B.E. ELECTRONICS AND COMMUNICATION ENGINEERING

CURRICULUM FOR

CHOICE BASED CREDIT SYSTEM

Regulations 2024

(Admitted in the Academic Year: 2024-2025)

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

MAHENDRA ENGINEERING COLLEGE

(AUTONOMOUS)

MALLASAMUDRAM WEST, TAMIL NADU 637503

Head of the Department,
Electronics and Communication Engg
Mahendra Engineering College (Autonomous)
Mallasamudram, Namakkal Dt
Tamil Nadu 637 503

Department of Electronics and Communication Engineering
Curriculum – R-2024

SEMESTER-I

Course Code	Course Name	Contact Periods	Hours/Week				Category
			L	T	P	C	
	Theory						
24MA12101	Engineering Mathematics –I	4	3	1	0	4	BS
24CH12001	Engineering Chemistry	3	3	0	0	3	BS
24CS13001	Problem Solving Techniques using C	3	3	0	0	3	EEC
24EE13001	Basics of Electrical and Electronics Engineering	3	3	0	0	3	BS
24HS11002	Heritages of Tamil	4	3	0	2	4	ES
	Induction Program	-	-	-	-	-	MC
	Practical						
24CS23001	Problem Solving Techniques using C Laboratory	3	0	0	3	1.5	EEC
24GE23001	Engineering Practices Laboratory	2	0	0	2	1	BS
24CH22001	Chemistry Laboratory	3	0	0	3	1.5	BS
					Total	**21**	

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MAHENDRAENGINEERINGCOLLEGE (Autonomous)						
Regulations 2024						
Department	**MATHEMATICS**	**Programme Code**			1041	
SEMESTER– I						
Coursecode	**CourseName**	**Hours/week**			**Credit**	**Maximummarks**
		L	**T**	**P**	**C**	
24MA12101	**ENGINEERINGMATHEMATICS-I (Common to all Branches)**	3	1	0	4	**100**
Objectives	Toenable thestudents to: • Learn the types of matrices and linear algebrain a comprehensivemanner. • Familiarize with functions of several variables and its applications toengineering. • Define the geometric aspects of curvature, radius of curvature, evolutes and envelopes as application of differential calculus. • Explainvarioustechniquesofintegration. • Learndoubleandtripleintegrals andgivetheir representationasareaandvolume.					
Outcomes	At theend ofthe coursethestudents will be able to: • Determinetherankofamatrix,eigenvalues,eigenvectorsandinverseof a givenmatrix and diagonalize symmetric matrix by orthogonal transformations, solvesystem oflinearequations. • Determinemaximaandminimaoffunctionsofseveralvariables. • Applythe concepts ofdifferentialcalculusinphysicalproblems. • Applydifferentmethodsof integrationinsolvingpracticalproblems. • Computetheareaandvolumebyusingmultipleintegrals.					
UNIT – I	**MATRICES**					**9+3**
Matrix and its types – Rank of matrix –Solving system of linear equations - Characteristic equation - Eigenvalues and Eigenvectors of the matrix - Cayley-Hamilton Theorem, Diagonalization of real andsymmetricmatrices byOrthogonal transformation– Reducethe quadraticform to canonicalform.						
UNIT – II	**DIFFERENTIALCALCULUSOFSEVERAL VARIABLES**					**9+3**
Differentiationofimplicitfunctions–Partialderivatives–Totalderivative–Euler'stheorem–Jacobianandproperties–Taylor'sseriesforfunctionsoftwovariables–Maxima and minima of functionsof twovariables– Lagrange'smethodof undeterminedmultipliers.						

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UNIT – III	**APPLICATIONSOFDIFFERENTIALCALCULUS**	**9+3**
CurvatureinCartesian co-ordinates–Centreandradiusofcurvature–Circle ofcurvature–Evolutes–Envelopes–Evoluteasenvelope ofnormals andtheirproperties.		
UNIT – IV	**INTEGRALCALCULUS**	**9+3**
DefiniteandIndefiniteintegrals-Substitutionrule-TechniquesofIntegration:Integrationbyparts, Trigonometricintegrals,Trigonometricsubstitutions,Integrationofrationalfunctionsbypartialfraction,Integration ofirrationalfunctions- Improper integrals – Applications to Engineeringproblems.		
UNIT – V	**MULTIPLEINTEGRALS**	**9+3**
DoubleintegralsinCartesian co-ordinates–Changeoforderofintegration–Areaasdoubleintegral– TripleintegralinCartesianco-ordinates–Volumeastripleintegral–Changeofvariablesindoubleintegrals. ApplicationstoEngineeringproblems.		
Total	**(L:45+T:15):60Periods**	

TEXT BOOK:

1	B.S.Grewal,HigherEngineeringMathematics,KhannaPublishers, 2017.
2	JamesStewart,Calculus withEarlyTranscendental function,Cengage, 2013.

REFERENCES:

1	ErwinKreyszig,AdvancedEngineeringMathematics,John Wiley&Sons,2016.
2	RayWylie,LouisC.Barrett,AdvancedEngineeringMathematics,McGraw-Hill,2013.
3	Ben Orlin, Changeis theOnlyConstant: TheWisdom of Calculus in aMadcap World, Pearson 2018.

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MAHENDRA ENGINEERING COLLEGE (Autonomous)-Syllabus						R 2024
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	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 Nanomaterials. 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 theirtreatments fordomestic and industrial applications. 2. Classify the reaction mechanism, synthesis and application of polymers. 3. Develop the essential concepts of nanoscience and nanotechnology in designing the nanomaterial 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

Types of water- Alkalinity,types and determination- Hardness,types andEstimationby 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

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).

UNIT-III	NANOCHEMISTRY	9

Basic -Distinction between molecules, nanoparticles and bulk materials - size-dependent properties (optical, electrical, mechanical and magnetic) - Types of nanomaterials: Definition, properties and uses of – nanoparticles ,nanocluster, nanorod, nanotube and nanowire - Synthesis of nanomaterials: laser ablation, Sol

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gel, Synthesis of Carbon nano tubes by CVD Method- SWCNT and MWCNT- Applications (Medicine, Agriculture and Electronics).		
UNIT-IV	**ENERGY STORAGE DEVICE**	9
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 – Fissionand 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
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 Hours	**45**

TEXT BOOK :

1.	Jain P.C. and Monica Jain, "Engineering Chemistry", DhanpatRai 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 Nanoscience" 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.	ShikhaAgarwal,"Engineering Chemistry-Fundamental and Application",Cambridge University press,Delhi,Second Edition,2019.

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MAHENDRA ENGINEERING COLLEGE (Autonomous)						
Syllabus						
Department	**Computer Science and Engineering**		**Programme Code**		**1041**	
I Semester						
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					
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					
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**

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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**

TEXT BOOK :	
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	PradipDey, Manas Ghosh, " Computer Fundamentals and Programming in C", 2nd Edition, Oxford University Press.,2013.
4	M.Rajaram and P.UmaMaheshwari" 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

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MAHENDRA ENGINEERING COLLEGE (Autonomous)						
Regulations 2024						
Department	**Electronics and communication Engineering**				**Programme Code**	**1041**
I Semester						
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					
Outcome(s)	At the end of the course, students will be able to: 1. Summarize the concepts of electrical circuits and measuring instruments 2. Illustrate the constructional features and working principle of Electrical machines 3. Explain the operation of semiconductor devices 4. Interpret the concepts of integrated circuits 5. Discuss the basic concepts of Communications 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)**

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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	**45 Hours**

TEXT BOOKS

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, SatyebrantaJit, "Electronic Devices & Circuits", Tata McGraw Hill, Second Edition, 2008.
4.	**NPTEL :** **Prof. L. Umanand, Basic Electrical Technology, IISc Bangalore** https://nptel.ac.in/courses/108108076 **Prof. M.B. Patil Basic Electronics IIT Bombay** https://onlinecourses.nptel.ac.in/noc21_ee55/preview

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

Course Code	Course Name	Periods/Week			Credit	Maximum Marks
		L	T	P	C	
24HS11002	தமிழர் மரபு	1	0	0	1	100

அலகு 1	மொழிமற்றும் இலக்கியம்	3

இந்தியமொழிக் குடும்பங்கள்–திராவிடமொழிகள்–தமிழ்ஒருசெம்மொழி–தமிழ்செவ்வியக்கங்கள்–சங்கஇலக்கியத்தின் சமயச் சார்பற்றதன்மை–சங்கஇலக்கியத்தில் பகிர்தல் அறம் – திருக்குறளில்மேலாண்மைக் கருத்துக்கள்–தமிழ்க் காப்பியங்கள், தமிழகத்தில்சமணபௌத்தசமயங்களின் தாக்கம் –பக்திஇலக்கியம், ஆழ்வார்கள்மற்றும் நாயன்மார்கள்– சிற்றிலங்கியங்கள்–தமிழில்நவீனஇலக்கியத்தின் வளர்ச்சி –தமிழ்இலக்கிய வளர்ச்சியில்பாரதியார் மற்றும் பாரதிதாசன் ஆகியோரின் பங்களிப்பு.

அலகு 2	மரபு–பாறைஓவியங்கள்முதல்நவீனஓவியங்கள்வரை–சிற்பக் கலை	3

நடுகல்முதல்நவீனசிற்பங்கள்வரை–ஐம்பொன் சிலைகள்–பழங்குடியினர் மற்றும் அவர்கள்தயாரிக்கும் கைவினைப் பொருட்கள்,பொம்மைகள்–தேர் செய்யும் கலை–சுடுமண் சிற்பங்கள்–நாட்டுப்புறத் தெய்வங்கள்–குமரிமுனையில்திருவள்ளுவர் சிலை–இசைக் கருவிகள்–மிருதங்கம், பறை, வீணை, யாழ், நாதஸ்வரம் – தமிழர்களின் சமூகபொருளாதாரவாழ்வில்கோவில்களின் பங்கு.

அலகு 3	நாட்டுப்புறக் கலைகள்மற்றும் வீரவிளையாட்டுகள்	3

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

அலகு 4	தமிழர்களின் திணைக் கோட்பாடுகள்	3

தமிழகத்தின் தாவரங்களும் விலங்குகளும் – தொல்காப்பியம் மற்றும் சங்கஇலக்கியத்தில் அகம் மற்றும் புறக் கோட்பாடுகள்–தமிழர்கள்போற்றிய அறக்கோட்பாடு–சங்ககாலத்தில்தமிழகத்தில்எழுத்தறிவும் கல்வியும் – சங்ககாலநகரங்களும் துறைமுகங்களும் – சங்ககாலத்தில்ஏற்றுமதிமற்றும் இறக்குமதி–கடல்கடந்தநாடுகளில்சோழர்களின் வெற்றி.

அலகு 5	இந்தியதேசியஇயக்கம் மற்றும் இந்தியபண்பாட்டிற்குத் தமிழர்களின் பங்களிப்பு	3

இந்தியவிடுதலைப்போரில்தமிழர்களின் பங்கு–இந்தியாவின் பிறப்பகுதிகளில்தமிழ்ப் பண்பாட்டின் தாக்கம் – சுயமரியாதைஇயக்கம் – இந்தியமருத்துவத்தில்,சித்தமருத்துவத்தின் பங்கு–கல்வெட்டுகள்,கையெழுத்துப்படிகள்–தமிழ்ப் புத்தகங்களின் அச்சுவரலாறு.

TOTAL – 15 PERIODS

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MAHENDRA ENGINEERING COLLEGE (Autonomous)			
Syllabus			
Department	**Electronics and Communication Engineering**	**Programme Code**	**1041**

I Semester

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
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

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)

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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**

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Regulations 2024						
Department	**Electronics and Communication Engineering**			**Programme Code**		**1041**
I Semester						
COURSE CODE	**COURSE NAME**	**Hours/week**			**Credit**	**Maximum Marks**
		L	**T**	**P**	**C**	
24GE23001	**ENGINEERING PRACTICES LABORATORY**	**0**	**0**	**3**	**1.5**	**100**
Objectives	• To learn the concepts of electrical wiring and power measurements. • To study the concepts of electronic devices					
Outcomes	At the end of the course, students will be able to: 1. Demonstrate the domestic wiring and power measurements. 2. Demonstrate the operation of Electric Circuits and PN Junction Diode					
LIST OF EXPERIMENTS						
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					
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					
					Total	**45 Hours**

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MAHENDRA ENGINEERING COLLEGE (Autonomous)- Syllabus			R 2024
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	MAXIMUM 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

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Department of Electronics and Communication Engineering
Curriculum – R-2024

SEMESTER-II

Course Code	Course Name	Contact Periods	Hours/Week				Category
			L	T	P	C	
	Theory						
24MA12201	Engineering Mathematics –II	4	3	1	0	4	BS
24PY12101	Engineering Physics	3	3	0	0	3	BS
24GE13001	Engineering Graphics & Design	5	3	0	2	4	ES
24EC13201	Electronic Devices and Circuit Theory	4	3	1	0	4	PC
24EC13202	Communicative English	3	3	0		3	HS
24EE13201	Tamils and Technology	3	1	0	2	2	ES
	Practical						
24EC23201	Electric Circuits and Electronic Devices Laboratory	3	0	0	3	1.5	ES
24PY22001	Physics Laboratory	3	0	0	3	1.5	BS
24HS21001	Personality Development Practice Laboratory	3	0	0	2	1	HS
						Total	24	

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MAHENDRAENGINEERINGCOLLEGE(Autonomous)							
Syllabus						Regulations2024	
Department	MATHEMATICS		Programme Code				
SEMESTER –II							
Course code	Course Name	Hours/week				Credit	Maximum marks
		L	T	P			
24MA12201	ENGINEERING MATHEMATICS- II (Common to all Branches)	3	1	0		4	100

Objectives	To enable the students to: • Define vector function ,operators andworkingproceduretoevaluate line,surface and volume integrals. • Explaindifferenttypesofhigherorderordinarydifferentialequationswithvariableco efficients andvariousmethods to solvethe equations. • LearnLaplacetransform,inverseLaplacetransformanditspropertiestosolvedifferential equations. • Knowaboutfunctionsofcomplexvariables,propertiesandproblemsinvolvingconformalma pping. • LearnaboutTaylor'sandLaurent'sseriesexpansionofcomplexfunctionsandtheprocess ofevaluatingcomplexintegrals.
Outcomes	At theend ofthe coursethestudents will be able to • Solveproblemsrelatedtovectordifferentiation,line,surfaceandvolumeintegralsand theorems involvingthem. • Solvehigherorderdifferentialequationswithvariablecoefficients. • DescribeLaplacetransformanditspropertiesinverseLaplacetransformandthesolutiono flinear differentialequation usingLaplacetransform techniques. • SolveAnalyticfunctions,harmonicfunctions,conformalmappinganditsapplications. • ExpandthefunctionsasTaylor'sandLaurent'sseriesandevaluatethecomplex integrals.

UNIT-I	VECTORCALCULUS	9+3
GradientDivergenceandCurl–Directionalderivative–Irrotationalandsolenoidalvectorfields–Vectorintegration–Green'stheoreminaplane,GaussdivergencetheoremandStokes'theorem(excluding proofs).Verificationand applicationinevaluatingline,surfaceandvolume integrals.		
UNIT -II	**ORDINARYDIFFERENTIAL EQUATIONSOFHIGHER ORDERS**	**9+3**
Second and Higher order linear differential equations with constant coefficients– Method of variation ofparameters – Cauchy Euler equation, Legendre's type differential equations – System of simultaneouslineardifferential equations with constant coefficients.		

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UNIT-III	**LAPLACETRANSFORM**	**9+3**
Transform,PropertiesofLaplaceTransform,Laplacetransformofperiodicfunctions.Findinginverse Laplacetransformbydifferentmethods,convolutiontheorem,solvingInitialvalueproblemsbyLaplaceTransform method.		
UNIT-IV	**ANALYTICFUNCTIONS**	**9+3**
Functionsofacomplexvariable,Cauchy-Riemannequations–Analyticfunctions– Harmonicandorthogonalpropertiesofanalyticfunction–Harmonicconjugate– Constructionofanalyticfunctions– Conformalmapping:w=z+c,cz,1/z,andBilineartransformation.		
UNIT -V	**COMPLEXINTEGRATION**	**9+3**
Complex integration – Statement and applications of Cauchy's integral theorem and Cauchy's integralformula(withoutproof)–TaylorandLaurentexpansions–TypesofSingularities-Singularpoints– Residues–Residuetheorem(withoutproof)–Applicationofresiduetheoremtoevaluaterealintegrals– Contourintegration.		
	Total	**(L:45+T:15):60Periods**

TEXTBOOK:	
1	B.S.Grewal,HigherEngineeringMathematics,KhannaPublishers,2017.
2	ErwinKreyszig,AdvancedEngineeringMathematics,JohnWiley&Sons, 2018.
REFERENCES:	
1	MichaelD.Greenberg,AdvancedEngineeringMathematics,Pearson2013.
2	LokenathDebnathandDambaruBhatta,"IntegralTransformsandTheirApplications,CRC Press2015.
3	DennisG.ZillandWarrenS.Wright"Advanced EngineeringMathematics",JonesandBartlett2014.

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MAHENDRA ENGINEERING COLLEGE (Autonomous)-Syllabus							R 2024
DEPARTMENT:	SCIENCE & HUMANITIES		Programme Code & Name				ENGINEERING PHYSICS
SEMESTER-I&II							
COURSE CODE	**COURSE NAME**	**HOURS/WEEK**				**CREDIT**	**MAXIMUM MARKS**
		L	**T**	**P**			
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.						
Out come(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.						
UNIT I	**LASER AND FIBER OPTICS**						9 (Hrs)
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 Hrs)
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 Hrs)
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 Hrs)
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 Hrs)

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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 to be taught	(45 Hrs)
Text book :	
1.	Dr. G.Senthilkumar- 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.

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MAHENDRA ENGINEERING COLLEGE
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II Semester

Course Code	Course Name	Hours / Week			Credit	Maximum marks
		L	T	P	C	
24GE33201	**ENGINEERING GRAPHICS AND DESIGN** (Common to circuit Branches)	3	0	2	4	**100**
Objective(s)	• Increase ability to communicate with engineers through drawing skills as per the standard, • Learn to sketch and take field dimensions, • Learn to take data and transform it into graphic drawings, • Learn basic Autocad skills, • Learn basic engineering drawing formats.					

Examination Pattern: Theoretical Mode

UNIT -I Plane Curves and Free Hand Sketching	**HOURS**	**12**

Introduction to engineering drawing and standards, Construction of ellipse, Parabola and hyperbola by eccentricity method – Construction of cycloid –involutes, define tangents and normal.

Free Hand Sketching:

Representation of Three Dimensional objects – General principles of orthographic projection – Need for
importance of multiple views and their placement – First angle projection – layout views – Developing
visualization skills through free hand sketching of multiple views from pictorial views of objects.

UNIT- II Projection of Points, Lines and Plane Surfaces	**HOURS**	**12**

Projection of points and straight lines located in the first quadrant – Determination of true lengths and true inclinations – Projection of polygonal surface and circular lamina inclined to both reference planes.

Examination Pattern: Practical Mode

UNIT- III Introduction to CADD	**HOURS**	**12**

Basics of CADD- Working with drawing –Editing, Modifying commands and Layers.
Projection of simple solids like prisms, pyramids, cylinder and cone when the axis is inclined to one reference plane by change of position method.

UNIT- IV Section of Solids and Development of Surfaces	**HOURS**	**12**

Sectioning of above solids in simple vertical position by cutting planes inclined to one reference plane and perpendicular to the other – Obtaining true shape of section. Development of lateral surfaces of simple and truncated solids – Prisms, pyramids, cylinders and cones –Development of lateral surfaces of solids with cylindrical cutouts, perpendicular to the axis.

UNIT -V Isometric and Perspective Projections	**HOURS**	**12**

Principles of isometric projection – isometric scale – isometric projections of simple solids, truncated prisms, pyramids, cylinders and cones. Perspective projection of prisms, pyramids and cylinders by visual ray method.

	Total hours	**60**

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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 become familiar with Autocad two dimensional drawings. • Students will be able to improve their visualization skills so that they can apply these skills in developing new products.

LIST OF EQUIPMENTS(for a batch of 30 students)

List of Equipments:

1. Computer systems-30 No
2. Licensed software for Drafting and Modeling. - 30 Licenses
3. Laser Printer or Plotter to print / plot drawings - 1 No

TEXT BOOKS:

1.	Bhatt,N.D; Panchal,V.M "Engineering Drawing:Plane and solid Geometry" Charotar Publishing House Pvt. Ltd.Charotar Publishing House Pvt. Ltd.Gujarat 388001
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
4.	K. V. Natrajan, "A text book of Engineering Graphics", Dhanalakshmi Publishers, Chennai, 2012

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.	DhananjayA.Jolhe, "Engineering Drawing with an introduction to AutoCAD" Tata McGraw Hill Publishing Company Limited 2008.

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MAHENDRA ENGINEERING COLLEGE (Autonomous)							
Syllabus R-2024							
Department	**Electronics and Communication Engineering**				**Programme Code**		**1041**
II Semester							
Course code	**Course Name**	**Hours/week**			**Credit**		**Maximum marks**
24EC13201	**Electronic Devices and Circuit Theory**	**L**	**T**	**P**	**C**		**100**
		3	1	0	4		
Objective(s)	▪ To understand various methods of circuit/ network analysis using network theorems. ▪ To understand the transient and steady state response of the circuits subjected to DC excitations and AC with sinusoidal excitations. ▪ To introduce basic semiconductor devices. ▪ To acquaint the construction, theory and operation of BJT. ▪ To explore the characteristics and operation of JFET and MOSFET.						
UNIT-I	**INTRODUCTION TO CIRCUIT ANALYSIS AND NETWORK THEOREMS**						**9**
Basic Components of electric Circuits, Ohms Law, Kirchhoff's Current Law, Kirchhoff's voltage law, Useful Circuit Analysis techniques - Linearity and superposition, Thevenin and Norton Equivalent Circuits, Maximum Power Transfer, Delta-Wye Conversion.							
UNIT-II	**STEADY STATE AND TRANSIENT RESPONSE IN R, L, C CIRCUITS**						**9**
Sinusoidal Steady – State analysis and Characteristics of Sinusoids, Basic RL and RC Circuits, Transient Response of the Source- Free RL, RC, RLC Frequency Response, Parallel Resonance, Series Resonance and Quality Factor.							
UNIT-III	**SEMICONDUCTOR DIODE**						**9**
Review Of Properties of Semiconductor Materials - Theory of PN Junction Diode and Zener diode- V-I Characteristics and its Temperature dependence - Break down mechanisms - Rectifiers - Clipper - Clamper - Tunnel Diode and Varactor Diode							
UNIT-IV	**BIPOLAR JUNCTION TRANSISTOR**						**9**
Transistor types -NPN -PNP -Operations-Early Effect-Current equations – Input and Output characteristics of CE, CB, CC- Ebers Moll Model - Transistor as a Switch and Amplifier – Comparison of CE, CB, CC.							
UNIT-V	**FIELD EFFECT TRANSISTOR**						**9**
JFET and its Characteristics - MOSFET – Types - V-I Characteristics - Principle of operation - MOSFET Biasing - MOSFET as switch, Special Semiconductors Devices- MESFET, FINFET, PINFET, CNTFET, DUAL GATE MOSFET							
					Total		**60**

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Outcomes	▪ Apply suitable network theorems and analyze AC and DC circuits ▪ Analyze steady state response of any R, L and C circuits ▪ Explain the basics of semiconductor diodes. ▪ Demonstrate the operations of BJT, JFET and MOSFET ▪ Summarize the characteristics of Special Semiconductors Devices

TEXT BOOK :

Hayt Jack Kemmerly, Steven Durbin, "Engineering Circuit Analysis", McGraw Hill Education, 9th Edition, 2018.

Robert Boylestad and Louis Nashelsky, "Electron Devices and Circuit Theory" Pearson Prentice Hall, 10th edition, July 2008.

REFERENCES:

S Salivahanan, N Suresh Kumar, "Electronic Devices and Circuits" 5th Edition, Mc Graw Hill 2022

Thomas L. Floyd, "Electronic Devices - Electron Flow Version" 9th Edition, PHI 2012.

Bhattacharya and Sharma, "Solid State Electronic Devices", 2nd Edition, Oxford University Press, 2014.

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SYLLABUS - REGULATION - 2024

SEMESTER – I (Non-Circuit Branches)SEMESTER- II (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	**9Hrs**
Listening- Listening to Short Conversations (Formal and Informal) **Speaking** – Introducing Oneself and Others **Reading** – Skimming and Scanning-Reading Comprehension Passages and Answering Multiple Choice Questions **Writing** - Leave/On Duty application, Bonafide Certificate-requisition, Check list, Instructions **Grammar & Vocabulary** – Parts of Speech, Articles, Prefixes and Suffixes	
UNIT II	**9Hrs**
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	
UNIT III	**9Hrs**
Listening - Listening to TED Talks and Note taking	

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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	**9Hrs**
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	**9Hrs**
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/

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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

சங்ககாலத்தில்நெசவுத் தொழில்–பானைத் தொழில்நுட்பம் – கருப்புசிவப்புபாண்டங்கள்–பாண்டங்களில்கீறல்குறியீடுகள்

அலகு 2	வடிவமைப்புமற்றும் கட்டிடத் தொழில்நுட்பம்	3

சங்ககாலத்தில்வடிவமைப்புமற்றும் கட்டுமானங்கள்&சங்ககாலத்தில் வீட்டுப் பொருட்களில்வடிவமைப்பு–சங்ககாலத்தில்கட்டுமானபொருட்களும் நடுகல்லும் – சிலப்பதிகாரத்தில்மேடைஅமைப்பு பற்றிய விவரங்கள்–மாமல்லபுரச் சிற்பங்களும்,கோவில்களும் – சோழர் காலத்துப் பெருங்கோயில்கள்மற்றும் பிறவழிபாட்டுத் தலங்கள்–நாயக்கர் காலக் கோயில்கள்–மாதிரிகட்டமைப்புகள் பற்றி அறிதல், மதுரைமீனாட்சிஅம்மன் ஆலயம் மற்றும் திருமலைநாயக்கர் மஹால்–செட்டிநாட்டுவீடுகள்–பிரிட்டிஷ்காலத்தில்சென்னையில்இந்தோ–சாரோசெனிக் கட்டிடக் கலை.

அலகு 3	உற்பத்தித் தொழில்நுட்பம்	3

கப்பல்கட்டும் கலை–உலோகவியல்–இரும்புத் தொழிற்சாலை–இரும்பைஉருக்குதல், எஃகு–வரலாற்றுச் சான்றுகளாகசெம்புமற்றும் தங்கநாணயங்கள்–நாணயங்கள்அச்சடித்தல்–மணிஉருவாக்கும் தொழிற்சாலைகள்–கல்மணிகள், கண்ணாடிமணிகள்–சுடுமண் மணிகள்–சங்குமணிகள்–எலும்புத் துண்டுகள்–தொல்லியல்சான்றுகள்–சிலப்பதிகாரத்தில்மணிகளின் வகைகள்.

அலகு 4	வேளாண்மைமற்றும் நீர்ப்பாசனத் தொழில்நுட்பம்	3

அணை, ஏரி, குளங்கள், மதகு–சோழர்காலக் குமிழித் தூம்பின் முக்கியத்துவம் – கால்நடைபராமரிப்பு–கால்நடைகளுக்காகவடிவமைக்கப்பட்ட கிணறுகள்–வேளாண்மைமற்றும் வேளாண்மைசார்ந்த செயல்பாடுகள்–கடல்சார் அறிவு–மீன்வளம் – முத்து மற்றும் முத்துக்குளித்தல்–பெருங்கடல் குறித்த பண்டையஅறிவு–அறிவுசார் சமூகம்.

அலகு 5	அறிவியல்தமிழ்மற்றும் கணித்தமிழ்	3

அறிவியல்தமிழின் வளர்ச்சி –கணித்தமிழ்வளர்ச்சி –தமிழ்நூல்களைமின்பதிப்புசெய்தல்–தமிழ்மென்பொருட்கள்உருவாக்கம் – தமிழ்இணையக் கல்விக்கழகம் – தமிழ் மின் நூலகம் – இணையத்தில்தமிழ்அகராதிகள்–சொற்குவைத் திட்டம்,

TOTAL – 15 PERIODS

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MAHENDRA ENGINEERING COLLEGE (Autonomous)			
Syllabus R-2024			
Department	**Electronics and Communication Engineering**	**Programme Code**	**1041**
Semester-II			

Course Code	Course Name	Hours/Week			Credit	Maximum marks
		L	T	P	C	
24EC23201	**Electric Circuits and Electronic Devices Laboratory**	**0**	**0**	**4**	**2**	**100**

Objective(s)	• To understand the concept of network theorems • Be exposed to the characteristics of basic electronic devices • To provide students basic experimental experiences in physical operation and circuit applications of semiconductor devices using hardware components and PSPICE software

LIST OF EXPERIMENTS

	Hardware Experiments
1	Verification of Thevenin's and Norton's Theorem.
2	Verification of superposition Theorem.
3	Verification of maximum power transfer Theorem.
4	Measurement of ripple factor of Half wave and Full wave rectifier with and without filter.
5	Characteristics of CE configuration of BJT.
6	Characteristics of JFET and MOSFET
	Simulation Experiments
7	Simulation of half and full wave Rectifiers using PSPICE
8	Simulation of VI characteristics of CE configuration of BJT using PSPICE
9	Simulation of VI characteristics of CB configuration of BJT using PSPICE
10	Simulation of VI characteristics of CC configuration of BJT using PSPICE
11	Simulation of Drain and Transfer characteristics of FET
12	Simulation of Drain and Transfer characteristics of MOSFET
	Total **45 Hours**

Outcomes	• Apply network theorems to solve the electric circuits problems • Design circuits using diode, BJT and MOSFET for simple applications • Simulation of circuits using PSPICE software

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MAHENDRA ENGINEERING COLLEGE(Autonomous) Syllabus			R 2024
DEPARTMENT:	SCIENCE & HUMANITIES	Programme Code	1051

SEMESTER –I & II

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.
OUTCOMES	• The hands on exercises undergone by the students will help them to apply physics principles • Principles of optics and Liquid to evaluate engineering properties of materials.

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 – Poiseuille's 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)

REFERENCES

1.	Physics Laboratory Manual(2023), Department of Physics, Mahendra Engineering College, Namakkal.
2	GeetaSanon, B.Sc Practical Physics, 5thEdn. (2015), R. Chand & Co.
3	C. L. **Arora**B.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, KitabMahal, NewDelhi.
5	D. P. Khandelwal, A Laboratory Manual of Physics: For Undergraduate Classes (1985), VaniEducational books, New Delhi.

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Syllabus - Regulation 2024						
Department	**English**					
Semester I – Non-Circuit Branches **Semester II – Circuit Branches** **(Common to all B.E./B.Tech. Programmes)**						
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

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https://www.calameo.com/read/00072308558ed20d410e7/
Activity: Worksheets for relevant topics

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Department of Electronics and Communication Engineering

Curriculum – R-2024

SEMESTER-III

Course Code	Course Name	Contact Periods	Hours/Week				Category
			L	T	P	C	
	Theory						
24MA12302	Mathematics III	4	3	1	0	4	BS
24EC14301	Electronic Circuits	3	3	0	0	3	PC
24EC14302	Digital Electronics	3	3	0	0	3	PC
24EC14303	Electromagnetics	4	3	1	0	4	PC
24EC14304	Universal Human Values	3	3	0	0	3	MC
	Open Elective -1	2	1	0	2	2	OE
	Open Elective - 2	3	3	0	0	3	OE
	Practical						
24EC24301	Electronic Circuits Laboratory	2	0	0	2	1	PC
24EC24302	Digital Electronics Laboratory	2	0	0	2	1	PC
					Total	22	

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MAHENDRA ENGINEERING COLLEGE (Autonomous)						
Syllabus					**Regulations2024**	
Department	**MATHEMATICS**	**ProgrammeCode**			**1041**	
III Semester						
Course code	**Course Name**	**Hours/week**			**Credit**	**Maximum marks**
		L	**T**	**P**	**C**	
24MA12301	**TRANSFORMS AND PARTIAL DIFFERENTIAL EQUATIONS (Aero, Aerospace, Agri, Chemical, Civil, EEE, ECE, Food, Mech, MCT &Pharma)**	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 ofdifference 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**

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Dirichlet's conditions – General Fourier series – Odd and even functions – Half range sine series – Half range cosine series – Parseval's identity – Harmonic Analysis.		
UNIT-IV	**PARTIAL DIFFERENTIAL EQUATIONS**	**9+3**
Formation of partial differential equations – Solutions of standardtypes 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.

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MAHENDRA ENGINEERING COLLEGE
(Autonomous)

Syllabus

Department	Electronics and Communication Engineering	Programme Code	1041

III Semester

Course code	Course Name	Hours/week			Credit	Maximum marks
		L	T	P	C	
24EC14301	Electronic Circuits	3	0	0	3	100

Objectives	• To understand the methods of biasing transistors and To design and construct amplifiers using BJTs and MOSFETs • To construct amplifiers with active loads • To study high frequency response of feedback amplifiers and oscillators • To understand the concept of Power amplifiers like Class A, Class B, Class C, Class AB and other types of amplifiers • To introduce the basic building blocks of linear integrated circuits and To learn the linear and non-linear applications of operational amplifiers

UNIT-I	BIASING OF BJT AND MOSFET	9

BJT-Need for biasing - DC Load line, operating point- Various biasing methods for BJT - Design - Stability - Bias Compensation-Thermal stability- Biasing of MOSFET.

UNIT-II	BJT AND MOSFET AMPLIFIERS	9

Small signal Analysis of Common Emitter - AC Load line, Voltage swing limitations, Common collector and common base amplifiers - Differential amplifiers - CMRR - Darlington Amplifier - Cascode amplifier - Bootstrap technique - Cascaded Amplifiers - Small signal Analysis of MOSFET, Common source amplifier, Voltage swing limitations, Source follower and Common Gate amplifiers.

UNIT-III	FREQUENCY ANALYSIS OF BJT AND MOSFET	9

High frequency analysis of BJT in CE mode - Short circuit current gain, Cut off frequency – f_α and f_β unity gain - Determination of bandwidth for single stage and multistage amplifiers - High frequency analysis of MOSFET in CS mode.

UNIT-IV	FEEDBACK AMPLIFIERS AND OSCILLATORS	9

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Block diagram, Loop gain, Gain with feedback, Effects of negative feedback - Sensitivity and desensitivity – gain- Cut-off frequencies, Distortion, Noise, Input Impedance and Output Impedance with feedback, Nyquist criterion for stability of feedback amplifiers - Four types of negative feedback connections - Voltage series feedback, Voltage shunt feedback, Current series feedback and Current shunt feedback, Method of identifying feedback topology and feedback factor - Classification of oscillators - Barkhausen Criterion – LC oscillators - Hartley and Colpitts oscillator - Crystal oscillators - RC oscillators – RC phase shift oscillator and Wein bridge oscillator – Frequency and amplitude stability of oscillators.		
UNIT-V	**LARGE SIGNAL AND TUNED AMPLIFIERS**	**9**
Classification of amplifiers, Class A large signal Amplifier - Distortion in amplifiers – Complementary symmetry (Class B) push-pull amplifier, Class C, Class D amplifier - Introduction to Q factor - Coil losses, Unloaded and loaded Q of tank circuits- Class C tuned amplifier		
	Total	**45** Hours
Outcomes	• Explain and construct circuits using BJT and MOSFET • Interpret small signal models of BJT and FET amplifiers • Analyze the frequency response characteristics of BJT and FET amplifiers in single stage and multi stage amplifiers • Analyze oscillator and feedback amplifier circuits using Bipolar Junction Transistors • Examine power amplifiers for a variety of Engineering applications	

TEXT BOOK :	
1	Millman Jacob, Christos C. Halkias, Satyabrata Jit, "Electronic Devices & Circuits",3rd Edition, TMH 2010
2	David A.Bell, "Electronic Devices and Circuits", Oxford Higher Education Press, 5th Edition, 2010
REFERENCES:	
3	Adel .S. Sedra, Kenneth C. Smith, "Micro Electronic Circuits", 6th Edition, Oxford University Press, 2010
4	Salivahanan, "Electronic Devices and Circuits" 2nd edition Tata McGraw-Hill Education, 2011

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MAHENDRA ENGINEERING COLLEGE (Autonomous)							
Syllabus R-2024							
Department	**Electronics and Communication Engineering**				**Programme Code**		**1041**
III Semester							
Course code	**Course Name**	**Hours/week**			**Credit**	**Maximum marks**	
24EC14302	**Digital Electronics**	**L**	**T**	**P**	**C**	**100**	
		3	0	0	3		
Objective(s)	• To introduce basic postulates of Boolean algebra and show the correlation between Boolean expressions • To sketch the formal procedures for the analysis and design of combinational circuits and To introduce the concept of memories and programmable logic devices • To understand the concept of synchronous and asynchronous sequential circuits • To study the design of various synchronous and asynchronous circuits • To study the concepts of modeling a digital system using Verilog hardware description language						
UNIT-I	**Fundamentals of Digital Systems**						**9**
Review of number systems - Boolean postulates and laws – De-Morgan's Theorem - Boolean expression – Boolean function - Minimization of Boolean expressions – Sum of Products (SOP) –Product of Sums (POS)- Minterm - Maxterm - Canonical forms – Conversion between canonical forms – Karnaugh map Minimization – Quine Mc Cluskey simplification – Don't care conditions - Implementation using logic gates							
UNIT-II	**Combinational Circuits and Memory Devices**						**9**
Combinational logic circuits- adders, subtractors, BCD adder, ripple carry look ahead adders, parity generator checker, decoders, encoders, Multiplexers, Demutiplexer, comparators, code convertors - Realization of Boolean expressions using multiplexers. Memories – ROM - organization, PROMs. Types of RAMs – Basic structure, organization, Static and dynamic RAMs, PLDs- PLA, PAL.							
UNIT-III	**Sequential Circuits**						**9**
Latches, Flip flops -SR, JK, T, D, Master/Slave FF - operation and excitation tables, Triggering of FF, Binary counters - Asynchronous/Ripple counters, Finite State Machine- Mealy State Machine-Moore State Machine- Synchronous counters, Modulus-n Counter, Up -Down counter, Design of counters, Shift registers - SISO, SIPO, PISO, PIPO - Universal shift register							

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UNIT-IV	Design of Synchronous Circuit	9
Analysis and design of clocked sequential circuits- Design - Moore/Mealy models, State diagram- State table, state minimization, state assignment, circuit implementation, Excitation table and maps, Circuit implementation – Asynchronous Sequential circuits: Design of fundamental mode and pulse mode circuits – Analysis procedure, design procedure, reduction of state and flow table – Problems in Asynchronous Circuits – Races, cycles and Hazards – Design of Hazard Free Switching circuits-		
UNIT-V	**Introduction To Verilog**	9
Verilog as HDL, Levels of Design Description, Concurrency, Simulation and Synthesis, Functional Verification, Programming Language Interface (PLI), Module, Test Benches - Language Constructs and Conventions: Introduction, Keywords, Identifiers, White Space Characters, Comments, Numbers, Strings, Logic Values, Strengths, Data Types, Scalars and Vectors, Parameters, Memory, Operators, System Tasks, Design of Basic Circuits in combinational and sequential circuits.		
	Total	**45**
Outcome(s)	• Apply Boolean algebra, Karnaugh map and Tabulation method to design combinational logic circuits • Build the combinational circuits using logic gates and Interpretation the types of memories with their operations and programmable logic devices • Contrast and debug the sequential circuit elements and its conversions • Design various synchronous and asynchronous circuits using Flip Flops • Explain the constructs and conventions of the Verilog hardware description language programming and able to design some basic circuits.	

TEXT BOOK:	
1	M. Morris Mano, "Digital Logic and Computer Design", Pearson Education, 4th Edition, 2016.
2	Thomas L. Floyd, "Digital Fundamentals", 10th Edition, Pearson Education, New Delhi, 2011.
3	Leach D, Malvino A P & Saha, "Digital Principles and Applications" 8th Edition, Tata McGraw Hill Publishing Company, 2014.
REFERENCES:	
1	Donald D.Givone, "Digital Principles and Design", Tata Mc-Graw Hill Publishing company limited, New Delhi, 2003.
2	Alan B Marcovitz, —Introduction to Logic Design, second edition, Tata McGraw-Hill, New Delhi, 2005.
3	S.Salivahanan, "Digital circuits and Design", Thomson – Vikas Publishing House, New Delhi, 2012.

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MAHENDRA ENGINEERING COLLEGE (Autonomous)						
Syllabus						
Department	**Electronics and Communication Engineering**				**Programme Code**	**1041**
Semester						
Course code	**Course Name**	**Hours/week**			**Credit**	**Maximum marks**
24EC14303	**Electromagnetics**	**L**	**T**	**P**	**C**	**100**
		3	1	0	4	
Objectives	• To understand the basics of static electric field and the associated laws • To attain knowledge on the basics of static magnetic field • To educate scientifically about Maxwell's equations and Poynting theorem • To interpret the Wave propagation in between parallel planes and know the concept of plane waves, mathematically represent it in different forms, study wave propagation through various media • To understand the principles of propagation of uniform plane waves					
UNIT-I	**ELECTROSTATICS**					**9+3**
Coulomb's Law. Electric field intensity, Electric flux density – Gauss's law - Applications of Gauss law for point and infinite line charge distributions. Electric potential, Relationship between E and V, an electric dipole. Boundary conditions for dielectric-dielectric interface. Poisson"s and Laplace equation. Capacitance, Capacitance of various geometries using Laplace equations.						
UNIT-II	**MAGNETOSTATICS**					**9+3**
Biot-Savart Law, Magnetic field Intensity, Magnetic flux and magnetic flux density, Estimation of Magnetic field intensity for finite straight conductor. Ampere's circuital law, Application of Amperes law on infinitely long coaxial transmission line. Scalar and Vector magnetic potentials. Inductance of Solenoid and Toroid. Magnetic boundary condition.						
UNIT-III	**MAXWELL'S EQUATIONS**					**9+3**
Faraday's law – Displacement current –Maxwell's Second Equation in integral form from Faraday's Law–Equation expressed in point form. Modified form of Ampere's circuital law as Maxwell's first equation in integral form – Equation expressed in point form. Maxwell's four equations in integral form and differential form. Poynting Vector and the flow of power.						

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UNIT-IV	GUIDED WAVES	9+3
Waves between parallel planes: Transverse Electric waves-Transverse Magnetic waves-Characteristic of TE and TM waves-TEM waves. Attenuation in parallel plane guides-Wave impedance.		
UNIT-V	**ELECTROMAGNETIC WAVE PROPAGATION**	**9+3**
Derivation of Wave Equation – Plane waves in free space and in a homogenous material. Wave equation for a conducting medium –Reflection of Plane Wave from a conductor – normal incidence – Reflection of Plane Waves by a perfect dielectric – normal incidence. Brewster angle		
	Total	**60 Hours**
Outcomes	At the end of this course the students' will be able to • Describe electro-static theory and apply them for modelling and analysis of capacitors. • Explain magneto-static theory for modelling and analysis of inductors • Analyze the relation between fields under time varying situations • Describe the fundamental concepts of guided waves and characterizing parameters in parallel plane • Examine the phenomenon of wave propagation and reflection in different media	

TEXT BOOK :	
1	Matthew N. O. Sadiku, Sudarshan Nelatury "Elements of Electromagnetics",7th Edition, Oxford University Press 2020
2	W H.Hayt & J A Buck, "Engineering Electromagnetic", TATA McGraw-Hill, 7th Edition, 2011
REFERENCES:	
1	E.C. Jordan & K.G. Balmain, "Electromagnetic Waves and Radiating Systems", Pearson Education/PHI 4th edition, 2006.
2	Narayana Rao, N, "Elements of Engineering Electromagnetics", Prentice Hall of India, New Delhi, 6th edition, 2009.

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Course Code	Course Name	Hours/Week			Credit	Maximum Marks
		L	T	P	C	
24HS11006	UNIVERSAL HUMAN VALUES -II	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.

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).

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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-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.

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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

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. JeevanVidya: EkParichaya, ANagaraj, JeevanVidyaPrakashan, 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 - PanditSunderlal.
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.

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MAHENDRA ENGINEERING COLLEGE(Autonomous)						
Syllabus-R2024						
Department	**Electronics and Communication Engineering**			**Programme Code**		**1041**
III Semester - Open Elective -1						
Course Code	**Course name**	**HOURS/WEEK**			**CREDIT**	**Maximum Marks**
		L	**T**	**P**	**C**	
24EC34304	**Introduction to Python Programming**	**1**	**0**	**2**	**2**	**100**
Objectives	• To understand the needs of Python language for developers • To learn basics of flow control • To know the concept of list, Dictionaries and structured data					
UNIT I	**PYTHON BASICS**					6
Entering Expressions into the Interactive Shell -The Integer, Floating-Point, and String Data Types -String Concatenation - Storing Values in Variables - Assignment Statements-Variable Names-The print Function - The input Function-Printing the User's Name-The len Function -The str(), int(), and float Functions						
UNIT II	**FLOW CONTROL**					6
Boolean Values-Comparison Operators-Boolean Operators - Binary Boolean Operators-The not Operator-Mixing Boolean and Comparison Operators-Elements of Flow Control-Conditions - Blocks of Code - Flow Control Statements-if Statements - else Statements- elif Statements-while Loop Statements-break Statements-Continue Statements- for Loops and the range() Function-Importing Modules-import Statements						
UNIT III	**LISTS, TUPLE AND DICTIONARIES**					3
List Data Type-Getting Individual Values in a List with Indexes-Negative Indexes-Getting Sublists with Slices-Getting a List's Length with len()-Lists using for Loops -The in and not in Operators-Mutable and Immutable Data Types-Tuple and Dict						
					Total	**15Hrs**
	List of Experiments					**30**
Write a Python program for basic I/O operations and arithmetic computations.						
Develop a Python script using conditional statements and loops						
Implement list and dictionary operations for student mark processing						
Simulate basic signal data (e.g., sine wave) using NumPy and plot using matplotlib						
Interface Python with external sensors or data using file handling or libraries.						
					Total	15+30 = 45Hrs
Outcomes	• Explain the basics concepts of Python Programming Language • Analyze the flow control statements • Apply the data structures concepts in solving computational problems					

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Syllabus			
Department	**Electronics and Communication Engineering**	**Programme Code**	**1041**
Semester-III			

Course Code	Course Name	Hours/Week			Credit	Maximum marks
		L	T	P	C	
24EC24301	**Electronic Circuits Laboratory**	**0**	**0**	**3**	**1.5**	**100**

Objective(s)	• Study the characteristics and frequency response of CE and CS Amplifiers • Study the Transfer characteristics of differential amplifier • Perform experiment to obtain the bandwidth of single stage and multistage amplifiers • Study the effect of feedback on amplifiers

LIST OF EXPERIMENTS

Hardware Experiments

1	**Fixed Bias amplifier circuit using BJT** 1. Waveforms at input and output with bias. 2. Plot the frequency response 3. Measurement of Gain and Bandwidth
2	**Design and construct BJT Common Emitter Amplifier using voltage divider bias (self-bias) with and without bypassed emitter resistor** 1. Waveforms at input and output with bias. 2. Plot the frequency response 3. Measurement of Gain and Bandwidth
3	**Darlington Amplifier using BJT** 1. Waveforms at input and output with bias. 2. Plot the frequency response 3. Measurement of Gain and Bandwidth

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4	**Source follower with Bootstrapped gate resistance** 1. Waveforms at input and output with bias 2. Measurement of gain, input resistance & output resistance with & without Bootstrapping
5	BJT Differential amplifier - Measurement of CMRR.
6	Drain and Transfer Characteristics of JFET.
7	Hartley Oscillator using transistor.
8	Frequency response of Tuned Class C Amplifier using transistor.
9	Frequency Response of Current series and Voltage Shunt feedback amplifier using BJT.
10	Class B complementary symmetry amplifier with and without cross over distortion.
	Simulation Experiments
11	Simulation of BJT Common Emitter Amplifier using voltage divider bias.
12	Simulation of Differential amplifier using BJT.
13	Simulation of frequency response of Tuned Class C Amplifier using transistor.
14	Simulation of Class B complementary symmetry amplifier with and without cross over distortion.
15	Simulation of Hartley Oscillator and Colpitts oscillator
	Total **45 Hours**
Outcomes	• Illustrate the basics of transistor biasing and frequency analysis for any amplifier circuits • Analyze the limitations in Gain for Darlington Transistor and CMRR in differential amplifier • Analyze the feedback amplifiers and oscillators

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Syllabus

Department	Electronics and Communication Engineering	Programme Code	1041

Semester-III

Course Code	Course Name	Hours/Week			Credit	Maximum marks
		L	T	P	C	
24EC24302	**Digital Electronics Laboratory**	**0**	**0**	**3**	**1.5**	**100**

Objective(s)

- Understand the various logic gate functions
- Be familiar with various combinational and sequential circuits
- Understand the various components used in the design of digital computers

LIST OF EXPERIMENTS

1	Design and implementation of Adder and Subtractor using logic gates
2	Design and implementation of code converters using logic gates (i) BCD to excess-3 code and vice versa (ii) Binary to gray and vice-versa
3	Design and implementation of 4 bit binary Adder/subtractor and BCD adder
4	Design and implementation of 16 bit odd/even parity checker generator
5	Design and implementation of Multiplexer and De-multiplexer using logic gates
6	Design and implementation of encoder and decoder using logic gates
7	Design and implementation of 3-bit synchronous up/down counter
8	Implementation of SISO, SIPO, PISO and PIPO shift registers
9	Simulation of Half adder and Full adder using Verilog HDL
10	Simulation of 2 bit Magnitude Comparator & 8 Bit Magnitude Comparator using Verilog HDL
11	Simulation of Multiplexer and De-multiplexer using Verilog HDL
12	Simulation of 4 Bit synchronous up / Down Counter using Verilog HDL
13	Simulation of 4-bit ripple counter and Mod-10 / Mod-12 Ripple counters using Verilog HDL
	Total **45 Hours**

Outcomes

- Apply Boolean simplification techniques to design a combinational hardware circuit
- Build digital logic circuits using gates to solve the various problems
- Analyze the combinational and sequential circuits

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Department of Electronics and Communication Engineering
Curriculum – R-2024

SEMESTER-IV

Course Code	Course Name	Contact Periods	Hours/Week				Category
			L	T	P	C	
	Theory						
24SH11006	Probability and Random Processes	3	3	0	0	4	BS
24EC14401	Signals and Systems	3	2	0	2	4	PC
24EC14402	Analog Communication	3	3	0	0	3	PC
24CY11001	Environmental Science and Sustainability	3	3	0	0	0	HS
24EC14402	Microprocessors and Microcontrollers	3	3	0	0	3	PC
24EC34401	Analog Integrated Circuits (Integrated Course)	3	1	0	2	2	PC
	Open Elective - 3	3	3	0	0	3	OE
	Open Elective - 4	3	3	0	0	3	OE
	Practical						
24EC24401	Analog Communication Laboratory	3	0	0	2	1.5	PC
24EC24402	Microprocessors and Microcontrollers Laboratory	3	0	0	2	1.5	PC
24EN60001(R)	Professional Communication Skills	3	0	1	2	2	EEC
					Total	27	

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Syllabus R-2024							
Department	**Electronics and Communication Engineering**				**Programme Code**		**1041**
IV Semester							
Course code	**Course Name**	**Hours/week**			**Credit**		**Maximum marks**
		L	**T**	**P**	**C**		
24EC14401	**Signals and systems**	3	0	0	3		**100**
Objective(s)	• Understand the Mathematical Representation of Signals and Systems • Represent a given Continuous Time signal in frequency domain using Fourier Series ,Fourier Transform and Laplace transform • Explain the concept of Linear Time Invariant Systems and State variable Equations in CT Systems • Understand Spectrum Analysis of Continuous Time signals and sampled version of the CT signal • Explain the concept of Linear Time Invariant Systems and State variable Equations in CT Systems						
UNIT-I	**CLASSIFICATION OF SIGNALS AND SYSTEMS**						**9**
Continuous and Discrete time signals: Step, ramp, pulse, impulse, exponential - Classification of CT and DT signals and systems - Linear time invariant systems and its properties							
UNIT-II	**ANALYSIS OF CONTINUOUS TIME SIGNALS**						**9**
Fourier series analysis - Spectrum of CT Signals - Fourier transform and its properties - Laplace transform: ROC and properties							
UNIT-III	**LINEAR TIME INVARIANT – CONTINUOUS TIME SYSTEMS**						**9**
Differential equations: Frequency response, impulse response, Fourier and Laplace transform in analysis of CT systems - Block diagram representation - Convolution integral - State variable equations and matrix representation of CT systems.							
UNIT-IV	**ANALYSIS OF DISCRETE TIME SIGNALS**						**9**
Sampling of continuous time signals - Aliasing - DTFT and its properties - Z Transform: ROC and properties, Inverse Z Transform.							
UNIT-V	**LINEAR TIME INVARIANT - DISCRETE TIME SYSTEMS**						**9**

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Difference equations: Impulse response, LTI systems analysis using DTFT and Z Transform - Block diagram representation - Convolution sum - State variable equations and matrix representation of DT systems.	
Total	**45**
Outcome(s)	• Demonstrate the basic concept of classification of signals and systems • Analyze continuous time signals using Fourier and Laplace Transforms • Apply Fourier and Laplace Transform techniques to find the response of CT systems. • Analyze discrete time signals using DTFT and Z-Transforms. • Analyze system using DTFT and ZTransforms and realize the structure for DT systems.

TEXT BOOK :	
1	Text Books: Allan V.Oppenheim, S.Wilsky and S.H.Nawab, "Signals and Systems", Pearson Education, Second edition, 2017.
2	Edward W Kamen and Bonnie's Heck, "Fundamentals of Signals and Systems", Pearson Education, Third edition, 2014
REFERENCES:	
1	H P Hsu, RakeshRanjan "Signals and Systems", Schaums Outlines, Tata McGraw Hill, Indian Reprint 2013.
2	P.RameshBabu, R.Anandanatarajan, "Signals and Systems", Scitech Publications, Fourth edition, Reprint 2015.
3	Kani A N, "Signal And Systems" , CBS publishers ,2nd edition ,2022
4	Robert A. Gabel and Richard A.Roberts, "Signals & Linear Systems", John Wiley, Third edition, 2014.

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Syllabus						**Regulations 2024**
Department	**MATHEMATICS**	**Programme Code**				
IV Semester						
Course code	**Course Name**	**Hours/week**			**Credit**	**Maximum marks**
		L	**T**	**P**	**C**	
24MA12402	**PROBABILITY AND RANDOM PROCESSES (ECE)**	3	1	0	4	**100**

Objective(s)	To enable the students to: • Gain knowledge of random variables and various standard distributions and their properties. • Familiarizes the students with two dimensional discrete and continuous random variables, correlation and regression analysis and central limit theorem. • Acquire the knowledge of classification of random processes. • Learn about auto correlation and power spectral densities. • Study the linear time invariant systems and random inputs and outputs.
Outcome(s)	At the end of the course the students will be able to: • Apply the ideas of probability and random variable and various discrete and continuous probability distributions and their properties which can describe real life phenomena. • Solve the problems involving more than one random variable. • Identify the nature of the process namely Poission, Markov and Random telegraph process and calculate stationary. • Calculate the Auto Correlation and Spectral Density functions for the given Random processes • Analyze the response of random inputs to linear time invariant systems.

MODULE - I	**RANDOM VARIABLES**	**9+3**
Probability-Axiom of probability- Conditional probability -Discrete and continuous random variables – Mathematical Expectation -Moments – Moment generating functions – Binomial, Poisson, Uniform, Exponential and Normal distributions.		
MODULE - II	**TWO DIMENSIONAL RANDOM VARIABLES**	**9+3**
Joint distributions - Marginal and conditional distributions – Covariance - Correlation and Linear regression - Central limit theorem (Lindberg's Levy form)		
MODULE- III	**CLASSIFICATION OF RANDOM PROCESSES**	**9+3**
Definition and examples - first order, second order, strictly stationary, wide-sense stationary - Markov process - Poisson processes - Random telegraph process.		
MODULE- IV	**CORRELATION AND SPECTRAL DENSITIES**	**9+3**

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Auto correlation - Cross correlation - Properties – Power spectral density – Cross spectral density - Properties – Wiener-Khintchine relation – Relationship between cross power spectrum and cross correlation function		
MODULE - V	**LINEAR SYSTEMS WITH RANDOM INPUTS**	**9+3**
Linear time invariant system - System transfer function – Linear systems with random inputs – Auto correlation and cross correlation functions of input and output.		
	Total hours to be taught	**(L:45+T:15): 60 PERIODS**

TEXT BOOK :	
1	Veerarajan T., Probability and Statistics, Random Processes and Queueing Theory Tata McGraw-Hill, New Delhi, 2018.
2	A.Papoulis and S. Unnikrishnan Pillai, ``Probability, Random Variables and Stochastic Processes," McGraw Hill, 2017.
REFERENCES:	
1	Hwei Hsu, Schaum's Outlines of "Probability, Random variables and Random Processes, Tata McGraw – Hill Edition, New Delhi, 2017.
2	H. Stark and J. Woods, ``Probability and Random Processes with Applications to Signal Processing," , Pearson Education, 2001.
3	Peyton Z Peepbles Jr.,"Probability Random Variables and Random Signal Principles", Tata McGraw – Hill Publishers, New Delhi, 2017.

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Syllabus R-2024

Department	**Electronics and Communication Engineering**	**Programme Code**	**1041**

Course code	**Course Name**	**Hours/week**			**Credit**	**Maximum marks**
		L	**T**	**P**	**C**	
24EC14402	**Analog Communication**	3	0	0	3	**100**

Objective(s)

- To introduce the concepts of various amplitude modulations and their spectral characteristics.
- To understand the frequency modulations and their spectral characteristics.
- To know the effect of noise on communication systems.
- To understand noise performance of AM and FM receivers.
- To Learn data and pulse communication techniques.

UNIT-I	**AMPLITUDE MODULATION SYSTEMS**	**9**

Generation and demodulation of AM, DSB-SC, SSB-SC, VSB Signals, Filtering of sidebands, Comparison of Amplitude modulation systems, Frequency translation, Frequency Division multiplexing, AM transmitters, AM receivers.

UNIT-II	**FREQUENCY MODULATION SYSTEMS**	**9**

Angle modulation, frequency modulation, Narrowband and wideband FM, transmission bandwidth of FM signals, Generation of FM signal: Direct FM, indirect FM, Demodulation of FM signals, FM stereo multiplexing, PLL: Nonlinear model and linear model of PLL, Non-linear effects in FM systems, FM Broadcast receivers, FM stereo receiver.

UNIT-III	**NOISE PERFORMANCE OF DSB, SSB RECEIVERS**	**9**

Noise: Shot noise, thermal noise, White noise, Noise equivalent Bandwidth, Narrowband noise, Representation of Narrowband noise in terms of envelope and phase components, Sine wave plus Narrowband Noise, Receiver model, Noise in DSB-SC receiver, Noise in SSB receiver.

UNIT-IV	**NOISE PERFORMANCE OF AM AND FM RECEIVERS**	**9**

Noise in AM receivers threshold effect, Noise in FM receivers capture effect, FM threshold effect, FM threshold reduction, Pre-emphasis and de-emphasis in FM, Comparison of

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performance of AM and FM systems.		
UNIT-V	**PULSE MODULATION**	**9**
Sampling process: sampling theorem for band limited signals, ideal and practical sampling, Anti-aliasing and reconstruction filters, Generation and detection of Pulse Amplitude Modulation (PAM), Generation and detection of Pulse Width Modulation (PWM), Generation and detection of Pulse Position Modulation (PPM),Generation and detection of Pulse Time Modulation (PTM), Time division Multiplexing, Crosstalk effect.		
	Total	**45**
Outcome(s)	• Analyze the mathematical model for generation and detection of different AM systems based on time domain representation and its spectrum • Design of FM Transmission &Reception system and analyze it with its mathematical model. • Analyze the effect of noise on communication receivers. • Compare the noise performance of AM and FM receivers. • Apply the concepts of the sampling process and determine the characteristics of Pulse Analog	

TEXT BOOK :	
1	Simon Haykin, Communication Systems, John Wiley &sons, NY, 5th Edition, 2016.
REFERENCES:	
1	Michael P. Fitz, Fundamentals of Communication Systems, Tata McGraw-Hill, 2nd Edition-2013.
2	Taub and Schilling, Principles of communication systems, TMH, New Delhi, 4th Edition, 2017.
3	Simon Haykin, Michael Moher, Ajay Singh Raghuvanshi, Shweta Shah , "Communication Systems", Wiley, 5ed, , 2022
4	Michael Moher Simon Haykin, An Introduction to Analog &Digital Communications, 2nd Edition, 2012.

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MAHENDRA ENGINEERING COLLEGE (Autonomous)-Syllabus							R 2024
DEPARTMENT:	**SCIENCE & HUMANITIES**		**Programme Code & Name**				**CY& CHEMISTRY**
SEMESTER-III (For Non Circuit Branches & Cyber Security) & SEMESTER- IV (For Circuit Branches Except Cyber Security)							
COURSE CODE	**COURSE NAME**	**HOURS/WEEK**				**CREDIT**	**MAXIMUM MARKS**
24CY11001	**ENVIRONMENTAL SCIENCE AND SUSTAINABILITY**	**L**	**T**	**P**		**C**	**100**
		2	0	0		0	
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 inter dependence 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**						9 Hrs
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**						9 Hrs
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**						9 Hrs

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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**	9 Hrs
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.		
UNIT-V	**SUSTAINABILITY AND MANAGEMENT**	9 Hrs
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	**45 Hrs**

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", 3nd 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.

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MAHENDRA ENGINEERING COLLEGE
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Department	**Electronics and Communication Engineering**	**Programme Code**	**1041**

IV Semester

Course code	**Course Name**	**Hours/week**			**Credit**	**Maximum marks**
		L	**T**	**P**	**C**	
24EC14402	**Microprocessors and Microcontrollers**	3	0	0	3	**100**

Objectives	• To understand the concept of microcontroller based system • To understand the concept of architecture and peripherals • To study and understand the concepts of mode of operations and instructions • To develop the Programming and Peripheral Interface for microcontroller and its applications • To develop skill to explore system design technique

UNIT-I	**INTRODUCTION TO MICROPROCESSOR**	**9**

Introduction to microprocessor, 8086 Architecture, Pin description of 88086, Instruction sets, various addressing Modes of 8086, Development tools: Assembler-Compiler- simulator/ Debugger.

UNIT-II	**8051 MICROCONTROLLER**	**9**

Introduction to microcontroller, Comparison of microprocessor and microcontroller, Block Diagram and Architecture of 8051, Pin description of 8051, PSW and Flag Bits, 8051 Register Banks and Stack, Internal Memory Organization of 8051, IO Port Usage in 8051, Types of Special Function Registers and their uses in 8051, 8051 Interfacing With External ROM And RAM, Interrupts and Timers

UNIT-III	**INSTRUCTION SETS AND PROGRAMMING**	**9**

Data types and Assembler directives, 8051 Addressing Modes and accessing memory using various addressing modes, instruction set: Arithmetic, Logical, Jump, Loop and call instructions. Timer/ Counter programming, Assembly language programming examples

UNIT-IV	**MICROCONTROLLER PERIPHERAL INTERFACING**	**9**

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8051 Interfacing: DC motor, stepper motor, sensors, relay, keyboard, switches, seven segment display, RTC and LCD. Case study: Traffic light control.		
UNIT-V	**32- BIT ARM PROCESSOR**	**9**
RISC Vs CISC Architecture, ARM Processor Architecture, ARM Core data flow model, Barrel Shifter, ARM processor modes and families, pipelining , ARM instruction Set and its Programming.		
	Total	**45 Hours**
Outcomes	• Outline the concepts of 8086 microprocessor based system • Identify a detailed hardware structure of the 8051 microcontroller • Describe the functions of instruction sets and programming of 8051 microcontroller • Develop the program to interface the relevant peripherals and simple applications using microcontroller • Design, develop and trouble shoot microcontroller based system.	

TEXT BOOK :	
1	Yu-Cheng Liu, Glenn A.Gibson, Microcomputer Systems: The 8086/8088 Family - Architecture, Programming and Design, Second Edition, Prentice Hall of India, 2011
2	Kenneth Ayala J. The 8051 Microcontroller: Architecture, Programming, and Applications, 3rd edition ,Thomson Delmar learning 2017
REFERENCES:	
1	Raj kamal, Microcontrollers: Architecture, Programming, Interfacing and System Design,4th edition, Pearson Education India, 2013
	Ramesh S. Gaonkar, "Microprocessor Architecture, Programming and Applications with 8085". Penram International Publishing reprint, 6th Edition, 2017
2	Ajay V Deshmukh, Microcontrollers: Theory and Applications, 4th edition ,Tata McGraw-Hill Education, 2015
3	Mazidi Ali, Muhammad Mazidi Gillispie Janice, The 8051 microcontroller and embedded systems, PHI, New Delhi 2012

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MAHENDRA ENGINEERING COLLEGE (Autonomous)						
Department	**Electronics and Communication Engineering**			**Programme Code**		**1051**
Syllabus-R2024- IV Semester						
Course Code	**Course name**	**HOURS/WEEK**			**CREDIT**	**Maximum Marks**
		L	**T**	**P**	**C**	
24EC34401	**Analog Integrated Circuits**	**1**	**0**	**2**	**2**	**100**
Objectives	• To understand the basics of operational amplifiers • To learn the applications of operational amplifiers • To study the PLL as AM demodulator					
UNIT I	**BASICS OF OPERATIONAL AMPLIFIERS**					7
Current mirror and current sources, Current sources as active loads, Voltage sources, Voltage References, BJT Differential amplifier with active loads, - Ideal Operational Amplifier — General operational amplifier stages -and internal circuit diagrams of IC 741, DC and AC performance characteristics, slew rate, Open and closed loop configurations						
UNIT II	**APPLICATIONS OF OPERATIONAL AMPLIFIERS**					8
Sign Changer, Scale Changer, Phase Shift Circuits, Voltage Follower, V-to-I and I-to-V converters, adder, subtractor, Instrumentation amplifier, Integrator, Logarithmic amplifier, Comparators, Schmitt trigger, Precision rectifier, peak detector, Low-pass, high-pass filter-Operation of the basic PLL- Monolithic PLL IC 565-Application of PLL -AM detection						
	List of Experiments					**15**
Design a inverting amplifier and non-inverting circuit with OPAMP IC 741C						
Design a summing amplifier circuit with OP AMP 741C						
Design a Schmitt trigger, plot the input output waveforms and measure VUT and VLT.						
Design Low Pass Filter using OPAMP IC 741C						
AM Detection using PLL						
					Total	**30Hrs**
Outcomes	• Explain the concept of operational amplifiers • Explain the working principle of OP amp and PLL • Design application specific circuits for applications					

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MAHENDRA ENGINEERING COLLEGE
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Syllabus

Department	Electronics and Communication Engineering	Programme Code	1041

Semester-IV

Course Code	Course Name	Hours/Week			Credit	Maximum marks
		L	T	P	C	
22EC24402	Analog Communication Laboratory	0	0	3	1.5	100

Objective(s)

- To Learn the need and basics of analog modulation techniques
- To simulate various analog modulation schemes
- To understand principles of AM & FM modulation and demodulation

LIST OF EXPERIMENTS

1	Signal Sampling and reconstruction
2	Amplitude modulation and demodulation
3	Pulse Amplitude Modulation & Demodulation
4	Pre-emphasis & de-emphasis
5	Pulse Width Modulation & Demodulation
6	Frequency modulation and demodulation
7	Pulse Position Modulation & Demodulation

Using Matlab /Simulink

8	DSB-SC Modulator & Detector
9	SSB-Sc Modulator & Detector (Phase Shift Method)
10	Frequency Synthesizer
9	AGC Characteristics for AM and FM
10	PLL as FM Demodulator
	Total **45**

Outcome(s)

- Apply and design analog modulation techniques and frequency synthesizer for simple applications
- Analyze the performance of FM and AM techniques
- Simulate Matlab programs for various modulation techniques

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6	Develop a program to interface ADC and DAC Module with 8051	
7	Develop a program to interface LED and LCD Module with 8051	
8	Develop a program to interface a DC Motor with 8051	
9	Develop a program to interface a Stepper Motor with 8051	
10	Develop Programs for Communication between 8051 Microcontroller kit and PC	
11	Develop a program to interface traffic light control system with 8051	
12	Develop a program to interface 8051 based temperature measurement with 8051	
	Total	**45Hours**
Outcomes	• Write programs in 8051 for a specific Applications • Write programs related to memory operations and applications • Interface A/D and D/A convertors with 8051 microcontroller	

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Syllabus - Regulation 2024

Department	**English**

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

Course code	Course Name	Hours/week			Credit	Maximum marks
		L	T	P	C	
24HS21002	**PROFESSIONAL COMMUNICATION SKILLS** (Common to all B.E./B.Tech. Degree Programmes)	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 workplace 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.	Soft Skills (Goal Setting, Empathy, Stress Management, Emotional Intelligence, Conflict Resolution)
3.	Building Vocabulary (Intermediate Level)
4.	Welcome Address and Vote of Thanks
5.	Stage Dynamics (Body Language and Paralanguage –Individual Presentation for 3 minutes)
6.	Framing Questions (WH Questions & 'Yes' or 'No' Questions)
7.	Narrative Techniques - Narrating the Experience
8.	Master of Ceremony Skills
9.	Picture Description
10.	Impromptu Speech (Just a Minute)

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Total Hrs : 30

Textbook:	
1	Joshi, Manmohan, *Soft Skills*, 1st Edition. Bookboon, 2017
Reference Books:	
1	Muralikrishna, &Sunita Mishra, *Communication Skills for Engineers*. Pearson, New Delhi, 2011.
2	Barun K. Mitra, Personality Development and Soft Skills, Oxford University Press, New Delhi, 2011
Online Websites:	
1	https:// www.ted.com/talks
2	https://joshtalks.com
3	https://quizziz.com
4	www.pdfdrive.com
5	www.talking books.com

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