid and fluid statics principles • To calculate the rate of flow and energy losses in flow through pipes • To emphasize the concepts of boundary layer theory and the importance of dimensional analysis • To educate the working principles and performance analysis of fluid pumps. • To provide knowledge on the working principle and performance curves of hydraulic turbines
Outcome(s)	At the end of the course, the students will be able to 1. Explain the fluid properties and the pressure measurement using fundamental laws of fluid mechanics 2. Analyze the volume rate of flow and losses occur in a flow through pipes. 3. Apply the concept of boundary layer, Dimensional analysis and Modal analysis on the fluid structures 4. Select a suitable pump for a given application and evaluate the operating characteristics of Hydraulic pumps 5. Choose a suitable turbine for a given application and evaluate the operating characteristics of Hydraulic turbines

UNIT-I	**FLUID PROPERTIES AND FLOW CHARACTERISTICS**	**(9)**
Fluid – definition, distinction between solid and fluid – Units and dimensions – Properties of fluids – Fluid statics - Pressure Measurements - Buoyancy and floatation. Flow characteristics – concept of control volume – application of continuity equation, energy equation and momentum equation.		
UNIT-II	**FLOW THROUGH PIPES**	**(9)**
Reynold's Experiment - Laminar flow through circular conduits - Darcy Weisbach equation - friction factor - Moody diagram - Major and minor losses -Hydraulic and energy gradient lines - Pipes in series and parallel.		
UNIT-III	**FLUID FLOW OVER BODIES AND DIMENSIONAL ANALYSIS**	**(9)**
Boundary layer concepts-Types of boundary layer thickness -Lift and Drag of an aerofoil-Need for dimensional analysis -Methods of dimensional analysis using Buckingham pi theorem -Similitude - Types of similitude-Dimensionless parameters-Application of Dimensionless parameters		

Dr. T.JESUDAS, M.E., Ph.D
Professor and Head
Department of Mechatronics
Mahendra Engineering College
Mallasamudram, Namakkal

DEPARTMENT OF MECHATRONICS ENGINEERING

UNIT-IV	**TURBINES**	**(9)**
Classification of turbines heads and efficiencies velocity triangles. Axial, radial and mixed flow turbines. Pelton wheel, Francis turbine and Kaplan turbines- working principles. Work done by water on the runner draft tube. Specific speed unit quantities performance curves for turbines.		
UNIT-V	**PUMPS**	**(9)**
Euler's equation - Theory of roto-dynamic machines-Centrifugal pumps working principle- velocity triangle -work done by the impeller - performance curves - Reciprocating pump- working principle Rotary pumps –classification		
	Total hours to be taught	**45 Periods**

TEXTBOOKS :

1	Bansal, R.K., Fluid Mechanics and Hydraulics Machines, Laxmi Publications (P) Ltd., New Delhi.
2	Streeter. V.L., and Wylie, E.B., Fluid Mechanics, McGraw Hill,1983.

REFERENCE:

1	Kumar. K.L., Engineering Fluid Mechanics (VII Ed.) Eurasia Publishing House(P) Ltd., New Delhi,1995.
2	Ramamritham.S, Fluid Mechanics, Hydraulics and Fluid Machines, Dhanpat Rai & Sons, Delhi,1988.
3	Rathakrishnan. E, Fluid Mechanics, Prentice Hall of India (II Ed.), 2007.
4	White,F.M.,FluidMechanics,TataMcGraw-Hill,NewDelhi,2003.
5	Som,S.K., and Biswas, G., Introduction to Fluid Mechanics and Fluid Machines, Tata McGraw - Hill,2004.

Dr. T.JESUDAS, M.E., Ph.D
Professor and Head
Department of Mechatronics
Mahendra Engineering College
Mallasamudram, Namakkal

DEPARTMENT OF MECHATRONICS ENGINEERING

III Semester						
Course Code	**COURSE NAME**	**Hours/week**			**Credit**	**Maximum Marks**
		L	**T**	**P**	**C**	
24MT14304	**ELECTRICAL DRIVES AND CONTROLS**	3	0	0	3	**100**

Objectives	• To impart knowledge on the basic concepts of different types of electrical machines and their performance. • To determine the basic concepts of drive motor characteristics. • To get exposure on AC and DC starting methods. • To explain the speed control methods of conventional drives. • To discuss the solid-state drive speed control methods
Outcomes	on completion of this course the students will be able to 1. Describe Basic concept of Electric drives and motor characteristics. 2. Analyze the characteristics of electrical drives. 3. Summarize different methods of starting D.C motors and induction motors. 4. Explain the conventional speed control methods of electric drives. 5. Discuss the solid state drives for speed control of AC and DC drives.

UNIT-I	**BASIC ELEMENTS OF ELECTRIC DRIVES**	**9**
Basic Elements – Types of Electric Drives – Factors influencing the choice of electrical drives – Heating and cooling curves – Loading conditions and classes of duty - Braking of Electrical motors		
UNIT-II	**DRIVE MOTOR CHARACTERISTICS**	**9**
Mechanical characteristics – Speed-Torque characteristics of various types of load and drive motors — DC motors: Shunt, series and compound - Single phase and Three phase Induction motors.		
UNIT-III	**STARTING METHODS**	**9**
Types of D.C Motor starters – Typical control circuits for shunt and series motors – Types of A.C Motor starters -Three phase squirrel cage and slip ring induction motors.		
UNIT-IV	**SPEED CONTROL OF ELECTRICAL DRIVES USING CONVENTIONAL METHOD**	**9**
Speed control of DC series and shunt motors – Armature and field control, Ward- Leonard control system - speed control of three phase induction motor – Voltage control, voltage / frequency control, slip power recovery scheme		

Dr. T.JESUDAS, M.E., Ph.D
Professor and Head
Department of Mechatronics
Mahendra Engineering College
Mallasamudram, Namakkal

DEPARTMENT OF MECHATRONICS ENGINEERING

UNIT-V	SPEED CONTROL OF ELECTRICAL DRIVES USING SOLID STATE METHOD	9
Speed control of DC series and shunt motors Using controlled rectifiers and DC choppers – Speed control of three phase induction motor Using inverters and AC voltage regulators – applications.		
	Total hours to be taught	**(L:45+T:0): 45Hours**

TEXT BOOKS

1	Vedam Subrahmaniam, “Electric Drives (concepts and applications)”, Tata McGraw-Hill, 2001
2	Nagrath.i.j. &Kothari.D.P, “Electrical Machines”, Tata McGraw-Hill, 2014.
3	Murugesh Kumar K, “DC Machines & Transformers”, Vikas Publishing House Pvt Ltd., Second Edition, 2004.

REFERENCES

1	Pillai.S.K “A first course on Electric drives”, Wiley Eastern Limited, 2003.
2	M.D.Singh, K.B.Khanchandani, “Power Electronics”, Tata McGraw-Hill, 2003.
3	H.Partab, “Art and Science and Utilisation of electrical energy”, Dhanpat Rai and Sons, 2008.

Dr. T.JESUDAS, M.E., Ph.D
Professor and Head
Department of Mechatronics
Mahendra Engineering College
Mallasamudram, Namakkal

DEPARTMENT OF MECHATRONICS ENGINEERING

Semester III						
Course Code	**Course Name**	**Hours/Week**			**Credit**	**Maximum Marks**
		L	**T**	**P**	**C**	
24MA12304	**Quantitative Aptitude and Problem Solving Skills**	2	1	0	3	**100**

Objectives	**To enable the students to:** • Enhance the problem solving skills. • Improve the basic mathematical skills. • Develop their logical reasoning thinking ability. • Analysis the problems logically and approach in different manner. • Develop the skill of computation with sequences and series.
Outcomes	At the end of the course the students will be able to: • Solve problems concerning number system, divisibility, factorials, time and work. • Apply the concepts involving time, speed and distance in real life problems. • Solve problems involving investment, profit, loss and interest. • Develop analytical skills in trigonometry, partnership and averages. • Solve problems related to series, sequence, clocks and direction.

UNIT-I	**NUMBERS, TIME AND WORK**	**9**
Number system: Properties - Divisibility rules – Factorization - Concepts of HCF and LCM - Factorial based problems, Time and work: Facts and Formulae, Arithmetic operations using Vedic Mathematics.		
UNIT-II	**PERCENTAGES, TIME AND DISTANCE**	**9**
Concept of Percentages – Results of Population - Results of Depreciation, Time, Speed and Distance; Units - Relationship between Time and Distance – Applications - Inverse proportionality of Speed and Time.		
UNIT-III	**PROFIT AND LOSS**	**9**
Basic concepts - Cost price - Selling price - Marked price - Gain percentage - Loss percentage, Simple interest - Compound interest.		
UNIT-IV	**TRIGONOMETRY, PARTNERSHIPS AND AVERAGE**	**9**
Definition – Ratios – Functions - Even and Odd functions – Angles - Applications, Partnerships: Definition - Types of Partnership - Ratio of division of gains - Working and sleeping partners, Average: Facts and Formulae.		

Dr. T.JESUDAS, M.E., Ph.D
Professor and Head
Department of Mechatronics
Mahendra Engineering College
Mallasamudram, Namakkal

DEPARTMENT OF MECHATRONICS ENGINEERING

UNIT -V	SERIES AND SEQUNCENCE	9
Definition - Types - Difference between series and sequence, Clocks: Hour hand – Minute hand - Angle traced by hour – Angle traced by minute, Direction sense: Facing direction – Imaging and Comparing - Cubes; Definition – Properties - Area and Volume.		
	Total	**45Periods**

TEXTBOOK :

"Quantitative Aptitude" – R.S. Aggarwal, S.Chand and Company Ltd, New Delhi, 2022.

REFERENCES:

1.	A Modern Approach to Verbal and Non-Verbal Reasoning by R.S. Aggarwal, S.Chand and Company Ltd, New Delhi, 2012.
2.	*Quantitative Aptitude for Competitive Examinations by Abhijit Guha, Tata McGraw Hill Publication 2010.*

Dr. T.JESUDAS, M.E., Ph.D
Professor and Head
Department of Mechatronics
Mahendra Engineering College
Mallasamudram, Namakkal

DEPARTMENT OF MECHATRONICS ENGINEERING

DEPARTMENT:	SCIENCE & HUMANITIES	Programme Code & Name	CY& CHEMISTRY

SEMESTER-III

COURSE CODE	COURSE NAME	HOURS/WEEK			CREDIT	MAXIMUM MARKS
		L	T	P	C	
24CY11001	ENVIRONMENTAL SCIENCE AND SUSTAINABILITY	2	0	0	0	100

Objectives	To make the students familiar with : 1. The importance of Environment and Ecosystem. 2. The basic concepts of biodiversity and emphasize on the biodiversity of India and its conservation. 3. The causes, effects and prevention measures of environmental pollution. 4. The social issues of the environment and National laws for environment protection. 5. The concept of sustainable development goals and appreciate the interdependence of economic and social aspects of sustainability, recognize and analyze.
Outcomes	At the end of the course the student will be able to 1. Explain the importance of Environment and types of Ecosystem. 2. Classify the biodiversity and measure the variety of animals, plants and microbial species. 3. Identify the different types of Pollution and be familiar with control measures 4. List out the environmental issues and essential legislation on environmental laws. 5. Recognize the different goals of sustainable development and apply them for suitable technological advancement and societal development.

UNIT-I	**ENVIRONMENT& ECOSYSTEM**	9Hrs

Definition, Scope and Importance of Environment – Need for public awareness – Ecosystem: concept of an ecosystem – structure and function of an ecosystem – energy flow in the ecosystem - Introduction, types, characteristic features, structure and function of the terrestrial (Forest and Grass land) ecosystem.

UNIT-II	**BIODIVERSITY AND ITS CONSERVATION**	9Hrs

Biodiversity: Introduction – definition - genetic, species and ecosystem diversity - Value of biodiversity – India as a mega-diversity nation – hot-spots of biodiversity – threats to biodiversity – endangered and endemic species of India – conservation of biodiversity: In-situ and ex-situ conservation of biodiversity – Field visit to local area.

UNIT-III	**ENVIRONMENTAL POLLUTION**	9Hrs

Definition – causes, effects and control measures of: (a) Air, (b) Water, (c) Soil, (d) Noise pollution– solid waste management: causes, effects and control methods of municipal solid wastes – E-waste and plastic waste: recycling and reuse - role of an individual in prevention of pollution – pollution case studies (vizag gas leakage)

UNIT-IV	**SOCIAL ISSUES& ENVIRONMENTAL IMPACT ASSESMENT**	9Hrs

Social issues – Climate change, global warming, acid rain, ozone layer depletion, case studies (Global warming). – EPA: Environment protection act - EIA: EIA structure- methods of baseline data acquisition. Planning and management of impact studies - operational aspects of EIA - methods for impact identification.

Dr. T. JESUDAS, M.E., Ph.D
Professor and Head
Department of Mechatronics
Mahendra Engineering College
Mallasamudram, Namakkal

DEPARTMENT OF MECHATRONICS ENGINEERING

UNIT-V	SUSTAINABILITY AND MANAGEMENT	9Hrs
Development ,GDP ,Sustainability- concept, needs and challenges - economic, social and aspects of sustainability - from unsustainability to sustainability - millennium development goals, and protocols- Sustainable Development Goals - targets, indicators and intervention areas.		
	TOTAL	**45Hrs**

TEXT BOOKS :

1.	Rajagopalan, R, "Environmental Studies-From Crisis to Cure", Oxford University Press (2015)
2.	Benny Joseph, "Environmental Science and Engineering", Tata McGraw-Hill, New Delhi, 2017.
3.	Dr.A.Ravikrishnan, "Environmental Science and Engineering" , Sri Krishna Hi-tech Publishing Company Pvt. Ltd. Chennai, 2018.
4.	Allen, D. T. and Shonnard, D. R., Sustainability Engineering: Concepts, Design and Case Studies, Prentice Hall.

REFERENCES

1.	Gilbert M.Masters, "Introduction to Environmental Engineering and Science", 3rd Edition, Pearson Education, 2023.
2.	R.K. Trivedi, "Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards", Vol. I and II, Enviro Media.
3.	Dharmendra S. Sengar, "Environmental law", Prentice hall of India PVT LTD, New Delhi, 2007.

Dr. T.JESUDAS, M.E., Ph.D
Professor and Head
Department of Mechatronics
Mahendra Engineering College
Mallasamudram, Namakkal

DEPARTMENT OF MECHATRONICS ENGINEERING

III Semester						
Course Code	**Course Name**	**Hours/Week**			**Credit**	**Maximum Marks**
		L	**T**	**P**	**C**	
24MT24301	**STRENGTH OF MATERIALS LABORATORY**	**0**	**0**	**3**	**1.5**	**100**
Objective(s)	• To study the mechanical properties of materials when subjected to tension. • To study the mechanical properties of materials when subjected to torsion. • To study the mechanical properties of hardness materials. • To study the mechanical properties of materials when subjected to compression load. • To study the mechanical properties of materials when the materials gets deformed.					
Outcome(s)	The students will be 1. Ability to perform Tension & Torsion test. 2. Ability to perform Hardness & Compression test. 3. Ability to perform Deformation test on Solid materials.					

LISTOFEXPERIMENTS

1.	Tension test on a mild steel rod
2.	Double shear test on Mild steel and Aluminum rods
3.	Torsion test on mild steel rod
4.	Impact test on metal specimen
5.	Hardness test on metals – Brinnell and Rockwell Hardness Number
6.	Hardness test on wood - universal testing machine
7.	Deflection test on cantilever beams
8.	Deflection test on wooden beams
9.	Compression test on helical springs
	Total hours to be taught **30Periods**

Dr. T.JESUDAS, M.E., Ph.D
Professor and Head
Department of Mechatronics
Mahendra Engineering College
Mallasamudram, Namakkal

DEPARTMENT OF MECHATRONICS ENGINEERING

MAHENDRAENGINEERINGCOLLEGE (Autonomous)						
Syllabus						
Department	**Mechatronics**		**Programme Code**		**1101**	
III Semester						
Course Code	**Course Name**	**Hours/Week**			**Credit**	**Maximum Marks**
		L	**T**	**P**	**C**	
24MT24302	**FLUID MECHANICS AND MACHINERY LABORATORY**	**0**	**0**	**3**	**1.5**	**100**
Objective(s)	• To verify the principles studied in Fluid Mechanics theory by performing experiments in lab. • To study and understand the importance of various types of flow in pumps. • To study and understand the importance of dimensional analysis.					
Outcome(s)	The students should be able to 1. Use the measurement equipments for flow measurement. 2. Perform test on flow measurement devices. 3. Perform test on different types of fluid pumps. 4. Perform test on different types of fluid turbines.					

LISTOFEXPERIMENTS

1.	Determination of the Coefficient of discharge of given Orifice meter.
2.	Determination of the Coefficient of discharge of given Venturi meter.
3.	Determination of minor losses in pipes.
4.	Determination of friction factor for a given set of pipes.
5.	Bernoulli's Theorem – Verification
6.	Conducting experiments and drawing the characteristic curves of centrifugal pump.
7.	Conducting experiments and drawing the characteristic curves of reciprocating pump.
8.	Conducting experiments and drawing the characteristic curves of Gear pump.
9.	Conducting experiments and drawing the characteristic curves of Pelton wheel.
10.	Conducting experiments and drawing the characteristics curves of Francis turbine.
	Total hours to be taught **30Periods**

Dr. T.JESUDAS, M.E., Ph.D
Professor and Head
Department of Mechatronics
Mahendra Engineering College
Mallasamudram, Namakkal

DEPARTMENT OF MECHATRONICS ENGINEERING

III Semester

COURSE CODE	COURSE NAME	Hours/week			Credit	Maximum Marks
		L	T	P	C	
24MT24303	ELECTRICAL MACHIINES LABORATORY	0	0	3	1.5	100

Objectives	• To introduce techniques of magnetic-circuit analysis and working principles of electrical machines using the electromechanical energy conversion. • To provide an impact on the machine windings and the EMF pattern of armature and field windings dc generators. • To expose knowledge on the theory, operation and characteristics of DC machines.
Outcomes	1. Understand the Basics of Magnetic Circuits and Rotating Electrical Machines 2. Understand the constructional details and principle of operation of DC Generators 3. Analyze the performance of the DC Machines under various operating conditions using their various characteristics.

LIST OF EXPERIMENTS

1.	Load test on DC Shunt motor
2.	Load test on DC Series motor
3.	Load test on DC Compound motor
4.	Speed control of DC shunt motor (Armature and Field Control)
5.	O.C.C and Load characteristics of DC Shunt generator
6.	Load test on single phase transformer.
7	O.C & S.C Test on a single phase transformer.
8.	Load test on single phase Induction Motor.
9.	Load test on three phase squirrel cage Induction Motor.
10.	Speed control of three phase slip ring Induction Motor
	Total Hours to be taught: **L:00 P:45 (45 Hours)**

REFERENCES

1.	Sakshat Virtual Laboratory- Electrical Machines Laboratory Link: http://iitg.vlab.co.in/?sub=61&brch=168

Dr. T.JESUDAS, M.E., Ph.D
Professor and Head
Department of Mechatronics
Mahendra Engineering College
Mallasamudram, Namakkal

DEPARTMENT OF MECHATRONICS ENGINEERING

Regulation 2024							
IV Semester							
Sl. No.	**Course code**	**Course Title**	**Category**	**L**	**T**	**P**	**C**
THEORY							
1	24MA12401	Numerical Methods	BS	3	1	0	4
2	24MT14401	Dynamics of Machinery	PC	3	0	0	3
3	24MT14402	Applied Hydraulics and Pneumatics	PC	3	0	0	3
4		Open Elective – 2	OE	3	0	0	3
5		Open Elective – 3	OE	3	0	0	3
6	24SH11006	Universal Human Values	HS	2	1	0	3
PRACTICAL							
7	24MT24401	Dynamics Laboratory	PC	0	0	3	1.5
8	24MT24402	Automation Laboratory	PC	0	0	3	1.5
9	24HS21002	Professional Communication Skills	EEC	0	1	2	2
		TOTAL		**17**	**3**	**8**	**24**

Dr. T.JESUDAS, M.E., Ph.D
Professor and Head
Department of Mechatronics
Mahendra Engineering College
Mallasamudram, Namakkal

DEPARTMENT OF MECHATRONICS ENGINEERING

IV Semester						
Course code	**Course Name**	**Hours/week**			**Credit**	**Maximum marks**
		L	**T**	**P**	**C**	
24MA12401	**NUMERICAL METHODS**	3	1	0	4	**100**

Objective(s)	To enable the students to, • Understand the solution of algebraic and transcendental equations and study the methods to solve linear system of equations by direct and iterative methods. • Interpolate the values of a function using Lagrange's, Newton's and cubic spline polynomial approximations. • Evaluate the derivatives from finite differences and evaluate single and double integrals by numerical integration methods. • Gain the knowledge to solve ordinary differential equations by single step and multi-step methods. • Acquire the knowledge to solve boundary value problems in ordinary and Partial differential equations, using finite difference approximations.
Outcome(s)	At the end of the course the students will be able to • Determine the solution of algebraic and transcendental equations and system of linear equations numerically. • Demonstrate the concepts of interpolations. • Acquired the knowledge of numerical differentiation and integration using finite differences. • Apply numerical methods to solve ordinary differential equations. • Solve ordinary and partial differential equations using finite difference methods.

MODULE-I	**SOLUTION OF EQUATIONS**	**(9+3)**
Solution of Algebraic and transcendental equations – Iteration method and Newton Raphson method– Solution of linear system of equations-Gauss elimination and Gauss Jordon methods- Gauss Jacobi and Gauss Seidel methods-Matrix inversion by Gauss Jordon method.		
MODULE -II	**INTERPOLATION AND APPROXIMATION**	**(9+3)**
Review of difference operators-Interpolation using Lagrange's and Newton's divided difference interpolation-Newton's forward and backward difference interpolation-Interpolating with cubic spline.		

Dr. T.JESUDAS, M.E., Ph.D
Professor and Head
Department of Mechatronics
Mahendra Engineering College
Mallasamudram, Namakkal

DEPARTMENT OF MECHATRONICS ENGINEERING

MODULE -III	**NUMERICAL DIFFERENTIATION AND INTRGRATION**	**(9+3)**
Differentiation using Newton's forward and backward interpolation formula-Numerical integration: Trapezoidal rule and Simpson's 1/3rd and 3/8 rules-Two- and Three-point Gaussian quadrature formulae-Double integrals using Trapezoidal rule and Simpson's rule.		
MODULE -IV	**SOLUTIONS OF ODE**	**(9+3)**
Ordinary differential equations: Taylor's series, Euler and modified Euler's methods. Runge- Kutta method of fourth order for solving first and second order equations. Milne's and Adam's predicator-corrector methods.		
MODULE -V	**SOLUTIONS OF PDE**	**(9+3)**
Partial differential equations: Finite difference solution two-dimensional Laplace equation and Poisson equation, Implicit and explicit methods for one dimensional heat equation (Bender-Schmidt and Crank-Nicholson methods), Finite difference explicit method for wave equation.		
	Total hours to be taught	**(L:45+T:15): 60 Periods**

TEXT BOOKS:	
1	Veerarajan.T, and Ramachandran, T., "Numerical Methods with programming in C", Second Edition, Tata McGraw Hill, (2007).
2	S.S. Sastry, Introductory methods of numerical analysis, PHI,5th Edition, 2012.
REFERENCE:	
1	Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2016.
2	B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 44th Edition,2017.
3	P. Kandasamy, K. Thilagavathy, K. Gunavathi, Numerical Methods, S. Chand & Company, 2nd Edition, Reprint 2012.
4	Gerald, C.F.and Wheatley, P.O., "Applied Numerical Analysis", 6th Edition, Pearson Education, Asia, New Delhi, 2006.

Dr. T.JESUDAS, M.E., Ph.D
Professor and Head
Department of Mechatronics
Mahendra Engineering College
Mallasamudram, Namakkal

DEPARTMENT OF MECHATRONICS ENGINEERING

IV Semester						
Course code	**Course Name**	**Hours/week**			**Credit**	**Maximum Marks**
		L	**T**	**P**	**C**	
24MT14401	**DYNAMICS OF MACHINERY**	3	0	0	3	**100**
Objective(s)	• To understand the force-motion relationship in components subjected to external forces and analysis of standard mechanisms. • To understand the undesirable effects of unbalances resulting from prescribed motions in mechanism. • To understand the effect of Dynamics of undesirable vibrations. • To understand the effect of damping. • To understand the principles in mechanisms used for speed control and stability control.					
Outcome(s)	The students will be able to 1. Calculate static and dynamic forces of mechanisms. 2. Calculate the balancing masses and their locations of reciprocating and rotating masses. 3. Compute the frequency of free vibration. 4. Compute the frequency of forced vibration and damping coefficient. 5. Calculate the speed and lift of the governor and estimate the gyroscopic effect on automobiles, ships and airplanes.					
UNIT-I	**FORCE ANALYSIS**					**(9)**
Dynamic force analysis –Inertia force and Inertia torque– D Alembert's principle –Dynamic Analysis in reciprocating engines – Gas forces – Inertia effect of connecting rod– Bearing loads – Crank shaft torque – Turning moment diagrams –Fly Wheels.						
UNIT-II	**BALANCING**					**(9)**
Static and dynamic balancing – Balancing of rotating masses – Balancing a single cylinder engine – Balancing of Multi-cylinder inline, V-engines –Balancing of linkages – Balancing machines.						
UNIT-III	**SINGLE DEGREE FREE VIBRATION**					**(9)**
Basic features of vibratory systems – Degrees of Freedom – single degree of Freedom – Free vibration – Equations of motion – Natural frequency – Types of Damping – Damped vibration– Critical speeds of shafts – Torsional vibration – Two and three rotor torsional systems.						

Dr. T.JESUDAS, M.E., Ph.D
Professor and Head
Department of Mechatronics
Mahendra Engineering College
Mallasamudram, Namakkal

DEPARTMENT OF MECHATRONICS ENGINEERING

UNIT-IV	**FORCED VIBRATION**	**(9)**
Response of one degree freedom systems to periodic forcing – Harmonic disturbances –Disturbance caused by unbalance – Support motion –transmissibility – Vibration isolation.		
UNIT-V	**MECHANISM FOR CONTROL**	**(9)**
Governors – Types – Centrifugal governors – Gravity controlled centrifugal governors – Characteristics – Effect of friction – Controlling force curves. Gyroscopes –Gyroscopic forces and torques – Gyroscopic stabilization – Gyroscopic effects in Automobiles, ships and airplanes.		
	Total hours to be taught	**45 Periods**

TEXT BOOK :

1	Ratan, S.S, “Theory of Machines”, 3rd Editon, Tata McGraw-Hil, 2009

REFERENCE:

1	Thomas Bevan, "Theory of Machines", 3rd Editon, CBS Publishers and Distributors, 2005.
2	Cleghorn. W. L, “Mechanisms of Machines”, Oxford University Pres, 2005
3	Benson H. Tongue, ”Principles of Vibrations”, Oxford University Pres, 2nd Editon, 2007
4	Robert L. Norton, "Kinematics and Dynamics of Machinery", Tata McGraw-Hil, 2009
5	Alen S. Hal Jr., “Kinematics and Linkage Design”, Prentice Hal, 1961
6	Ghosh. A and Malick, A.K., “Theory of Mechanisms and Machines", Affiliated East-West Pvt. Ltd., New Delhi.

Dr. T.JESUDAS, M.E., Ph.D
Professor and Head
Department of Mechatronics
Mahendra Engineering College
Mallasamudram, Namakkal

DEPARTMENT OF MECHATRONICS ENGINEERING

Department	Mechatronics	Programme Code	1101

IV Semester

Course code	Course Name	Hours/week			Credit	Maximum Marks
		L	T	P	C	
24MT14402	APPLIED HYDRAULICS AND PNEUMATICS	3	0	0	3	100

Objective(s)

- Know the fundamental principles, design and operation of hydraulic and pneumatic components and systems.
- To impart knowledge about Classification of hydraulic actuators and valves.
- Basic concepts of fluid power system design - Hydraulic oils and Hydraulic circuit.
- Describe the basic function, structure, and operation of pneumatic components' and pneumatic power system design.
- Identify possible causes of some common hydraulic component and system failures.

Outcome(s)

The students will be able to

1. Explain the fluid power system and its fundamentals.
2. Identify suitable hydraulic actuators for different applications.
3. Choose the suitable fluid power control components for various applications.
4. Choose the suitable pneumatic components for different applications.
5. Design fluid power circuit for given applications.

UNIT-I	FLUID POWER PRINCIPLES AND HYDRAULIC PUMPS	(9)

Introduction to Fluid power- Advantages and Applications- Fluid power systems – Types of fluids- Properties of fluids – Basics of Hydraulics – Pascal's Law- Principles of flow – Friction los- Work, Power and Torque. Problems Sources of Hydraulic power: Pumping Theory – Pump Classification- Construction, Working, Design, Advantages, Disadvantages, Performance, Selection criterion of Linear, Rotary-Fixed and Variable displacement pumps-Problems.

UNIT-II	HYDRAULIC ACTUATORS AND VALVES	(9)

Hydraulic Actuators: Cylinders – Types and construction, Application, Hydraulic cushioning– Hydraulic motors Control Components: Direction control, Flow control and Pressure control valves- Types, Construction and Operation- Servo and Proportional valves – Applications –Types of actuation. Accessories: Reservoirs, Pressure Switches – Applications – Fluid Power ANSI Symbols– Problems.

UNIT-III	HYDRAULIC SYSTEMS	(9)

Accumulators, Intensifiers, Industrial hydraulic circuits - Regenerative, Pump Unloading, Double - pump, Pressure Intensifier, Air – over oil, Sequence, Reciprocation, Synchronization, Fail-safe, Speed control, Hydrostatic transmission, Electro hydraulic circuits, Mechanical Hydraulic servo systems.

Dr. T.JESUDAS, M.E., Ph.D
Professor and Head
Department of Mechatronics
Mahendra Engineering College
Mallasamudram, Namakkal

UNIT-IV	**PNEUMATICSYSTEMS**	**(9)**
Properties of air – Perfect Gas Laws – Compressors Filter, Regulator, Lubricator, Muffler, Air control Valves, Quick Exhaust valves, Pneumatic actuators, Design of pneumatic circuit cascade method-Electro pneumatic circuits, Introduction to Fluidics, Pneumatic logic circuits.		
UNIT-V	**ADVANCEMENTS IN FLUID POWER ENGINEERING**	**(9)**
Overview of hydro pneumatics; Industrial internet of things for monitoring, control and diagnostics of systems for fluid power applications. Programmable Logic Controller: Construction, programming methods, timers and counters; Programming using ladder logic diagrams.		
	Total hours to be taught	**45 Periods**

TEXTBOOK:	
1	AnthonyEsposito,“FluidPowerwithApplications”,PrenticeHall,2009.
REFERENCES:	
1	Shanmugasundaram.K,“HydraulicandPneumaticControls”,Chand&Co,2006.
2	Majumdar,S.R.,“OilHydraulicsSystems-PrinciplesandMaintenance”,TataMcGraw Hill,2001.

Dr. T.JESUDAS, M.E., Ph.D
Professor and Head
Department of Mechatronics
Mahendra Engineering College
Mallasamudram, Namakkal

DEPARTMENT OF MECHATRONICS ENGINEERING

Course Code	Course Name	Hours/Week			Credit	Maximum Marks
		L	T	P	C	
24SH11006	UNIVERSAL HUMAN VALUES	2	1	0	3	100

(Mandatory Credit Course to All UG Programmes to be offered in III / IV Semester)
Pre-requisites: Universal Human Values 1 (Induction Programme) (desirable)

The foundation course "H-102 Universal Human Values: "Understanding Harmony" may be covered in III or IV semester. This course discusses the role of human beings in their family. It also touches issues related to their role in the society and the nature. During the Induction Program, students would get an initial exposure to human values through Universal Human Values 1. This exposure is to be augmented by this compulsory full semester foundation course. The Course has 5 Modules (5 Units): 30 Lectures and 15 Practice sessions (Tutorials).

1. COURSE OBJECTIVES:

The objectives of the course are:
(i). Development of a holistic perspective based on self-exploration about themselves (human being), family, society and nature/existence.
(ii). Understanding (or developing clarity) the harmony in the human being, family, society and nature/existence
(iii). Strengthening of self-reflection for harmonious relationship in family, society
(iv). Development of commitment and courage to act as human being in ensuring harmony in nature for co-existence.
(v). Development of holistic principles of harmony and professional ethics for natural acceptance of human values and observe ethical human conduct.

2. COURSE OUTCOMES:

Upon completion of the Course the Learner will be able to:

- Distinguish between values and skills, and highlight the need for Universal Human Values.
- Describe the need for Harmony and distinguish between happiness and accumulation of physical facilities, etc.
- Relate the value of harmonious relationship in family, society based on trust and respect for happiness and prosperity in their life and profession.
- Outline the role of a human being in ensuring harmony in nature for co-existence.
- Apply the holistic principles of Harmony and Professional Ethics for natural acceptance of human values and observe Ethical Human Conduct.

Dr. T.JESUDAS, M.E., Ph.D
Professor and Head
Department of Mechatronics
Mahendra Engineering College
Mallasamudram, Namakkal

Module 1: Course Introduction - Need, Basic Guidelines, Content and Process for Value Education

L 1. Purpose and motivation for the course, recapitulation from Universal Human Values-I (Induction Programme).
L 2. Self-Exploration–what is it? Its content and process; 'Natural Acceptance' and Experiential Validation-as the process for self-exploration.
L 3. Continuous Happiness and Prosperity - A look at basic Human Aspirations.
L 4. Right understanding, Relationship and Physical Facility - the basic requirements for fulfillment of aspirations of every human being with their correct priority.
L 5. Understanding Happiness and Prosperity correctly - A critical appraisal of the current scenario.
L 6. Method to fulfill the above human aspirations: understanding and living in harmony at various levels.

3 Practice sessions *(T1 to T3) - To discuss natural acceptance in human being as the innate acceptance for living with responsibility (living in relationship, harmony and co-existence) rather than as arbitrariness in choice based on liking-disliking.*

Module 2: Understanding Harmony in the Human Being - Harmony in Myself!

L 7. Understanding human being as a co-existence of the sentient 'I' and the material 'Body'
L 8. Understanding the needs of Self ('I') and 'Body'- happiness and physical facility
L 9. Understanding the Body as an instrument of 'I'(I being the doer, seer and enjoyer)
L 10.Understanding the characteristics and activities of 'I' and harmony in 'I'
L 11.Understanding the harmony of I with the Body: Sanyam and Health; correct appraisal of Physical needs, meaning of Prosperity in detail.
L 12.Programs to ensure Sanyam and Health.

3 Practice sessions *(T4 to T6) - To discuss the role others have played in making material goods available to me. Identifying from one's own life. Differentiate between prosperity and accumulation. Discuss program for ensuring health vs dealing with disease.*

Module 3: Understanding Harmony in the Family and Society - Harmony in Human-Human Relationship

L 13. Understanding values in human-human relationship; meaning of Justice (Nine universal values in relationships) and program for its fulfillment to ensure mutual happiness; Trust and Respect as the foundational values of relationship.
L 14. Understanding the meaning of Trust; Difference between intention and competence.
L 15. Understanding the meaning of Respect, Difference between respect and differentiation; the other salient values in relationship.
L 16. Understanding the harmony in the society (society being an extension of family): Resolution, Prosperity, fearlessness (trust) and co-existence as comprehensive Human Goals.
L 17. Visualizing a universal harmonious order in Society-Undivided Society, Universal Order-

Dr. T.JESUDAS, M.E., Ph.D
Professor and Head
Department of Mechatronics
Mahendra Engineering College
Mallasamudram, Namakkal

from family to world family.

3 Practice sessions *(T7 to T9): Include practice sessions to reflect on relationships in family, hostel and institute as extended family, real life examples, teacher-student relationship, goal of education, etc. Discuss Gratitude as a universal value in relationships, scenarios. Elicit examples from students' lives.*

Module4: Understanding Harmony in the Nature and Existence - Whole existence as Coexistence

L 18. Understanding the harmony in the Nature.
L 19. Interconnectedness and mutual fulfillment among the four orders of nature - recyclability and self-regulation in nature.
L 20. Understanding Existence as Co-existence of mutually interacting units in all - pervasive space.
L 21. Holistic perception of harmony at all levels of existence.
2 Practice sessions *(T10 to T11): Include practice sessions to discuss human being as cause of imbalance in nature (film "Home" can be used), pollution, depletion of resources and role of technology, etc.*

Module 5: Implications of the above Holistic Understanding of Harmony on Professional Ethics

L 22. Natural acceptance of human values.
L 23. Definitiveness of Ethical Human Conduct.
L 24. Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order.
L 25. Competence in professional ethics: (a). Ability to utilize the professional competence for augmenting universal human order (b). Ability to identify the scope and characteristics of people-friendly and eco-friendly production systems, (c). Ability to identify and develop appropriate technologies and management patterns for above production systems.
L 26. Case studies of typical holistic technologies, management models and production systems.
L 27. 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.
L 28. Definition of Morals, Values and Ethics – Integrity – Work ethic – Service learning – Civic virtue – Respect for others – Living peacefully.
L 29. Importance of Caring – Sharing – Honesty – Courage – Valuing time – Cooperation – Commitment – Empathy – Self-confidence – Character – Spirituality.
L 30. Introduction to Yoga and meditation for professional excellence and stress management. *Sum up.*
4 Practice sessions *(T12 to T15) - Include Practice Exercises and Case Studies which will be taken up in Practice (Tutorial) Sessions.*
eg. To discuss the conduct as an Engineer or Scientist, etc.

TOTAL = 45 Hours

Dr. T.JESUDAS, M.E., Ph.D
Professor and Head
Department of Mechatronics
Mahendra Engineering College
Mallasamudram, Namakkal

3. READINGS:

3.1 Textbook

1. Human Values and Professional Ethics by R R Gaur, R Sangal, G P Bagaria, Excel Books, New Delhi, 2010.

3.2 Reference Books

1. Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak, 1999.
2. Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.
3. The Story of My Experiments with Truth -by Mohandas Karamchand Gandhi
4. Small is Beautiful - E. F Schumacher.
5. Slow is Beautiful - Cecile Andrews.
6. Economy of Permanence - J C Kumarappa.
7. Bharat Mein Angreji Raj - Pandit Sunderlal.
8. Rediscovering India by Dharampal.
9. Hind Swaraj or Indian Home Rule - by Mohandas K. Gandhi.
10. India Wins Freedom - Maulana Abdul Kalam Azad.
11. Vivekananda - Romain Rolland (English).
12. Mika Martin and Roland Scinger, 'Ethics in Engineering', Pearson Education/Prentice Hall, New York 1996.

Dr. T.JESUDAS, M.E., Ph.D
Professor and Head
Department of Mechatronics
Mahendra Engineering College
Mallasamudram, Namakkal

DEPARTMENT OF MECHATRONICS ENGINEERING

Department	Mechatronics	Programme Code & Name	1101 & MCT

IV Semester

Course Code	Course Name	Hours/Week			Credit	Maximum Marks
		L	T	P	C	
24MT24401	DYNAMICS LABORATORY	0	0	3	1.5	100

Objective(s)	• To supplement the principles learnt in Dynamics of Machinery to understand how certain measuring devices are used for dynamic testing. • To study the inertia effect of components. • To study the principles in mechanisms used for speed control and stability control.
Outcome(s)	1. Explain gear parameters, kinematics of mechanisms, and working of lab equipments. 2. Determine mass moment of inertia of mechanical element, natural frequency. 3. Determine the gyroscopic effect and governor effort and range sensitivity.

LIST OF EXPERIMENTS

1.	a) Study of gear parameters. b) Experimental study of velocity ratios of Epicyclic gear train.
2.	Kinematics of Four Bar Mechanism.
3.	Kinematics of Slider Crank Mechanism.
4.	Kinematics of single and double universal joints.
5.	Determination of Mass moment of inertia of connecting rod.
6.	Determination of Mass Moment of Inertia using bifilar suspension and compound pendulum.
7.	Motorized gyroscope – Study of gyroscopic effect and couple.
8.	Governor - Determination of range sensitivity, effort etc., for Proell Governor.
9.	Vibration of Equivalent Spring mass system – un damped and damped vibration.
10.	Whirling of shafts – Determination of critical speeds of shafts with concentrated loads.
11.	Balancing of rotating masses.
	Total hours to be taught **45 Periods**

Dr. T.JESUDAS, M.E., Ph.D
Professor and Head
Department of Mechatronics
Mahendra Engineering College
Mallasamudram, Namakkal

DEPARTMENT OF MECHATRONICS ENGINEERING

Department	Mechatronics	Programme Code & Name	1101 & MCT

IV Semester

Course Code	Course Name	Hours/Week			Credit	Maximum Marks
		L	T	P	C	
24MT24402	AUTOMATION LABORATORY	0	0	3	1.5	100

Objective(s)	• To introduce and provide hand on experience to students to design and test hydraulic circuit to control press, flow etc., • To provide hands on experience to design and test the pneumatic circuit to perform basic operations. • To introduce the Automation studio software to simulate hydraulic, pneumatic and electrical circuit.
Outcome(s)	At the end of the course, the student should be able to: 1. Ability to design and test hydraulic, pneumatic circuits. 2. Use of Automation studio software for simulation of hydraulic, pneumatic and electrical circuits.

LISTOF EXPERIMENTS

1.	Design and testing of hydraulic circuits such as i. Pressure control ii. Flow control iii. Direction control iv. Design of circuit with programmed logic sequence, using an optional PLC in hydraulic Electro hydraulic Trainer.
2.	Design and testing of pneumatic circuits such as i. Pressure control ii. Flow control iii. Direction control iv. Circuits with logic controls v. Circuits with timers vi. Circuits with multiple cylinder sequences in Pneumatic Electro pneumatic Trainer.
3.	Simulation of basic hydraulic, pneumatic and electrical circuits using Automation studio software.
	Total hours to be taught **45Periods**

Dr. T.JESUDAS, M.E., Ph.D
Professor and Head
Department of Mechatronics
Mahendra Engineering College
Mallasamudram, Namakkal

DEPARTMENT OF MECHATRONICS ENGINEERING

Semester–IV
(Common to all B.E./B.Tech. Programmes)

Course code	Course Name	Hours/week			Credit	Maximum marks
		L	T	P	C	
24EN60001	PROFESSIONAL COMMUNICATION SKILLS	0	1	2	2	100

Objectives	➢ To familiarize students with the stage dynamics ➢ To help the learners to improve their creative skills ➢ To make them acquire the ability to speak effectively in real life situations
Outcomes	**At the end of the course, the learners will be able to:** ➢ Apply suitable vocabulary in academic and work place contexts ➢ Demonstrate communication skills effectively in both oral and written formats ➢ Create documents professionally and make presentations effectively

LIST OF EXERCISES

1.	Introduction to Professional Communication and SWOT Analysis
2.	Reading Comprehension
3.	Listening Comprehension
4.	Stage Dynamics (Body Language and Paralanguage-Presentation)
5.	Framing Questions (WH Questions & 'Yes' or 'No' Questions)
6.	Narrative Techniques (Structure, Grammar &Vocabulary – Narrating the Experience)
7.	Master of Ceremony Skills (Practice)
8.	Picture Description
9.	Creative Writing
10.	Extempore Speech

Total Hrs:30

Textbook:

1 Joshi,Manmohan,*SoftSkills*,1st Edition.Bookboon,2017

References:

1 Muralikrishna,&SunitaMishra,*CommunicationSkillsforEngineers*.Pearson,NewDelhi,2011.

2 Barun K. Mitra, Personality Development and Soft Skills, Oxford University Press, New Delhi,2011

Dr. T.JESUDAS, M.E., Ph.D
Professor and Head
Department of Mechatronics
Mahendra Engineering College
Mallasamudram, Namakkal

DEPARTMENT OF MECHATRONICS ENGINEERING

Online Websites:	
1	https://www.ted.com/talks
2	https://joshtalks.com
3	https://quizziz.com
4	www.pdfdrive.com
5	www.talkingbooks.com

Dr. T.JESUDAS, M.E., Ph.D
Professor and Head
Department of Mechatronics
Mahendra Engineering College
Mallasamudram, Namakkal