SYLLABI BOOK

BACHELOR OF TECHNOLOGY
ELECTRONICS & COMMUNICATION ENGINEERING

Department of Electronics & Communication Engineering
Faculty of Technology
Dharmsinh Desai University
Nadiad – 387 001, Gujarat, India.

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Admission Year
2021 onwards

TEACHING SCHEME FOR THE COURSE
B. TECH. ELECTRONICS & COMMUNICATION
(Admission Year 2021)

B.Tech. Semester-1 (2021-2022)

Subject		Teaching Scheme (Hrs/Week)				Credit	Exam Scheme (Marks)				
		Lect	Tut	Prac	Total		Th.	Int.	TW	Prac.	Total
1	Mathematics-I	3	1	0	4	**4**	60	40	-	-	100
2	Basic Electrical Engineering	3	1	2	6	**5**	60	40	50	-	150
3	Programming for Problem Solving I	4	0	3	7	**5.5**	60	40	50	-	150
4	Engineering Graphics & Design	1	0	4	5	**3**	-	-	100	-	100
5	Software Workshop	0	0	2	2	**1**	-	-	50	-	50
						18.5					**550**

B.Tech. Semester-2 (2021-2022)

Subject		Teaching Scheme (Hrs/Week)				Credit	Exam Scheme (Marks)				
		Lect	Tut	Prac	Total		Th.	Int.	TW	Prac.	Total
1	Mathematics-II	3	1	0	4	**4**	60	40	-	-	**100**
2	Programming for Problem Solving II	4	0	3	7	**5.5**	60	40	50	-	**150**
3	Physics	3	1	2	6	**5**	60	40	50	-	**150**
4	Hardware Workshop	0	0	4	4	**2**	-	-	100	-	**100**
5	English	2	0	2	4	**3**	40	-	50	-	**90**
6	Environmental Studies	2	0	0	2	**0**	40	-	-	-	**40**
						19.5					**630**

B.Tech. Semester-3 (2022-2023)

Subject		Teaching Scheme (Hrs/Week)				Credit	Exam Scheme (Marks)				
		Lect	Tut	Prac	Total		Th.	Int.	TW	Prac.	Total
1	Applied Mathematics	3	1	0	4	**4**	60	40	-	-	**100**
2	Linear Electronics - I	4	0	2	6	**5**	60	40	25	25	**150**
3	Electronic Instrumentation	3	1	2	6	**5**	60	40	25	25	**150**
4	Network Analysis	3	1	2	6	**5**	60	40	25	25	**150**
5	Digital Electronics	3	1	2	6	**5**	60	40	25	25	**150**
6	Mathematical Computing Laboratory	0	0	2	2	**1**	-	-	25	25	**50**
						25					**750**

B.Tech. Semester-4 (2022-2023)

	Subject	Teaching Scheme (Hrs/Week)				Credit	Exam Scheme (Marks)				
		Lect	Tut	Prac	Total		Th.	Int.	TW	Prac.	Total
1	Signal & Systems	2	1	2	5	**4**	40	40	25	25	**130**
2	Linear Electronics - II	4	0	2	6	**5**	60	40	25	25	**150**
3	Control Theory	3	1	2	6	**5**	60	40	25	25	**150**
4	Electrical Machines & Power	3	0	2	5	**4**	60	40	25	25	**150**
5	Program Elective - 1	3	1	2	6	**5**	60	40	25	25	**150**
6	Universal Human Values	2	1	0	3	**3**	40	-	-	-	**40**
						26					**770**

B.Tech. Semester-5 (2023-2024)

	Subject	Teaching Scheme (Hrs/Week)				Credit	Exam Scheme (Marks)				
		Lect	Tut	Prac	Total		Th.	Int.	TW	Prac.	Total
1	Microcontroller Applications	4	0	2	6	**5**	60	40	25	25	**150**
2	Electronic Communication	3	0	2	5	**4**	60	40	25	25	**150**
3	Electromagnetic Fields	3	1	0	4	**4**	60	40	50	-	**150**
4	Program Elective - 2	4	0	2	6	**5**	60	40	25	25	**150**
5	Open Elective - 1	1	1	2	4	**3**	-	-	50	-	**50**
6	Electronic Circuits Project	0	0	2	2	**1**	-	-	50	-	**50**
7	Technical Communication	1	1	2	4	**3**	-	-	50	-	**50**
						25					**750**

B.Tech. Semester-6 (2023-2024)

	Subject	Teaching Scheme (Hrs/Week)				Credit	Exam Scheme (Marks)				
		Lect	Tut	Prac	Total		Th.	Int.	TW	Prac.	Total
1	Advanced Microprocessor	4	0	2	6	**5**	60	40	25	25	**150**
2	Communication Systems	3	1	2	6	**5**	60	40	25	25	**150**
3	Digital Signal Processing	3	1	2	6	**5**	60	40	25	25	**150**
4	Microcontroller and IoT Project	0	0	2	2	**1**	-	-	50	-	**50**
5	Program Elective - 3	3	1	2	6	**5**	60	40	25	25	**150**
6	Open Elective - 2	2	0	2	4	**3**	40	-	25	25	**90**
						24					**740**

B.Tech. Semester-7 (2024-2025)

Subject		Teaching Scheme (Hrs/Week)				Credit	Exam Scheme (Marks)				
		Lect	Tut	Prac	Total		Th.	Int.	TW	Prac.	Total
1	Data & Computer Communications	3	0	2	5	**4**	60	40	25	25	**150**
2	Summer Internship Project	0	0	2	2	**2**	-	-	50	-	**50**
3	Entrepreneurship and IP Strategy	2	0	0	2	**2**	40	-	-	-	**40**
4	Open Elective - 3	2	1	0	3	**3**	40	-	-	-	**40**
5	Program Elective - 4	3	1	0	4	**4**	60	40	-	-	**100**
6	Program Elective - 5	4	0	2	6	**5**	60	40	25	25	**150**
7	Program Elective - 6	4	0	2	6	**5**	60	40	25	25	**150**
						25					**680**

B.Tech. Semester-8 (2024-2025)

Subject		Teaching Scheme (Hrs/Week)				Credit	Exam Scheme (Marks)				
		Lect	Tut	Prac	Total		Th.	Int.	TW	Prac.	Total
1	Industrial Training Project	0	0	24	24	**12**	-	-	50	300	**350**
2	Seminar	0	6	0	6	**6**	-	-	50	100	**150**
						18					**500**

PROGRAM ELECTIVE OPTIONS

Program Elective – 1

CMOS VLSI Design
Introduction to MEMS
Nano Electronics

Program Elective - 2

Power Electronics
Scientific Computing
Bio-Medical Electronics

Program Elective – 3

Microwave & Antennas
Microwave Theory and Techniques
Satellite Communication

Program Elective - 4

Wireless Communication
High Speed Electronics
Fiber Optic Communication

Program Elective – 5

Image Processing
Wireless Sensor Networks
Digital Switching Systems

Program Elective - 6

Embedded Systems
RF Circuit Design
Adaptive Signal Processing

OPEN ELECTIVE OPTIONS

Open Elective – 1

Audio Video Engineering
Computer Organization & Architecture
Robotics Engineering

Open Elective – 2

Automated Electronics
Power Plant Automation
Smart Instruments

Open Elective – 3

Coding Theory & Compression Techniques
Error Correcting Codes
Radar and Navigation

TEACHING SCHEME FOR THE COURSE
B. TECH. ELECTRONICS & COMMUNICATION
(Admission Year 2022)

B.Tech. Semester-1 (2022-2023)

Subject		Teaching Scheme (Hrs/Week)				Credit	Exam Scheme (Marks)				
		Lect	Tut	Prac	Total		Th.	Int.	TW	Prac.	Total
1	Mathematics-I	3	1	0	4	**4**	60	40	-	-	100
2	Basic Electrical Engineering	3	1	2	6	**5**	60	40	50	-	150
3	Programming for Problem Solving I	4	0	3	7	**5.5**	60	40	50	-	150
4	Engineering Graphics & Design	1	0	4	5	**3**	-	-	100	-	100
5	Software Workshop	0	0	2	2	**1**	-	-	50	-	50
						18.5					**550**

B.Tech. Semester-2 (2022-2023)

Subject		Teaching Scheme (Hrs/Week)				Credit	Exam Scheme (Marks)				
		Lect	Tut	Prac	Total		Th.	Int.	TW	Prac.	Total
1	Mathematics-II	3	1	0	4	**4**	60	40	-	-	**100**
2	Programming for Problem Solving II	4	0	3	7	**5.5**	60	40	50	-	**150**
3	Physics	3	1	2	6	**5**	60	40	50	-	**150**
4	Hardware Workshop	0	0	4	4	**2**	-	-	100	-	**100**
5	English	2	0	2	4	**3**	40	-	50	-	**90**
6	Environmental Studies	2	0	0	2	**0**	40	-	-	-	**40**
						19.5					**630**

B.Tech. Semester-3 (2023-2024)

Subject		Teaching Scheme (Hrs/Week)				Credit	Exam Scheme (Marks)				
		Lect	Tut	Prac	Total		Th.	Int.	TW	Prac.	Total
1	Applied Mathematics	3	1	0	4	**4**	60	40	-	-	**100**
2	Linear Electronics – I	4	0	2	6	**5**	60	40	25	25	**150**
3	Electronic Instrumentation	1	0	4	5	**3**	-	-	50	50	**100**
4	Network Analysis	3	1	2	6	**5**	60	40	25	25	**150**
5	Digital Electronics	3	1	2	6	**5**	60	40	25	25	**150**
6	Mathematical Computing Laboratory	0	0	2	2	**1**	-	-	25	25	**50**
						23					**700**

B.Tech. Semester-4 (2023-2024)

	Subject	Teaching Scheme (Hrs/Week)				Credit	Exam Scheme (Marks)				
		Lect	Tut	Prac	Total		Th.	Int.	TW	Prac.	Total
1	Signal & Systems	2	1	2	5	**4**	40	40	25	25	**130**
2	Linear Electronics – II	4	0	2	6	**5**	60	40	25	25	**150**
3	Control Theory	3	1	0	4	**4**	60	40	-	-	**100**
4	Electrical Machines & Power	3	0	2	5	**4**	60	40	25	25	**150**
5	Program Elective – 1	3	1	2	6	**5**	60	40	25	25	**150**
6	Universal Human Values	2	1	0	3	**3**	40	-	-	-	**40**
						25					**720**

B.Tech. Semester-5 (2024-2025)

	Subject	Teaching Scheme (Hrs/Week)				Credit	Exam Scheme (Marks)				
		Lect	Tut	Prac	Total		Th.	Int.	TW	Prac.	Total
1	Microcontroller Applications	4	0	2	6	**5**	60	40	25	25	**150**
2	Electronic Communication	3	0	2	5	**4**	60	40	25	25	**150**
3	Electromagnetic Fields	3	1	0	4	**4**	60	40	50	-	**150**
4	Program Elective – 2	4	0	2	6	**5**	60	40	25	25	**150**
5	Open Elective – 1	1	1	2	4	**3**	-	-	50	-	**50**
6	Electronic Circuits Project	0	0	2	2	**1**	-	-	50	-	**50**
7	Technical Communication	1	1	2	4	**3**	-	-	50	-	**50**
						25					**750**

B.Tech. Semester-6 (2024-2025)

	Subject	Teaching Scheme (Hrs/Week)				Credit	Exam Scheme (Marks)				
		Lect	Tut	Prac	Total		Th.	Int.	TW	Prac.	Total
1	Advanced Microprocessor	4	0	2	6	**5**	60	40	25	25	**150**
2	Communication Systems	3	1	2	6	**5**	60	40	25	25	**150**
3	Digital Signal Processing	3	1	2	6	**5**	60	40	25	25	**150**
4	Microcontroller and IoT Project	0	0	2	2	**1**	-	-	50	-	**50**
5	Program Elective – 3	3	1	2	6	**5**	60	40	25	25	**150**
6	Open Elective – 2	2	0	2	4	**3**	40	-	25	25	**90**
						24					**740**

B.Tech. Semester-7 (2025-2026)

Subject		Teaching Scheme (Hrs/Week)				Credit	Exam Scheme (Marks)				
		Lect	Tut	Prac	Total		Th.	Int.	TW	Prac.	Total
1	Data & Computer Communications	3	0	2	5	**4**	60	40	25	25	**150**
2	Summer Internship Project	0	0	2	2	**2**	-	-	50	-	**50**
3	Entrepreneurship and IP Strategy	2	0	0	2	**2**	40	-	-	-	**40**
4	Open Elective – 3	2	1	0	3	**3**	40	-	-	-	**40**
5	Program Elective – 4	3	1	0	4	**4**	60	40	-	-	**100**
6	Program Elective – 5	4	0	2	6	**5**	60	40	25	25	**150**
7	Program Elective – 6	4	0	2	6	**5**	60	40	25	25	**150**
						25					**680**

B.Tech. Semester-8 (2025-2026)

Subject		Teaching Scheme (Hrs/Week)				Credit	Exam Scheme (Marks)				
		Lect	Tut	Prac	Total		Th.	Int.	TW	Prac.	Total
1	Industrial Training Project	0	0	24	24	**12**	-	-	50	300	**350**
2	Seminar	0	6	0	6	**6**	-	-	50	100	**150**
						18					**500**

PROGRAM ELECTIVE OPTIONS

Program Elective – 1

CMOS VLSI Design
Introduction to MEMS
Nano Electronics

Program Elective - 2

Power Electronics
Scientific Computing
Bio-Medical Electronics

Program Elective – 3

Microwave & Antennas
Microwave Theory and Techniques
Satellite Communication

Program Elective - 4

Wireless Communication
High Speed Electronics
Fiber Optic Communication

Program Elective – 5

Image Processing
Wireless Sensor Networks
Digital Switching Systems

Program Elective - 6

Embedded Systems
RF Circuit Design
Adaptive Signal Processing

OPEN ELECTIVE OPTIONS

Open Elective – 1

Audio Video Engineering
Computer Organization & Architecture
Robotics Engineering

Open Elective – 2

Automated Electronics
Power Plant Automation
Smart Instruments

Open Elective – 3

Coding Theory & Compression Techniques
Error Correcting Codes
Radar and Navigation

TEACHING SCHEME FOR THE COURSE
B. TECH. ELECTRONICS & COMMUNICATION
(Admission Year 2023)

B.Tech. Semester-1 (2023-2024)

Subject		Teaching Scheme (Hrs/Week)				Credit	Exam Scheme (Marks)				
		Lect	Tut	Prac	Total		Th.	Int.	TW	Prac.	Total
1	Mathematics-I	3	1	0	4	**4**	60	40	-	-	100
2	Basic Electrical Engineering	3	1	2	6	**5**	60	40	50	-	150
3	Programming for Problem Solving	4	0	3	7	**5.5**	60	40	50	-	150
4	Engineering Graphics & Design	1	0	4	5	**3**	-	-	100	-	100
5	Software Workshop	0	0	2	2	**1**	-	-	50	-	50
						18.5					**550**

B.Tech. Semester-2 (2023-2024)

Subject		Teaching Scheme (Hrs/Week)				Credit	Exam Scheme (Marks)				
		Lect	Tut	Prac	Total		Th.	Int.	TW	Prac.	Total
1	Mathematics-II	3	1	0	4	**4**	60	40	-	-	**100**
2	Object Oriented Programming	4	0	3	7	**5.5**	60	40	50	-	**150**
3	Physics	3	1	2	6	**5**	60	40	50	-	**150**
4	Hardware Workshop	0	0	4	4	**2**	-	-	100	-	**100**
5	English	2	0	2	4	**3**	40	-	50	-	**90**
6	Environmental Studies	2	0	0	2	**0**	40	-	-	-	**40**
						19.5					**630**

B.Tech. Semester-3 (2024-2025)

Subject		Teaching Scheme (Hrs/Week)				Credit	Exam Scheme (Marks)				
		Lect	Tut	Prac	Total		Th.	Int.	TW	Prac.	Total
1	Applied Mathematics	3	1	0	4	**4**	60	40	-	-	**100**
2	Linear Electronics – I	4	0	2	6	**5**	60	40	25	25	**150**
3	Electronic Instrumentation	1	0	4	5	**3**	-	-	50	50	**100**
4	Network Analysis	3	1	2	6	**5**	60	40	25	25	**150**
5	Digital Electronics	3	1	2	6	**5**	60	40	25	25	**150**
6	Mathematical Computing Laboratory	0	0	2	2	**1**	-	-	25	25	**50**
						23					**700**

B.Tech. Semester-4 (2024-2025)

	Subject	Teaching Scheme (Hrs/Week)				Credit	Exam Scheme (Marks)				
		Lect	Tut	Prac	Total		Th.	Int.	TW	Prac.	Total
1	Signal & Systems	2	1	2	5	**4**	40	40	25	25	**130**
2	Linear Electronics – II	4	0	2	6	**5**	60	40	25	25	**150**
3	Control Theory	3	1	0	4	**4**	60	40	-	-	**100**
4	Electrical Machines & Power	3	0	2	5	**4**	60	40	25	25	**150**
5	Program Elective – 1	3	1	2	6	**5**	60	40	25	25	**150**
6	Universal Human Values	2	1	0	3	**3**	40	-	-	-	**40**
						25					**720**

B.Tech. Semester-5 (2025-2026)

	Subject	Teaching Scheme (Hrs/Week)				Credit	Exam Scheme (Marks)				
		Lect	Tut	Prac	Total		Th.	Int.	TW	Prac.	Total
1	Microcontroller Applications	4	0	2	6	**5**	60	40	25	25	**150**
2	Electronic Communication	3	0	2	5	**4**	60	40	25	25	**150**
3	Electromagnetic Fields	3	1	0	4	**4**	60	40	50	-	**150**
4	Program Elective – 2	4	0	2	6	**5**	60	40	25	25	**150**
5	Open Elective – 1	1	1	2	4	**3**	-	-	50	-	**50**
6	Electronic Circuits Project	0	0	2	2	**1**	-	-	50	-	**50**
7	Technical Communication	1	1	2	4	**3**	-	-	50	-	**50**
						25					**750**

B.Tech. Semester-6 (2025-2026)

	Subject	Teaching Scheme (Hrs/Week)				Credit	Exam Scheme (Marks)				
		Lect	Tut	Prac	Total		Th.	Int.	TW	Prac.	Total
1	Advanced Microprocessor	4	0	2	6	**5**	60	40	25	25	**150**
2	Communication Systems	3	1	2	6	**5**	60	40	25	25	**150**
3	Digital Signal Processing	3	1	2	6	**5**	60	40	25	25	**150**
4	Microcontroller and IoT Project	0	0	2	2	**1**	-	-	50	-	**50**
5	Program Elective – 3	3	1	2	6	**5**	60	40	25	25	**150**
6	Open Elective – 2	2	0	2	4	**3**	40	-	25	25	**90**
						24					**740**

B.Tech. Semester-7 (2026-2027)

Subject		Teaching Scheme (Hrs/Week)				Credit	Exam Scheme (Marks)				
		Lect	Tut	Prac	Total		Th.	Int.	TW	Prac.	Total
1	Data & Computer Communications	3	0	2	5	**4**	60	40	25	25	**150**
2	Summer Internship Project	0	0	2	2	**2**	-	-	50	-	**50**
3	Entrepreneurship and IP Strategy	2	0	0	2	**2**	40	-	-	-	**40**
4	Open Elective – 3	2	1	0	3	**3**	40	-	-	-	**40**
5	Program Elective – 4	3	1	0	4	**4**	60	40	-	-	**100**
6	Program Elective – 5	4	0	2	6	**5**	60	40	25	25	**150**
7	Program Elective – 6	4	0	2	6	**5**	60	40	25	25	**150**
						25					**680**

B.Tech. Semester-8 (2026-2027)

Subject		Teaching Scheme (Hrs/Week)				Credit	Exam Scheme (Marks)				
		Lect	Tut	Prac	Total		Th.	Int.	TW	Prac.	Total
1	Industrial Training Project	0	0	24	24	**12**	-	-	50	300	**350**
2	Seminar	0	6	0	6	**6**	-	-	50	100	**150**
						18					**500**

PROGRAM ELECTIVE OPTIONS

Program Elective – 1

CMOS VLSI Design
Introduction to MEMS
Nano Electronics

Program Elective - 2

Power Electronics
Scientific Computing
Bio-Medical Electronics

Program Elective – 3

Microwave & Antennas
Microwave Theory and Techniques
Satellite Communication

Program Elective - 4

Wireless Communication
High Speed Electronics
Fiber Optic Communication

Program Elective – 5

Image Processing
Wireless Sensor Networks
Digital Switching Systems

Program Elective - 6

Embedded Systems
RF Circuit Design
Adaptive Signal Processing

OPEN ELECTIVE OPTIONS

Open Elective – 1

Audio Video Engineering
Computer Organization & Architecture
Robotics Engineering

Open Elective – 2

Automated Electronics
Power Plant Automation
Smart Instruments

Open Elective – 3

Coding Theory & Compression Techniques
Error Correcting Codes
Radar and Navigation

B.TECH.SEMESTER–I(EC/CE/IT)

SUBJECT: (BS101) MATHEMATICS – I (w. e. f. 2021-22)

Teaching Scheme (Hours/Week)				Credits	Examination Scheme				
Lect	Tut	Prac	Total		Ext	Sess.	TW	Pract.	Total
3	1	0	4	4	60	40	-	-	100

COURSE OBJECTIVES

The course is designed to provide the basic concepts and principles of mathematics such as improper integrals, matrices, and calculus. It offers a study to compute surface area and volume, express functions in terms of series, the concepts of matrix algebra, vector differential calculus, and to use it as a tool to solve and analyze the engineering problems.

DETAILED SYLLABUS

[1] CALCULUS

Evaluates and involutes, Evaluation of definite and improper integrals; Beta and Gamma functions and their properties, Applications of definite integrals to evaluate surface areas and volumes of revolutions. Rolle's Theorem, Mean value theorems, Taylor's and Maclaurin theorems with remainders; indeterminate forms and L'Hospital's rule, Maxima and minima.

[2] MATRICES

Matrices, Vectors: addition and scalar multiplication, matrix multiplication; Rank of a Matrix, Linear systems of equations, Determinants, Cramer's Rule, Inverse of a matrix, Gauss Elimination and Gauss Jordan method.

[3] VECTOR SPACES

Eigenvalues, Eigenvectors, Symmetric, Skew-symmetric, and Orthogonal Matrices, Linear Independence of vectors, Diagonalization.

[4] MULTIVARIABLE CALCULUS (DIFFERENTIATION)

Limit, Continuity and Partial derivatives, Directional derivatives, Total derivative; Tangent plane and normal line; Maxima, minima and saddle points; Method of Lagrange multipliers; Vector Differential Calculus; Gradient, curl and divergence.

TEXT / REFERENCE BOOKS

1) B. S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 40th Edition, 2007.

2) G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.

3) Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.

4) D. Poole, Linear Algebra: A Modern Introduction, 2nd Edition, Brooks/Cole, 2005.

5) Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2008.

6) Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010.
7) N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.
8) V. Krishnamurthy, V.P. Mainra and J.L. Arora, An introduction to Linear Algebra, Affiliated East–West press, Reprint 2005.

COURSE OUTCOMES

At the end of the course,students should be able to

CO1. Understand the concepts of Beta Gamma function used in applications of engineering problems.
CO2. Describe concepts of vector differential calculus for analysing engineering problem.
CO3. Apply the concept of integral calculus for computing improper integrals, surface area and volumes.
CO4. Analyse system of linear equations of engineering problems and can be solved using concepts of matrices.
CO5. Evaluate the optimum value of function of several variables.
CO6. Evaluate solution of eigenvalues and Eigen vectors of different engineering problems.

COURSE MATRIX

Course Outcome (CO's)	**Program Outcomes (PO's)**											
	Domain Specific (PSO)					**Domain Independent (PO)**						
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	2	2		2			1				
CO2	3	2				1	1					
CO3	2	3	2					1	1			
CO4	3	2	3		2			1	1	1		
CO5	2	3	2	2	2				1	1		
CO6	2	2	3	2								
1: Slight (Low) , 2: Moderate (Medium), 3: Substantial (High)												

B. TECH. SEMESTER – I (EC/CE/IT)

SUBJECT: (ES104) BASIC ELECTRICAL ENGINEERING (w. e. f. 2021-22)

Teaching Scheme (Hours/Week)				Credits	Examination Scheme				
Lect	Tut	Prac	Total		Ext	Sess.	TW	Pract.	Total
3	1	2	6	5	60	40	50*	-	150

*TW Marks includes Viva based on TW

COURSE OBJECTIVES

The course impart an in-depth understanding of the fundamental concepts associated with AC and DC circuit analysis used in electrical and electronic devices using basic circuital laws and Theorems. The course also focuses on the analyse relationship between electric and magnetic circuit, importance of magnetic circuit and performance of electrical machines.

To expose the students to the concepts of various types ofelectrical, electronic and magnetic circuits and their applications.

DETAILED SYLLABUS

[1] DC CIRCUITS

Electrical circuit elements (R, L and C), impact of temperature, voltage and current sources, Kirchhoff current and voltage laws, analysis of simple circuits with dc excitation. Superposition, Thevenin and Norton Theorems. Time-domain analysis of first order RL and RC circuits.

[2] AC CIRCUITS

Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor. Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel), resonance. Three-phase balanced circuits, voltage and current relations in star and delta connections

[3] ELECTRO-MAGNETIC INDUCTION

Introduction, Magnetic effect of electric current, Current carrying conductor in magnetic field, Law of electromagnetic induction, Induced emf, Self-Inductance (L), Mutual Inductance (M), and Coupling coefficient between two magnetically coupled circuits (K), Inductances in series and parallel.

[4] MAGNETIC CIRCUITS

Introduction, Definition of Magnetic quantities, Magnetic circuit, Leakage flux, Fringing effect, Comparison between magnetic and electric circuits

[5] TRANSFORMERS

Magnetic materials, BH characteristics, ideal and practical transformer, equivalent circuit, losses in transformers, regulation and efficiency. Auto-transformer and three-phase transformer connections

[6] ELECTRICAL MACHINES

Generation of rotating magnetic fields, Construction and working of a three-phase induction motor, Significance of torque-slip characteristic. Loss components and efficiency, starting and speed control of induction motor. Single-phase induction motor. Construction, working, torque-speed characteristic and speed control of separately excited DC motor. Construction and working of synchronous generators, Construction, Principles and working theory and Types of DC Motors & Generators, 1-Ph & 3-Ph Induction Motor, AC Generator

TEXT/ REFERENCE BOOKS

1) Basic Electrical, Electronics and Computer Engineering, R. Muthu Subramanian, S. Salvahanan, K. A. Muraleedharan, 2nd Edition, Tata McGraw Hill
2) Electronics Principles, Albert Paul Malvino, 6th Edition, Tata McGraw Hill
3) Electrical Technology (Vol: II), B. L. Theraja , A. K. Theraja, 23rd Edition, R. Chand & Company
4) Basic Electrical Engineering, D.P. Kothari, I. J. Nagrath, 3rd Edition, Tata McGraw Hill
5) Introduction to VLSI Circuit & Systems, John P. Uyemura, 1st Edition, John Willey & Sons Inc.
6) Basic Electrical Engineering, D.C. Kulshreshtha, 1st Edition, Tata McGraw Hill
7) Electrical and Electronics Technology, E. Hughes, 10th Edition, Pearson
8) Electrical Engineering Fundamentals, V.D. Toro, 2nd Edition, Prentice Hall India
9) Fundamentals of Electrical Engineering, L.S. Bobrow, , Oxford University Press

COURSE OUTCOMES

At the end of the course,students should be able to

CO1. To find DC Circuit parameters using KVL, KCL and Ohm's Laws in DC circuits.
CO2. Apply various Network Theorems to solve DC networks and calculate time constant of R-L and R-C circuits.
CO3. Compute various parameters of AC circuits consists of R, Land C.
CO4. Compute various parameters of Magnetic Circuits.
CO5. Understand the operationof Transformer and Compute its various parameters.
CO6. Understand the operation Electrical Machines and Compute its various parameters.

COURSE MATRIX

Course Outcome (CO's)	**Program Outcomes (PO's)**											
	Domain Specific (PSO)					**Domain Independent (PO)**						
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	2	3				1		1		1		1
CO2	3	3		2		1			1	1		
CO3	2	2	1									
CO4	2	2		1				1				
CO5	3	3				1	1		1			
CO6	2	3		1								1
1: Slight (Low) , 2: Moderate (Medium), 3: Substantial (High)												

B.TECH. SEMESTER – I (EC/CE/IT)

SUBJECT: (ES105) PROGRAMMING FOR PROBLEM SOLVING - I (w. e. f. 2021-22)

Teaching Scheme (Hours/Week)				Credits	Examination Scheme				
Lect	Tut	Prac	Total		Ext	Sess.	TW	Pract.	Total
4	0	3	7	5.5	60	40	50*	-	150

*TW Marks includes Viva based on TW

COURSE OBJECTIVES

The objectives of teaching this course are

- To impart in-depth understanding of fundamental programming concepts to build C programs.
- To explain conditional branching, iteration/looping, code reusability and pointers using C Programming Language.
- To demonstrate and teach how to code, document, test, and implement a well-structured C program.

DETAILED SYLLABUS

[1] OVERVIEW OF C

Basic structure of C program, compiling and running C program

[2] CONSTANTS, VARIABLES AND DATA TYPES

Types of constants, basic data types, identifier, variable, enum, symbolic constant, typedef, keywords, overflow and underflow

[3] OPERATORS AND EXPRESSIONS

Arithmetic, relational, logical, assignment, bitwise, and sizeof() operators, operator precedence and associativity, expression evaluation

[4] MANAGING INPUT OUTPUT OPERATIONS

getchar() and putchar() functions, formatted I/O using printf() and scanf()

[5] DECISION MAKING AND BRANCHING

if and if...else statement, nested and ladder if...else, conditional operator, switch statement, goto statement with warning

[6] DECISION MAKING AND LOOPING

while, do...while, and for loops, nested loops, break and continue statements

[7] ARRAYS AND STRINGS

Introduction to arrays, declaration, initialization and access of one-dimensional and two-dimensional arrays, Introduction to multi-dimensional and variable length arrays, declaration and initialization of strings, printing and scanning strings to/from standard I/O, string handling functions, list of strings

[8] USER-DEFINED FUNCTIONS

Function prototype and function declaration, function definition, function call, actual and formal parameters/arguments, return type and return statement, Nested function call, recursion, scope, visibility, and lifetime of variables.

[9] STRUCTURES AND UNIONS

Defining structure, declaring and initializing structure variables, typedef, accessing structure members, copying and comparing structure variables, nested structures, arrays and structures, structures and functions, unions

[10] POINTERS

Introduction, accessing address of a variable, declaration and initialization of pointer variables, Accessing variable using pointer, chain of pointers, scale factor and pointer expressions, pointers and arrays, pointer to array Vs array of pointers, passing arrays and strings to the function, array of pointers, pointers and functions, pointers and structures, const pointer vs pointer to const

TEXT / REFERENCE BOOKS

1) Programming in ANSI C by Balagurusamy, 8th Ed., Tata McGraw Hil
2) Programming with C by Byron Gottfried, 3rd Ed., McGraw Hill Education
3) The C Programming Language by Kernighan and Ritchie, 2nd Ed., PHI Learning
4) Expert C Programming: Deep C Secrets by Peter Van Der Linden, Pearson Education
5) Let Us C by YashvantKanetkar, 12th Ed., BPB Publication
6) Programming in C by Ashok N. Kamthane, 2nd Ed., Pearson Education

COURSE OUTCOMES

At the end of the course,students should be able to

CO1. Use and understand language syntax and concepts for C Programming.
CO2. Comprehend and use C Programming concepts to solve algorithmic and logical problems.
CO3. Analyse the given problem and to formulate appropriate C language solution based on definitive language concept(s).
CO4. Design a flowchart or a diagram for given problem and create C programs using decision making, branching, looping, user defined function, array, structure, pointers, etc.
CO5. Apply concepts to write, compile, debug, execute, and document C programs with different test cases using appropriate tool(s).

COURSE MATRIX

Course Outcome (CO's)	Program Outcomes (PO's)											
	Domain Specific (PSO)					Domain Independent (PO)						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3		1	2								
CO2		3			2	2			2		1	1
CO3			2	1	2			2		1	1	1
CO4				3	2	1			1	1		
CO5					3				2			
1: Slight (Low) , 2: Moderate (Medium), 3: Substantial (High)												

B.TECH. SEMESTER – I (EC)

SUBJECT: ( ) PROGRAMMING FOR PROBLEM SOLVING (w. e. f. 2023-24)

Teaching Scheme (Hours/Week)				Credits	Examination Scheme				
Lect	Tut	Prac	Total		Ext	Sess.	TW	Pract.	Total
4	0	3	7	5.5	60	40	50*	-	150

*TW Marks includes Viva based on TW

COURSE OBJECTIVES

To understand the basic concepts of Linux OS and study the usages of Linux commands. Also understand the basics of C programming language.

DETAILED SYLLABUS

[1] INTRODUCTION

Basic structure of c program, compiling and running c program, constants, variables and data types, operators and expressions, managing input output operations

[2] DECISION MAKING - BRANCHING & LOOPING

if and if...else statement, nested and ladder if...else, conditional operator, switch statement, goto statement, while, do...while, and for loops, nested loops, break and continue statements

[3] FUNCTIONS

Function prototype and function declaration, function definition, function call, actual and formal parameters/arguments, return type and return statement, Nested function call, recursion, scope, visibility, and lifetime of variables.

[4] ARRAYS

One-dimensional arrays, Multi-dimensional arrays, Dynamic arrays,
String variables, Arithmetic Operations on Characters, String handling.

[5] STRUCTURES AND UNIONS

Defining structure, declaring and initializing structure variables, typedef, accessing structure members, copying and comparing structure variables, nested structures, arrays and structures, structures and functions, unions

[6] POINTERS

Introduction, accessing address of a variable, declaration and initialization of pointer variables, Accessing variable using pointer, chain of pointers, scale factor and pointer expressions, pointers and arrays, pointer to array Vs array of pointers, passing arrays and strings to the function, array of pointers, pointers and functions, pointers and structures, const pointer vs pointer to const

[7] FILE HANDLING & HARDWARE INTERFACING

Basic File Operations in C, random access file, error handling in file, command line arguments, Study of Parallel Port Registers, *inportb( )* and *outportb ( )* Function Calls, Programming Parallel port of a PC, LED & Relay interfacing with a PC, Project

Development, Serial port interfacing basics.

TEXT / REFERENCE BOOKS

1) Programming in ANSI C, Balaguruswamy, 5th Edition, Tata McGraw Hill.
2) Let Us C, Yashvant Kanetkar, 12th Edition, BPB Publication.
3) Programming in C , Ashok N. Kamthane, 2nd Edition, Pearson Education
4) The C Programming Language, Kernighan and Ritchie, 2nd Edition, PHI Learning

COURSE OUTCOMES

At the end of the course,students should be able to

CO1. Use and understand language syntax and concepts for C Programming.
CO2. Comprehend and use C Programming concepts to solve algorithmic and logical problems.
CO3. Analyse the given problem and to formulate appropriate C language solution based on definitive language concept(s).
CO4. Design a flowchart or a diagram for given problem and create C programs using decision making, branching, looping, user defined function, array, structure, pointers, etc.
CO5. Apply concepts to write, compile, debug, execute, and document C programs with different test cases using appropriate tool(s).

COURSE MATRIX

Course Outcome (CO's)	**Program Outcomes (PO's)**											
	Domain Specific (PSO)					**Domain Independent (PO)**						
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3		1	2								
CO2		3			2	2			2		1	1
CO3			2	1	2			2		1	1	1
CO4				3	2	1			1	1		
CO5					3				2			
1: Slight (Low) , 2: Moderate (Medium), 3: Substantial (High)												

B.TECH. SEMESTER–I(EC/CE/IT)

SUBJECT: (ES106) ENGINEERING GRAPHICS AND DESIGN (w. e. f. 2021-22)

Teaching Scheme (Hours/Week)				Credits	Examination Scheme				
Lect	Tut	Prac	Total		Ext	Sess.	TW	Pract.	Total
1	0	4	5	3	-	-	100*	-	100

*TW Marks includes Viva based on TW

COURSE OBJECTIVES

The objectives of this course are:

- To Understand the drawing importance in Engineering.
- To Describe the 3-Dimensional object in a different 2-Dimensional view.
- To Develop skills in Reading and Interpretation of Engineering Drawings.
- To enhance drawing skills through hands-on training in a CAD lab using engineering software.

DETAILED SYLLABUS

[1] INTRODUCTION TO ENGINEERING DRAWING

Introduction to Engineering Drawing Covering, Principles of Engineering Graphics and their significance, usage of Drawing instruments, lettering, Conic sections including the Rectangular Hyperbola (General method only); Cycloid, Epicycloid, Hypocycloid and Involute; Scales –Plain, Diagonal and Vernier Scales.

[2] ORTHOGRAPHIC PROJECTIONS

Orthographic Projections Covering, Principles of Orthographic Projections-Conventions Projections of Points and lines inclined to both planes; Projections of planes inclined Planes - Auxiliary Planes;

[3] PROJECTIONS OF REGULAR SOLIDS

Projections of Regular Solids Covering, those inclined to both the Planes- Auxiliary Views; Draw simple annotation, dimensioning and scale. Floor plans that include: windows, doors, and fixtures such as WC, bath, sink, shower, etc.

[4] SECTIONS AND SECTIONAL VIEWS OF RIGHT ANGULAR SOLIDS

Sections and Sectional Views of Right Angular Solids Covering, Prism, Cylinder, Pyramid, Cone – Auxiliary Views; Development of surfaces of Right Regular Solids - Prism, Pyramid, Cylinder and Cone; Draw the sectional orthographic views of geometrical solids, objects from industry and dwellings (foundation to slab only)

[5] ISOMETRIC PROJECTIONS

Isometric Projections Covering, Principles of Isometric projection – Isometric Scale, Isometric Views, Conventions; Isometric Views of lines, Planes, Simple and compound Solids; Conversion of Isometric Views to Orthographic Views and Vice-versa, Conventions

[6] OVERVIEW OF COMPUTER GRAPHICS

Overview of Computer Graphics Covering, listing the computer technologies that impact on graphical communication, demonstrating knowledge of the theory of CAD software.

[7] CUSTOMIZATION & CAD DRAWING

Customization & CAD Drawing consisting of set up of the drawing page and the printer, including scale settings, Setting up of units and drawing limits; ISO and ANSI standards for coordinate dimensioning and tolerancing; Orthographic constraints, Snap to objects manually and automatically; Producing drawings by using various coordinate input entry methods to draw straight lines, Applying various ways of drawing circles;

[8] ANNOTATIONS, LAYERING & OTHER FUNCTIONS

Annotations, layering & other Functions Covering applying dimensions to objects, applying annotations to drawings; Setting up and use of Layers, layers to create drawings, Create, edit and use customized layers; Changing line lengths through modifying existing lines (extend/lengthen); Printing documents to paper using the print command; orthographic projection techniques; Drawing sectional views of composite right regular geometric solids and project the true shape of the sectioned surface; Drawing annotation, Computer-aided design (CAD) software modeling of parts and assemblies. Parametric and non-parametric solid, surface, and wire frame models. Part editing and two-dimensional documentation of models. Planar projection theory, including sketching of perspective, isometric, multi view, auxiliary, and section views. Spatial visualization exercises. Dimensioning guidelines, tolerancing techniques; dimensioning and scale multi views of dwelling;

TEXT / REFERENCE BOOKS

1) Bhatt N.D., Panchal V.M. & Ingle P.R., (2014), Engineering Drawing, Charotar Publishing House

2) Shah, M.B. &Rana B.C. (2008), Engineering Drawing and Computer Graphics, Pearson Education

3) Agrawal B. & Agrawal C. M. (2012), Engineering Graphics, TMH Publication

4) Narayana, K.L. & P Kannaiah (2008), Text book on Engineering Drawing, Scitech Publishers

5) (Corresponding set of) CAD Software Theory and User Manuals

COURSE OUTCOMES

At the end of the course, students should be able to

CO1. Understand and interpret engineering drawings so that concepts can be communicated graphically more effectively.

CO2. Demonstrate correct usage of methods, concept, and theories to illustrate and solve problems of conics, lines, planes, solids, surfaces, and many more.

CO3. Choose a suitable standard projection method, break down a complex 3D problem into various orthographic and sectional orthographic views, and highlight missing features.

CO4. Practical Exposure to computer-aided software to generate isometric projection and compose standard components of different streams

COURSE MATRIX

Course Outcome (CO's)	Program Outcomes (PO's)											
	Domain Specific (PSO)					Domain Independent (PO)						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3		1	2								
CO2		3			2	2			2		1	1
CO3			2	1	2			2		1	1	1
CO4				3	2	1			1	1		
1: Slight (Low) , 2: Moderate (Medium), 3: Substantial (High)												

B.TECH. SEMESTER–I (EC/CE/IT)

SUBJECT: (ES107) SOFTWAREWORKSHOP (w. e. f. 2021-22)

Teaching Scheme (Hours/Week)				Credits	Examination Scheme				
Lect	Tut	Prac	Total		Ext	Sess.	TW	Pract.	Total
0	0	2	2	1	-	-	50*	-	50

*TW Marks includes Viva based on TW

COURSE OBJECTIVES

Creating sound back ground for use of Linux operating system helps the students for their future endeavor in the study of programming subjects and Project work. By offering this course, the department encourages the student to use Open source software such as Linux OS, Scilab and Latex. The laboratory covers fundamentals and high-level architecture of Linux operating system. The laboratory offers hands-on experience for Linux Installation, various commands and driver installation. Hands on experience for writing pseudo code for given problem and writing shell scripts are inclusive in this study. The broad objective of this course is to understand the basic concepts of Linux OS and study the usages of Linux commands. Also to understand the basics of C programming language

DETAILED SYLLABUS

[1] OPERATINGSYSTEMBASICS

Introduction to Operating System and Linux Architecture

[2] SOFTWAREINSTALLATION

Installation of open source/freeware softwareusing package manager for programming/simulation.

[3] SHELLCOMMANDS

Linux usage, commands & shell scripting. Command structure and general purpose utility

[4] FILE HANDLING

basic of file handling. The file system, Handling ordinary files, File attributes and permission, file system details

[5] SHELLSCRIPTING

Basic Shell commands, Looping and Branching,

[6] SHELLUTILITIES

Find command and shell, simple filters, advance filters.

[7] EDITORS

VI editor for basic text editing, LATEX for scientific documents and report writing.

TEXT / REFERENCE BOOKS

1) Unix : Concepts and Applications, Sumitabha Das, 4th Edition, Tata McGraw Hill

COURSE OUTCOMES

At the end of the course,students should be able to

CO1. Store files, surf internet, carry out documentation work using Linux OS and Use Linux commands to perform file management and data security tasks.
CO2. Create articles and reports having multiple chapters and references using Latex typesetting.
CO3. Install open source software such as drivers of Hardware devices as well as other application like Scilab for mathematical computation.
CO4. Develop pseudo code for given problem statements.
CO5. Develop various shell scripts for any given problem statements along with use of filters.

COURSE MATRIX

Course Outcome (CO's)	**Program Outcomes (PO's)**											
	Domain Specific (PSO)					**Domain Independent (PO)**						
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	2				3			3		1		3
CO2	2	2			3					1		
CO3					3	3				3		
CO4	2				3			3		1		3
CO5	2	2			3					1		
1: Slight (Low) , 2: Moderate (Medium), 3: Substantial (High)												

B. TECH. SEMESTER II (EC/CE/IT)

SUBJECT: (BS201) MATHEMATICS-II (w. e. f. 2021-22)

Teaching Scheme (Hours/Week)				Credits	Examination Scheme				
Lect	Tut	Prac	Total		Ext	Sess.	TW	Pract.	Total
3	1	0	4	4	60	40	0	0	100

COURSE OBJECTIVES

The course is designed to understand and apply the basic concepts of first order and higher order differential equations, numerical methods, Laplace transforms, multiple integrals, and vector integral calculus. It covers solving the initial value problems to address engineering applications.

DETAILED SYLLABUS

[1] FIRST ORDER ORDINARY DIFFERENTIAL EQUATIONS AND INTRODUCTION TO HIGHER ORDER DIFFERENTIAL EQUATIONS

Exact, linear and Bernoulli's equations, Euler's equations, Equations not of first degree: equations solvable for p, equations solvable for y, equations solvable for x and Clairaut's type, second order linear differential equations with variable coefficients, Method of variation of parameters, Cauchy-Euler equation.

[2] NUMERICAL METHODS

Ordinary differential equations: Taylor's series, Euler and modified Euler's methods, Runge-Kutta method of fourth order for solving first order equations, Solution of algebraic and transcendental equations: Newton Raphson's Method, Numerical integration: Trapezoidal rule and Simpson's 1/3rd and 3/8 rules.

[3] MULTIVARIABLE CALCULUS (INTEGRATION)

Multiple Integration: Double integrals (Cartesian), Change of order of integration in double integrals, Change of variables (Cartesian to polar), Applications: areas and volumes, Triple integrals (Cartesian), Scalar line integrals,Vector line integrals, Scalar surface integrals, Vector surface integrals, Theorems of Green, Gauss and Stoke's.

[4] LAPLACE TRANSFORM

Laplace Transform, Properties of Laplace Transform, Laplace transform of periodic functions, Finding inverse Laplace transform by different methods, Convolution theorem. Evaluation of integrals by Laplace transform, Solving ODE by Laplace Transform method.

TEXT / REFERENCE BOOKS

1) B. S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 40th Edition, 2007.

2) G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Ed.,Pearson, 2002.

3) Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.

4) W. E. Boyce and R. C. DiPrima, Elementary Differential Equations and Boundary Value Problems, 9th Edn., Wiley India, 2009.

5) S. L. Ross, Differential Equations, 3rd Ed., Wiley India, 1984.

6) E. A. Coddington, An Intro. to Ordinary Differential Equations, Prentice Hall India, 1995.
7) J. W. Brown and R. V. Churchill, Complex Variables and Applications, 7th Ed., Mc- Graw Hill, 2004.
8) N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.

COURSE OUTCOMES

At the end of the course,students should be able to

CO1. Understand effective mathematical tools for the solution of first order ordinary differential equations.
CO2. Extend their learning of differential calculus: Methods to solve and analyse higher order differential equations.
CO3. Analyse and evaluate the accuracy of common numerical methods such as Newton's Raphson's, False position and so on.
CO4. Derive numerical methods for integration and the solution of linear and nonlinear differential equations.
CO5. Evaluate and Differentiate multivariate functions in all directions such as differentiation, integration and solve applied problems involving vector-valued functions.
CO6. Investigate ordinary differential equations using Laplace transform.

COURSE MATRIX

Course Outcome (CO's)	**Program Outcomes (PO's)**											
	Domain Specific (PSO)					**Domain Independent (PO)**						
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	2				3			3		1		3
CO2	2	2			3					1		
CO3					3	3				3		
CO4	2				3			3		1		3
CO5	2	2			3					1		
CO6					3	3				3		
1: Slight (Low) , 2: Moderate (Medium), 3: Substantial (High)												

B. TECH. SEMESTER – II (EC/CE/IT)

SUBJECT: (ES201) PROGRAMMING FOR PROBLEM SOLVING - II (w. e. f. 2021-22)

Teaching Scheme (Hours/Week)				Credits	Examination Scheme				
Lect	Tut	Prac	Total		Ext	Sess.	TW	Pract.	Total
4	0	3	7	5.5	60	40	50*	-	150

*TW Marks includes Viva based on TW

COURSE OBJECTIVES

To make students familiar with the difference between object-oriented programming and procedural programming. In addition, the student should acquire skills for programming using advanced C++ features such as composition of objects, operator overloading, dynamic memory allocation, inheritance and polymorphism, file I/O, exception handling, etc.

DETAILED SYLLABUS

[1] BASICS OF C++

Overview, Program structure, keywords, identifiers, constants, data types, symbolic constants, declaration of variables, operators, namespaces, control structures, dynamic memory – C style – malloc(), calloc(), realloc() and free() Vs C++ style - new and delete keywords, reference and pointer

[2] FUNCTIONS IN C++

main function (variations in signature), function prototype, inline functions, call and return by reference, default parameters, function overloading

[3] INTRODUCTION TO OBJECT ORIENTED PROGRAMMING

Procedural Vs Object Oriented Programming, Principles of OOP, Benefits and applications of OOP

[4] CLASSES AND OBJECTS – ENCAPSULATION AND ABSTRACTION

Introduction, private and public members, Defining member functions, static members, Objects as function arguments and return type, friend functions, const member functions, Constructors and their types, Destructor, Operator overloading, type conversion

[5] INTRODUCTION TO C++ STRING CLASS

[6] INHERITANCE

Introduction, types of inheritance – single, multiple, multilevel, hierarchical, and hybrid inheritance, Protected members, overriding, virtual base class

[7] POLYMORPHISM

Introduction, Pointers and Objects, this pointer, pointer to derived classes, virtual and pure virtual functions, dynamic binding

[8] INPUT/OUTPUT

Introduction to streams, standard I/O stream objects, stream classes, unformatted and formatted I/O, manipulators

[9] EXCEPTION HANDLING

Basics of exception handling, try-catch-throw, rethrowing exceptions, user defined exceptions

[10] TEMPLATES

Basics of class templates and function templates

TEXT / REFERENCE BOOKS

1) Object-Oriented programming with C++, Seventh Ed., by E Balagurusamy, TMH publication
2) The C++ Programming Language, Fourth Ed., by Bjarne Stroustrup, Addison-Wesley publication
3) Object-Oriented Programming in C++, Fourth Edition, by Robert Lafore, SAMS publication
4) Accelerated C++: Practical Programming by Example, First Edition, by Andrew Koenig and Barbara E. Moo, Addison-Wesley publication
5) C++ Black Book, First edition, by Steven Holzner, Paraglyph Press
6) C++: The Complete Reference, Fourth Edition, by Herbert Schildt, McGraw Hill Education

COURSE OUTCOMES

At the end of the course,students should be able to

CO1. Realize the typical differences in C and C++ languages with reference to keywords, dynamic memory allocation, structures, strings and vetcoors etc. and write simple C++ programs.
CO2. Design simple object-oriented programs using classes with help of key fundamentals of object-oriented modeling and design.
CO3. Utilize distinctive features like function overloading, constructors, destructors and friend functions for dynamic handling of the objects in the programs.
CO4. Demonstrate reuse of the code using different forms of inheritance in programs.
CO5. Demonstrate run-time polymorphism using inheritance and virtual base class and analysis of run-time errors in orderly fashion with help of exception handling in C++.
CO6. Write objectoriented programs to exploit other salient features of C++ like operator overloading, templates and type conversion.

COURSE MATRIX

Course Outcome (CO's)	Program Outcomes (PO's)											
	Domain Specific (PSO)					Domain Independent (PO)						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	3	3	1	2	2			2	2		1
CO2	2	3	3	2	2	2			2			1
CO3	2	3	3	2	2	2			2			
CO4	2	3	3	2	2	2			2	2		1
CO5	2	3	3	3	2	2			2	1		1
CO6	2	3	3	3	2	2			2	1		1
1: Slight (Low) , 2: Moderate (Medium), 3: Substantial (High)												

B. TECH. SEMESTER – II (EC)

SUBJECT: ( ) OBJECT ORIENTED PROGRAMMING (w. e. f. 2023-24)

Teaching Scheme (Hours/Week)				Credits	Examination Scheme				
Lect	Tut	Prac	Total		Ext	Sess.	TW	Pract.	Total
4	0	3	7	5.5	60	40	50*	-	150

*TW Marks includes Viva based on TW

COURSE OBJECTIVES

To make students familiar with the difference between object-oriented programming and procedural programming. In addition, the student should acquire skills for programming using advanced C++ features such as composition of objects, operator overloading, dynamic memory allocation, inheritance and polymorphism, file I/O, exception handling, etc.

DETAILED SYLLABUS

[1] PROGRAMMING WITH C++

OOP Concepts, C ++ Features, Input Output Operations using cin & cout, Data types & Operators, input - output operations, Looping Operations, Branching Operations, Dynamic Memory Management C Vs C++ style.

[2] OBJECTS AND CLASSES

Comparison of Structure and Class, Concept of Classes and Objects, Concept of Constructor & Destructor, Passing and Returning Objects, Static Data Members and Functions, Array of Objects & Array within a Class.

[3] FUNCTIONS & STRING HANDLING

Passing Arguments & Returning Values, return by reference, inline functions, Default Arguments, Function Overloading, Friend Function, Member Function as Friend and Friend Class, introduction to string class and member functions.

[4] OPERATOR OVERLOADING

Operator Overloading, Type conversion

[5] INHERITANCE

Inheritance Defined, Concept of Inheritance, Single Inheritance, Derived Class Constructor, Function Overriding, Hierarchical & Multilevel Inheritance, Hybrid Inheritance, Multiple Inheritance and Constructor in Multiple Inheritance.

[6] POINTERS, VIRTUAL FUNCTIONS & POLYMORPHISM

Introduction to Pointers & Pointer to an Object, Pointers & Arrays, Pointers & Functions, Pointer to a Pointer, this pointer, pointer to derived class, Virtual Functions & Pure Virtual functions

[7] TEMPLATES & EXCEPTION HANDLING

Template Programming, Study of Various Exception Classes, Exception Handling Mechanisms, Generation of Exceptions.

[8] INTRODUCTION TO GRAPHICS & MOUSE PROGRAMMING

Using graphics.h, and basic functions, Detecting Mouse, Display mouse pointer, Hide pointer in graphics mode.

TEXT / REFERENCE BOOKS

1) Object-Oriented programming with C++, Seventh Ed., by E Balagurusamy, TMH publication

2) The C++ Programming Language, Fourth Ed., by Bjarne Stroustrup, Addison-Wesley publication

3) Object-Oriented Programming in C++, Fourth Edition, by Robert Lafore, SAMS publication

4) Accelerated C++: Practical Programming by Example, First Edition, by Andrew Koenig and Barbara E. Moo, Addison-Wesley publication

5) C++ Black Book, First edition, by Steven Holzner, Paraglyph Press

6) C++: The Complete Reference, Fourth Edition, by Herbert Schildt, McGraw Hill Education

COURSE OUTCOMES

At the end of the course, students should be able to

CO1. Realize the typical differences in C and C++ languages with reference to keywords, dynamic memory allocation, structures, strings and vetcoors etc. and write simple C++ programs.

CO2. Design simple object-oriented programs using classes with help of key fundamentals of object-oriented modeling and design.

CO3. Utilize distinctive features like function overloading, constructors, destructors and friend functions for dynamic handling of the objects in the programs.

CO4. Demonstrate reuse of the code using different forms of inheritance in programs.

CO5. Demonstrate run-time polymorphism using inheritance and virtual base class and analysis of run-time errors in orderly fashion with help of exception handling in C++.

CO6. Write object oriented programs to exploit other salient features of C++ like operator overloading, templates and type conversion.

COURSE MATRIX

Course Outcome (CO's)	**Program Outcomes (PO's)**											
	Domain Specific (PSO)					**Domain Independent (PO)**						
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	2	3	3	1	2	2			2	2		1
CO2	2	3	3	2	2	2			2			1
CO3	2	3	3	2	2	2			2			
CO4	2	3	3	2	2	2			2	2		1
CO5	2	3	3	3	2	2			2	1		1
CO6	2	3	3	3	2	2			2	1		1
1: Slight (Low) , 2: Moderate (Medium), 3: Substantial (High)												

B. TECH. SEMESTER II (EC/CE/IT)

SUBJECT: (BS202) PHYSICS (w. e. f. 2021-22)

Teaching Scheme (Hours/Week)				Credits	Examination Scheme				
Lect	Tut	Prac	Total		Ext	Sess.	TW	Pract.	Total
3	1	2	6	5	60	40	50*	-	150

*TW Marks includes Viva based on TW

COURSE OBJECTIVES

The course provides the in-depth understanding of the concepts associated with Semiconductor, Optoelectronics, Communication, Oscillators and Basic Switching devices. It also serves the basic design ideas around rectification and amplification. The course focuses on modulation techniques and its components. The overall aspects of basic physics application in electronics with practical approach are covered in this subject. This course also includes the analog modulation & demodulation techniques (AM, FM and PM) and digital modulation (ASK, FSK and PSK).

DETAILED SYLLABUS

[1] SEMICONDUCTORS

Intrinsic and extrinsic semiconductors, Carrier generation and recombination, Carrier transport: diffusion and drift, p-n junction, Metal-semiconductor junction (Ohmic and Schottky), Semiconductor materials of interest for optoelectronic & other devices.

[2] DIODE

Introduction to P-N junction Diode and V-I characteristics, Half wave and Full-wave rectifiers, capacitor filter. Zener diode and its characteristics, Zener diode as voltage regulator, Special purpose diodes.

[3] LIGHT-SEMICONDUCTOR INTERACTION

Radiative transitions and optical absorption, LED and LASER, Photo detectors.

[4] ACTIVE COMPONENTS AND APPLICATIONS

BJT:Structure and input-output characteristics of a BJT, The Unbiased Transistor, Transistor Currents , Biased Transistor, a single stage voltage divider biasing, Emitter Bias, The CE Connections, The Base Curve, Collector curve, Transistor approximation Variation in current Gain, The Load Line, The Operating point, Recognizing Saturation, BJT as a switch & Amplifiers, LED Drivers.

[5] OSCILLATORS

General form of oscillator, Sinusoidal oscillator, phase shift oscillator, Crystal Oscillator.

[6] MOSFET

MOS physics and mode of operations, nFET current-voltage relationship, MOS pass characteristics and CMOS inverter, Dynamic RAM (DRAM) 1T bit-cell.

[7] FIBER OPTICS

Fiber Optics and Optoelectronics, Historical Developments, A Fiber-Optic Communication System, Advantages of Fiber-Optic Systems, Ray Propagation in Optical Fibers, Fundamental Laws of Optics, Ray Propagation in Step-Index Fibers, Ray Propagation in Graded-Index Fibers

[8] COMMUNICATION SYSTEMS

Communication system components, Analog modulation- AM, FM,PM. Digital modulation- ASK, FSK, PSK

TEXT / REFERENCE BOOKS

1) Electronics Principles, Albert Paul Malvino, 6thEdition, Tata McGraw Hill
2) David Griffiths, Introduction to Electrodynamics
3) S. M. Sze, Semiconductor Devices: Physics and Technology, Wiley (2008).
4) R.P Khare, Fiber Optics and Optoelectronics, Oxford University Press
5) Sanjay Sharma, Communication Systems: Analog and Digital
6) Halliday and Resnick, Physics
7) W. Saslow, Electricity, magnetism and light
8) Singh, Semiconductor Optoelectronics: Physics and Technology, McGraw-Hill Inc. (1995).
9) B. E. A. Saleh and M. C. Teich, Fundamentals of Photonics, John Wiley & Sons, Inc., (2007).
10) Yariv and P. Yeh, Photonics: Optical Electronics in Modern Communications, Oxford University Press, New York (2007).
11) P. Bhattacharya, Semiconductor Optoelectronic Devices, Prentice Hall of India (1997)
12) Behrouz A. Forouzan, Data communication and networking.
13) B. P lathi, Modern Digital and Analog Communication Systems, Third edition.

COURSE OUTCOMES

At the end of the course,students should be able to

CO1. Discriminate half wave / full wave rectifier circuit and voltage regulator circuit based on the working principleof PN junction diode and Zener diode.
CO2. Analyze load line and operating point for different biasing circuits of NPN and PNP transistor.
CO3. To understand different oscillator structure and review the effect of doping, temperature and regulation on different MOS circuits.
CO4. Assess the performance & characteristics of Opto-electronic semiconductor devices like LED, LASER, Photo detectors.
CO5. Analysis of ray optics for step index and graded index fiberin fiber optic communications.
CO6. Illustrating and relating AM, FM, PM, ASK, FSK, PSK modulation techniques.

COURSE MATRIX

Course Outcome (CO's)	Program Outcomes (PO's)											
	Domain Specific (PSO)					Domain Independent (PO)						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	1	-	-	-	1	1	2	-	1
CO2	3	3	3	-	1	-	-	1	1	2	-	1
CO3	3	3	2	2	-	-	1	1	1	2	-	1
CO4	2	3	2	-	1	-	-	1	1	2	-	1
CO5	2	2	2	-	1	-	1	1	1	2	-	1
CO6	2	2	3	2	-	-	-	1	1	2	-	1
1: Slight (Low) , 2: Moderate (Medium), 3: Substantial (High)												

B. TECH. SEMESTER II (EC/CE/IT)

SUBJECT: (ES202) HARDWAREWORKSHOP (w. e. f. 2021-22)

Teaching Scheme (Hours/Week)				Credits	Examination Scheme				
Lect	Tut	Prac	Total		Ext	Sess.	TW	Pract.	Total
0	0	4	4	2	-	-	100*	-	100

*TW Marks includes Viva based on TW

COURSE OBJECTIVES

Operating the test and measuring electronic instruments is essential in the entire study of electronics and communication branch. Study of circuit simulators, PCB design software, Raspberry pi and Arduino boards help student in creating foundation for development of successful projects in higher semesters. Course covers study and hands on test and measuring instruments, operation of Raspberry pi and Arduino boards, circuit implementation on bread boar and simulators, Linux operating system and website development.

DETAILED SYLLABUS

[1] ELECTRONICCOMPONENTS

Digital Multi-meter, Power Supply, Function Generator, Cathode Ray Oscilloscope, Digital Oscilloscope, Measurement of Phase Difference in single phase circuit, Various Electrical and Electronics component like LED, LDR, Photo-diode, MOSFET, MCB and Relay.

[2] COMPUTERHARDWARE

Introduction to a personal computer and its basic peripherals, installation of Operating System Software and the required device drivers. Students are suggested to perform similar tasks on the Laptop scenario wherever possible.

[3] PERIPHERALS

Programming of Computer Ports & Interfacing of Electronic Components, Cables and Connectors like RJ45, RS232 and CRO probe.

[4] INTERNET

Introduction to Internet & World Wide Web modules, Making a PC Internet ready: Introduction to Internet and TCP/IP, Ethernet Connection, WiFi connection, configure TCP/IP (IP, Gateway, DNS, and Proxy), and use of ping command, Information sharing and data transfer over Local Area Network and Internet.

[5] WEBINFRASTRUCTURE

Basic Components of Web Sites, Front end & back end tools and technology. HTML & CSS, Developing, Configuring and deploying a website.

[6] IOTBOARDSANDCIRCUITSIMULATION

Introduction to IOT boards like Arduino, Raspberry Pie etc. Interfacing, Circuit designing and PCB designing.

[7] MINIPROJECT

Student will develop a mini project related to the topics listed above.

TEXT / REFERENCE BOOKS

1) Electronic Components and Materials Principles, Dr.MadhuriA Joshi, 2nd Edition, Shroff Publishers & Distributors PVT. LTD.

2) A Textbook of Computer Hardware and Networking, JyotikaDeshmukh, D J Publications

3) Learning Web Design, Jennifer Robbins, 4th edition, O'Reilly Media

COURSE OUTCOMES

At the end of the course,students should be able to

CO1. Use breadboard, DC Power supply, Function Generator, Cathode Ray Oscilloscope and Digital Storage Oscilloscope to verify the circuit operation.

CO2. Understand the working of MCB, Relay, and working of AC DC Motor.

CO3. Implement given circuit on NI-Multisim circuit simulator, on bread board and using Proteous PCB designing software and prepare physical PCB for hardware project (fixed DC power supply , water level detector).

CO4. Understand the usage of BNC, USB, RS232, RJ45, VGA, and HDMI connectors and make CRO probe and LAN cable using necessary wires and connectors.

CO5. Install Linux OS and the required drivers, and configure the network connection to transfer a file over LAN or Internet and Operate Arduino and Raspberry Pi IoT boards.

CO6. Develop a website using HTML and CSS.

COURSE MATRIX

Course Outcome (CO's)	**Program Outcomes (PO's)**											
	Domain Specific (PSO)					**Domain Independent (PO)**						
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3				3	1	1	1	1	1		2
CO2	2				3	1	1	1	1	1		1
CO3	3	2	3		3	1	1	1	1	1		2
CO4	2		3		3	1	1	1	1	1		1
CO5	3	2	3		3	1	1	1	1	1		2
CO6	2		3		3		1	1	1	1		
1: Slight (Low) , 2: Moderate (Medium), 3: Substantial (High)												

B.TECH. SEMESTER II (EC/CE/IT)

SUBJECT: (HS201) ENGLISH (w. e. f. 2021-22)

Teaching Scheme (Hours/Week)				Credits	Examination Scheme				
Lect	Tut	Prac	Total		Ext	Sess.	TW	Pract.	Total
2	0	2	4	3	40	-	50*	-	90

*TW Marks includes Viva based on TW

COURSE OBJECTIVES

This course will help students of engineering develop their Linguistic skills. Beginning with Vocabulary Building the course proceeds towards the Sentence Formation and Paragraph Formation which will help them to enhance their Writing skills and Communicative skills as well. Understanding the common errors, and nature and style of writing will mould students' Writing competency for their professional growth in the world of competition. Understanding Paralinguistic features like stress, intonation, rhythm and so on will improve their Speaking skills to be efficient and confident for academic and professional purposes.

DETAILED SYLLABUS

[1] VOCABULARY BUILDING

The concept of Word Formation, Root words from foreign languages and their use in English, Acquaintance with prefixes and suffixes from foreign languages in English to form derivatives, Synonyms, antonyms, and standard abbreviations.

[2] BASIC WRITING SKILLS

Sentence Structures, Use of phrases and clauses in sentences, Importance of proper punctuation, Creating coherence, Organizing principles of paragraphs in documents, Techniques for writing precisely

[3] IDENTIFYING COMMON ERRORS IN WRITING

Subject-verb agreement, Noun-pronoun agreement, Misplaced modifiers, Articles, Prepositions, Redundancies, Clichés

[4] NATURE AND STYLE OF SENSIBLE WRITING

Describing, Defining, Classifying, Providing examples or evidence, Writing introduction and conclusion

[5] WRITING PRACTICES

Comprehension, Précis Writing, Essay Writing

[6] ORAL COMMUNICATION

(This unit involves interactive practice sessions in Language Lab) Listening Comprehension, Pronunciation, Intonation, Stress and Rhythm, Common, Everyday Situations: Conversations and Dialogues, Communication at Workplace, Interviews, Formal Presentations

TEXT / REFERENCE BOOKS

1) Practical English Usage. Michael Swan. OUP. 1995.
2) Remedial English Grammar. F.T. Wood. Macmillan.2007
3) On Writing Well. William Zinsser. Harper Resource Book. 2001
4) Study Writing. Liz Hamp-Lyons and Ben Heasly. Cambridge University Press. 2006.
5) Communication Skills. Sanjay Kumar and PushpLata. Oxford University Press. 2011.
6) Exercises in Spoken English. Parts. I-III. CIEFL, Hyderabad. Oxford University Press

COURSE OUTCOMES

At the end of the course,students should be able to

CO1. Understand the vocabulary and their root forms to enhance vocabulary level
CO2. Enhance their Writing in effective way
CO3. Rectify common errors in their Speaking and Writing
CO4. Develop efficiency in writing
CO5. Be competent at Public Speaking and Interviews
CO6. Acquire Proficiency in all four skills of Language

COURSE MATRIX

Course Outcome (CO's)	**Program Outcomes (PO's)**											
	Domain Specific (PSO)					**Domain Independent (PO)**						
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3				3	1	1	1	1	1		2
CO2	2				3	1	1	1	1	1		1
CO3	3	2	3		3	1	1	1	1	1		2
CO4	2		3		3	1	1	1	1	1		1
CO5	3	2	3		3	1	1	1	1	1		2
CO6	2		3		3	1	1	1	1	1		1
1: Slight (Low) , 2: Moderate (Medium), 3: Substantial (High)												

B. TECH. SEMESTER – II (EC/CE/IT)

SUBJECT: (SM201) ENVIRONMENTAL STUDIES (w. e. f. 2021-22)

Teaching Scheme (Hours/Week)				Credits	Examination Scheme				
Lect	Tut	Prac	Total		Ext	Sess.	TW	Pract.	Total
2	0	0	2	0	40	--	--	--	40

COURSE OBJECTIVES

Identify and analyze the current issues related to environment and propose appropriate economical solutions for sustainable developmental activities.

DETAILED SYLLABUS

[1] THE MULTIDISCIPLINARY NATURE OF ENVIRONMENTAL STUDIES

Definition, scope and importance & Need for public awareness

[2] NATURAL RESOURCES

Renewable and non-renewable resource: Natural resources and associated problems**,** Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams, and their effects on forests and tribal people ,Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams benefit and problems, Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies, Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies, Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources, case studies, Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification, Role of an individual in conservation of natural resources. Equitable use of resources of sustainable lifestyles

[3] ECOSYSTEMS

Concept of an ecosystem, Structure and function of an ecosystem, producers, consumers and decomposers, Energy flow in the ecosystem, Ecological succession, Food chains, food webs and ecological pyramids, Introduction, types, characteristic features, structure and function of the following ecosystem: Forest ecosystem, Grassland ecosystem, Desert ecosystem and Aquatic ecosystem (ponds, streams, lakes, rivers, oceans, estuaries)

[4] BIODIVERSITY AND ITS CONSERVATION

Introduction definition: Genetic, species and ecosystem diversity,Bio-geographical classification of India, Value of biodiversity: Consumptive use, productive use, social, ethical, aesthetic and option values. Biodiversity at global, national and local levels, India as a mega-diversity nation, Hot-spots of biodiversity, Threats to biodiversity, habitat loss, poaching of wildlife, man-wildlife conflicts, Endangered and endemic species of India, Conservation of biodiversity: In-situ and ex-situ conservation of biodiversity

[5] ENVIRONMENTAL POLLUTION

Definition, Causes, effects and control measures of: Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution, Nuclear hazards, Solid waste management, causes, effects and control measures of urban and industrial wastes, Role of an individual in prevention of pollution, Pollution case studies, Disaster management: floods, earthquake, cyclone and landslides

[6] SOCIAL ISSUES AND THE ENVIRONMENT

From unsustainable to sustainable development, Urban problems related to energy,Water conservation, rain water harvesting, watershed management, Resettlement and rehabilitation of people: its problems and concerns. Case studies, Environmental ethics: Issues and possible solutions, Climate change: Global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, Case studies, Wasteland reclamation, Consumerism and waste products, Environment Protection Act: Air (Prevention and Control of Pollution) Act, Water (Prevention &Control of Pollution) Act, Wildlife Protection Act, Forest Conservation Act, Issues involved in enforcement of environmental legislation, Public awareness

[7] HUMAN POPULATION AND THE ENVIRONMENT

Population growth, variation among nations, population explosion, Family Welfare Program, environment and human health, human rights, Value education, HIV/AIDS, Women and Child Welfare, Role of Information Technology in Environmental and human health, Case studies

[8] FIELD WORK

Visit to a local area to document environmental assets (river/forest/grassland/hill/mountain), Visit to a local polluted site - Urban/Rural/Industrial/Agricultural, Study of common plants, insects, birds, Study of simple ecosystems – pond, river, hill, slopes etc.

TEXT / REFERENCE BOOKS

1) ErachBharucha Textbook of Environmental Studies; Second Edition, Universities Press: Hyderabad, 2013.

2) Rajagopalan, R. Environmental Studies; Oxford University Press: India, 2015.

3) Varandani, N. S. Basics of Environmental studies; Lambert Academic Publishing: Germany, 2013.

4) Rao, C. S. Environmental Pollution Control Engineering; Wiley publishers: New Delhi, 2006.

5) Clark, R. S. Marine Pollution; Clanderson Press Oxford: Bath, 2001.

6) Cunningham, W.P.; Cooper; Gorhani, T. H. E.; Hepworth, M.T., Environmental Encyclopedia; Jaico Publ. House: Mumbai, 2001.

7) De, A. K. Environmental Chemistry; Wiley Eastern: New Delhi, 2006.

COURSE OUTCOMES

At the end of the course,students should be able to

CO1. Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems

CO2. Identify, formulate, review research literature, and analyse complex engineering problems

reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.

CO3. Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

CO4. Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions for complex problems

CO5. Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

CO6. Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

CO7. Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

COURSE MATRIX

Course Outcome (CO's)	**Program Outcomes (PO's)**											
	Domain Specific (PSO)					**Domain Independent (PO)**						
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3				3	1	1	1	1	1		2
CO2	2				3	1	1	1	1	1		1
CO3	3	2	3		3	1	1	1	1	1		2
CO4	2		3		3	1	1	1	1	1		1
CO5	3	2	3		3	1	1	1	1	1		2
CO6	2		3		3	1	1	1	1	1		1
CO7	2		3		3	1	1	1	1	1		1
1: Slight (Low) , 2: Moderate (Medium), 3: Substantial (High)												

B. TECH. SEMESTER – III (EC)

SUBJECT: (BS306) APPLIED MATHEMATICS (w. e. f. 2022-23)

Teaching Scheme (Hours/Week)				Credits	Examination Scheme				
Lect	Tut	Prac	Total		Ext	Sess.	TW	Prac	Total
3	1	0	4	4	60	40	-	-	100

COURSE OBJECTIVES

The course is designed to provide comprehensive knowledge of complex numbers, linear differential equations of higher order, and partial differential equations for solving the initial value problems. It focuses on in-depth understanding of concepts associated with probability, discrete and continuous probability distributions, and relationship between independent variable and dependent variable. This course is extensively useful in engineering and its applications.

DETAILED SYLLABUS

[1] PROBABILITY AND STATISTICAL METHODS

Probability, permutation, combination, total probability, conditional probability, Baye's theorem, binomial distribution, Poisson distribution, normal distribution, uniform distribution, calculation of errors: probable error and standard error, coefficient of correlation, rank correlation, lines of regression.

[2] COMPLEX NUMBERS

Definition, elementary operations, properties, Argand diagram, modulus, amplitude, De-Moivre's theorem, expandsin □□ , cos □□ and tan □□ in powers of sin □ , cos □, and tan □ respectively, expand□□□□□ , □□□□□ , □□□□□□□□ · □□□□□ in a series of sines or cosines of multiples of □.

[3] LINEAR DIFFERENTIAL EQUATIONS & IT'S APPLICATION

Linear differential equations of higher order with constant coefficients, equations reducible to linear equations with constant coefficients, simultaneous linear equations with constant coefficients, application to engineering problems: electric circuits.

[4] PARTIAL DIFFERENTIAL EQUATIONS

Introduction, formation, equations solvable by direct integration, solution of linear equations of first order, and non-linear equations of first order, Charpit's method, homogenous linear equations with constant coefficient, rules to find the complementary function and the particular integral, non-homogenous linear equations with constant coefficients.

TEXT / REFERENCE BOOKS

1) B. S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 40th Edition,2007.

2) Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.

3) Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint,2010.

4) N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint,2010.

COURSE OUTCOMES

At the end of the course,students should be able to

CO1. Understand and represent the complex numbers in Argand diagram.
CO2. Analyse and understand the basic concepts and terminologies of probability and probability distribution functions.
CO3. Evaluate and examine the linear regression between two variables.
CO4. Extend their learning of differential calculus: methods to solve and analyse the higher order differential equations.
CO5. Model physical processes using ordinary and partial differential equations and characterize the solution of initial value problem.
CO6. Investigate and apply the ordinary differential equations in engineering problems.

COURSE MATRIX

Course Outcome (CO's)	**Program Outcomes (PO's)**											
	Domain Specific (PSO)					**Domain Independent (PO)**						
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3				3	1	1	1	1	1		2
CO2	2				3	1	1	1	1	1		1
CO3	3	2	3		3	1	1	1	1	1		2
CO4	2		3		3	1	1	1	1	1		1
CO5	3	2	3		3	1	1	1	1	1		2
CO6	2		3		3	1	1	1	1	1		1
1: Slight (Low) , 2: Moderate (Medium), 3: Substantial (High)												

B. TECH. SEMESTER – III (EC)

SUBJECT: (EC304) LINEAR ELECTRONICS – I (w. e. f. 2022-23)

Teaching Scheme (Hours/Week)				Credits	Examination Scheme				
Lect	Tut	Prac	Total		Ext	Sess.	TW	Prac	Total
4	0	2	6	5	60	40	25	25	150

COURSE OBJECTIVES

Devices such as diodes, transistors, FETs, MOSFETs are the building blocks of electronic circuits. Electronic devices have become an important part of our day-to-day life. Consumer electronics products such as refrigerators, washing machines, gadgets like mobile phones, laptops, calculators are based on these devices(either discrete or in a chip form). Similarly industrial electronics, industrial automation and motion control, medical applications etc. are not possible without these electronic devices. So clear understanding of these devices is necessary. In this subject the physics of these devices, characteristics of these devices and the basic applications are covered. The objective of this course is to offer a detail understanding of the basic physical structure, principles of operation, electrical characteristics and circuit models of semiconductor devices like, various diodes, BJT, FET and fabrication of integrated-circuits.

DETAILED SYLLABUS

[1] SEMICONDUCTOR DIODE

Mobility and conductivity, Mass-action law, Charge densities in a semiconductor, Generation and recombination of charges, Diffusion, The continuity equation, Injected minority carrier charge, Potential variation within graded semiconductor, The Temperature Dependence of the V/I Characteristics, Diode Resistance, Space- Charge, or Transition Capacitance CT, Charge controlled Description, Diffusion Capacitance, Junction Diode Switching Times, Breakdown Diodes, Tunnel Diodes, Diode Clipping& Clamping Circuits, Sampling gate.

[2] BIPOLAR JUNCTION TRANSISTORS

Introduction to Transistor, Transistor Switching Times, Transistor Hybrid Model, The h Parameters, Analysis of Transistor Amplifier Circuit Using h Parameters, Conversion Formula For The Parameters of the Three Transistor Configurations, The Hybrid Pi Common Emitter Transistor Model at high Frequency, Hybrid Pi Conductance's, Hybrid Pi Capacitances, Step Response of an Amplifier, Bandpass of Cascaded Stages.

[3] TRANSISTOR BIASING & THERMAL STABILIZATON

The Operating Point of a BJT, Bias Stability, Self-Bias or Emitter Bias, Stabilization against Variations in Ico, VBE and β, Bias compensation, biasing technique for linear integrated circuits, Thermistor &Sensistor Compensation

[4] FIELD EFFECT TRANSISTOR

Construction & characteristics of JFETs, Transfer characteristics, Depletion type MOSFET, MOS Device structure, physical operation, VI characteristics, MOSFET circuits at DC, MOSFET as an Amplifier and switch, Biasing, Small signal operation and Models, Single stage MOS amplifiers Common Gate, Common Source, Common Drain

[5] FREQUENCY RESPONSE OF AMPLIFIERS

MOSFET internal capacitance and high frequency Model, Frequency Response of CS amplifier, MOSFET Current mirror circuits, Miller's theorem, CMOS Implementation of CS amplifier, Cascode amplifiers, CS with source degeneration

TEXT / REFERENCE BOOKS

1) Integrated Electronics, Jacob Millman& Christos C. Halkias, 1st Edition, Tata McGraw Hill

2) Electronic Devices &Circuit Theory, Robert L. Boylstead&LouisNashelsky, 8th Edition, Prentice Hall of India.

3) Microelectronics Circuits, A. S. Sedra&Kemmetji C. Smith, 5th Edition, Oxford Indian Edition.

COURSE OUTCOMES

At the end of the course, students should be able to

CO1. Design JFET and D-MOSFET based biasing circuits and evaluate the dc voltage/current component in E-MOSFET based circuits.

CO2. Evaluate the diode-based circuits with understanding of semiconductor physics and diode characteristics.

CO3. Discriminate and choose the appropriate MOS amplifier configuration (CS/CD/CG) based on requirement of mid frequency voltage gain, current gain, input impedance and output impedance.

CO4. Analyze BJT biased circuit to decide the region in which transistor operates.

CO5. Evaluate the higher cut-off frequency to obtain the bandwidth of amplifier and analyze BJT based self-bias stabilization and compensation circuits for a given temperature range.

CO6. Analyze low and high frequency AC model of BJT.

COURSE MATRIX

Course Outcome (CO's)	**Program Outcomes (PO's)**											
	Domain Specific (PSO)					**Domain Independent (PO)**						
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	3			2					2		
CO2	3	3			2							
CO3	3	3	3			3				2		1
CO4	3	3			2							1
CO5	3	2		3								1
CO6	3	3				2						
1: Slight (Low) , 2: Moderate (Medium), 3: Substantial (High)												

B. TECH. SEMESTER – III (EC)

SUBJECT: (EC305) ELECTRONICS INSTRUMENTATION (w. e. f. 2022-23)

Teaching Scheme (Hours/Week)				Credits	Examination Scheme				
Lect	Tut	Prac	Total		Ext	Sess.	TW	Prac	Total
3	1	2	5	5	60	40	25	25	150

COURSE OBJECTIVES

Troubleshooting of electronic circuits is an essential requirement of service sector industry. This course will develop skills for measurement of electrical parameters of various systems using measuring instruments. Students will analyse construction, operation & design of Voltmeters, Ohmmeters, Ammeters, Power factor meter, Energy meter, Instrument transformer, CRO, DSO, transducers for temperature, pressure, level and flow measurement, P, PI PD and PID controller. Moreover, they can design and analysis fundamental method for measurement of resistance, inductance, capacitance and frequency. The objective of this course is to offer profound understanding of operating principles, working and applications of various instruments for measurement of electrical parameters with reference to electrical & electronic systems.

DETAILED SYLLABUS

[1] DIRECT-CURRENT INDICATING INSTRUMENTS

Suspension Galvanometer, Torque and Deflection of the Galvanometer, Permanent-Magnet Moving Coil Mechanism, DC Ammeters, DC Voltmeters, Voltmeter Sensitivity, Voltmeter-Ammeter Method of Measuring Resistance, Series-Type Ohmmeter Shunt-Type Ohmmeter, Multimeter or VOM, Calibration of DC Instruments, Alternating-Current Indicating Instruments, Thermo Instruments, Electrodynamometers in Power Measurements Watt-hour Meter, Power-Factor Meter, Instrument Transformers.

[2] BRIDGES AND THEIR APPLICATION

Introduction, Wheatstone Bridge, Kelvin Bridge, Guarded Wheatstone Bridge, AC Bridges and their Application, Comparison Bridges, Maxwell Bridge, Hay Bridge, Schering Bridge, Unbalance Conditions, Wien Bridge, Wagner Ground Connection, Potentiometer.

[3] ELECTRONIC INSTRUMENTS FOR MEASURING BASIC PARAMETERS

Amplified DC Meter, AC Voltmeter using Rectifiers, True RMS- Responding Voltmeter, Electronic Multimeter, Considerations in Choosing an Analog Voltmeter, Differential Voltmeters, Digital Voltmeters, Component Measuring Instruments, Q Meter, Vector Impedance Meter, Vector Voltmeter, RF Power and Voltage Measurement.

[4] OSCILLOSCOPES

Introduction, Oscilloscope, Block Diagram, Cathode Ray Tube, CRT Circuits, Vertical Deflection System, Delay Line, Multiple Trace, Horizontal Deflection System, Oscilloscope Probes and Transducers, Oscilloscope Techniques, Special Oscilloscopes.

[5] CONTROL ACTIONS AND CONTROLLERS

Control Actions like P, PI, PD & PID, Electronic Controllers, Characteristics of Different types of Control Valves.

[6] INDUSTRIAL INSTRUMENTATION

Measurement Schemes for Temperature, Pressure, Level & Flow with their Industrial Applications, Distributed Control System (DCS), and Programmable Logic Controller.

TEXT / REFERENCE BOOKS

1) Electrical & Electronic Measurement & Measuring Instruments, A. K. Sawhney, 17th Edition, Dhanpat Rai & Co.

2) Electronic Instrumentation and Measurement Technique, Wlliam D. Cooper & Albert D. Helfrick, 5thEdition , Prentice Hall of India

3) Electronics Measurement & Instrumentation, R. K. Rajput, 1st Edition, Prentice Hall of India

4) Electronic Instrumentation, H. S. Kalsi, 2nd Edition, Tata McGraw Hill

COURSE OUTCOMES

At the end of the course,students should be able to

CO1. Design various meters for measurement of voltage and current for given specification.

CO2. Design DC bridges for measurement of low & medium value of resistance like Wheatstone bridge, kelvin's double bridge and design AC bridges for measurement of primary and secondary parameters of components.

CO3. Compare various voltmeters like amplified DC meter, AC voltmeter using rectifier, True rms responding voltmeter and electronic multimeter, Digital voltmeter for improving accuracy & precision of measurement.

CO4. Illustrate the working of various oscilloscope for measuring voltage, frequency and phase.

CO5. Describe the working principle, selection criteria and applications of various transducers used in measurement systems.

CO6. Compare different types of control action like P, PI, PD & PID and controller like PLC & DCS.

COURSE MATRIX

Course Outcome (CO's)	**Program Outcomes (PO's)**											
	Domain Specific (PSO)					**Domain Independent (PO)**						
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	1	3	2					3	1		1
CO2	3	3										1
CO3	3	1										1
CO4	3	3			3							1
CO5	3	1	1									1
CO6	3	2	3				1					1
1: Slight (Low) , 2: Moderate (Medium), 3: Substantial (High)												

B. TECH. SEMESTER – III (EC)

SUBJECT: ( ) ELECTRONICS INSTRUMENTATION (w. e. f. 2023-24)

Teaching Scheme (Hours/Week)				Credits	Examination Scheme				
Lect	Tut	Prac	Total		Ext	Sess.	TW	Prac	Total
1	0	4	5	3	00	00	50	50	100

COURSE OBJECTIVES

Troubleshooting of electronic circuits is an essential requirement of service sector industry. This course will develop skills for measurement of electrical parameters of various systems using measuring instruments. Students will analyse construction, operation & design of Voltmeters, Ohmmeters, Ammeters, Power factor meter, Energy meter, Instrument transformer, CRO, DSO, transducers for temperature, pressure, level and flow measurement, P, PI PD and PID controller. Moreover, they can design and analysis fundamental method for measurement of resistance, inductance, capacitance and frequency. The objective of this course is to offer profound understanding of operating principles, working and applications of various instruments for measurement of electrical parameters with reference to electrical & electronic systems.

DETAILED SYLLABUS

[1] DIRECT-CURRENT INDICATING INSTRUMENTS

Suspension Galvanometer, Torque and Deflection of the Galvanometer, Permanent-Magnet Moving Coil Mechanism, DC Ammeters, DC Voltmeters, Voltmeter Sensitivity, Voltmeter-Ammeter Method of Measuring Resistance, Series-Type Ohmmeter Shunt-Type Ohmmeter, Multimeter or VOM, Calibration of DC Instruments, Alternating-Current Indicating Instruments, Thermo Instruments

[2] BRIDGES AND THEIR APPLICATION

Introduction, Wheatstone Bridge, Kelvin Bridge, Guarded Wheatstone Bridge, AC Bridges and their Application, Comparison Bridges, Unbalance Conditions.

[3] ELECTRONIC INSTRUMENTS FOR MEASURING BASIC PARAMETERS

Amplified DC Meter, AC Voltmeter using Rectifiers, Electronic Multimeter, Considerations in Choosing an Analog Voltmeter, Digital Voltmeters, Component Measuring Instruments.

[4] OSCILLOSCOPES

Introduction, Oscilloscope, Block Diagram, Cathode Ray Tube, CRT Circuits, Vertical Deflection System, Delay Line, Multiple Trace, Horizontal Deflection System, Oscilloscope Probes and Transducers, Oscilloscope Techniques, Special Oscilloscopes.

[5] INDUSTRIAL INSTRUMENTATION

Measurement Schemes for Temperature, Pressure, Level & Flow with their Industrial Applications.

TEXT / REFERENCE BOOKS

1) Electrical & Electronic Measurement & Measuring Instruments, A. K. Sawhney, 17th Edition, Dhanpat Rai & Co.

2) Electronic Instrumentation and Measurement Technique, Wlliam D. Cooper & Albert D. Helfrick, 5thEdition , Prentice Hall of India

3) Electronics Measurement & Instrumentation, R. K. Rajput, 1st Edition, Prentice Hall of India

4) Electronic Instrumentation, H. S. Kalsi, 2nd Edition, Tata McGraw Hill

COURSE OUTCOMES

At the end of the course, students should be able to

CO1. Design various meters for measurement of voltage and current for given specification.

CO2. Design DC bridges for measurement of low & medium value of resistance like Wheatstone bridge, kelvin's double bridge and design AC bridges for measurement of primary and secondary parameters of components.

CO3. Compare various voltmeters like amplified DC meter, AC voltmeter using rectifier, True rms responding voltmeter and electronic multimeter, Digital voltmeter for improving accuracy & precision of measurement.

CO4. Illustrate the working of various oscilloscope for measuring voltage, frequency and phase.

COURSE MATRIX

Course Outcome (CO's)	**Program Outcomes (PO's)**											
	Domain Specific (PSO)					**Domain Independent (PO)**						
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	1	3	2					3	1		1
CO2	3	3										1
CO3	3	1										1
CO4	3	3			3							1
1: Slight (Low) , 2: Moderate (Medium), 3: Substantial (High)												

B. TECH. SEMESTER – III (EC/IC)

SUBJECT: (CI311) NETWORK ANALYSIS (w. e. f. 2022-23)

Teaching Scheme (Hours/Week)				Credits	Examination Scheme				
Lect	Tut	Prac	Total		Ext	Sess.	TW	Prac	Total
3	1	2	5	5	60	40	25	25	150

COURSE OBJECTIVES

This course is designed to provide a complete overview of electric circuit analysis used in electronics engineering. The students can analyze electrical networks by understanding application of basic laws, theorems and transforms. The concept of this subject is useful to the students for understanding the concept of stability of the circuit and its frequency domain analysis. The students can inculcate capability to analyze electrical networks by understanding basic laws, theorems and transforms.

DETAILED SYLLABUS

[1] DEVELOPMENT OF THE CIRCUIT CONCEPT

Introduction, Charge and Energy, The Relationship of Field and Circuit Concepts, The Capacitance Parameter, The Inductance Parameter, The Resistance Parameter, Units and scaling, Approximation of a Physical System as a circuit.

[2] CONVENTIONS FOR DESCRIBING NETWORKS

Reference Directions for Current and Voltage, Active Element Conventions, the Dot Convention for Coupled Circuits, Topological Description of Networks.

[3] NETWORK EQUATIONS

Kirchhoff's Laws, The Number of Network Equations, Source Transformations, Examples of the Formulation of Network Equations Loop Variable Analysis, Node Variable Analysis, Determinants: Minors and the Gauss Method, Duality.

[4] FIRST ORDER DIFFERENTIAL EQUATIONS

General and particular solutions, Time constants, the integrating factor, More Complicated Networks.

[5] INITIAL CONDITIONS IN NETWORKS

Why Study Initial Conditions? Initial Conditions in Elements, Geometrical Interpretation of Derivatives, A Procedure for Evaluating Initial Conditions, Initial State of a Network.

[6] DIFFERENTIAL EQUATIONS

Second order equations, Internal Excitation, Higher order equations ;Internal Excitation, Networks Excited by External Energy Sources, Response as related to the s-Plane Location of Roots, General Solutions in terms of S,Q and ωn.

[7] THE LAPLACE TRANSFORMATION

Introduction, The Laplace Transformation, Some Basic Theorems for the Laplace Transformation, Examples of the solution of problems with the Laplace Transformation, Partial Fraction Expansion, Heaviside's Expansion Theorem, Examples of Solutions by the Laplace Transformation.

[8] TRANSFORMS OF SPECIAL SIGNAL WAVEFORMS

The Shifted Unit Step Function, The Ramp and impulse Functions, Waveform Synthesis, The Initial and Final Value of f (t) from F(s), The Convolution Integral, Convolution as Summation.

[9] IMPEDANCE FUNCTIONS AND NETWORK THEOREMS

The concept of Complex Frequency, Transform Impedance and Transform Circuits, Series and Parallel Combinations of Elements, Superposition and Reciprocity, Thevenin's Theorem and Norton's Theorem.

[10] NETWORK FUNCTIONS: POLES AND ZEROS

Terminal Pairs or Ports, Network Functions for One Port and Two port. The Calculation of Network Function (1) Ladder Networks (2) General Networks, Poles and Zeros of Network Functions, Restrictions on Pole and Zero Locations for Driving-Point Functions, Restrictions on Pole and Zero locations for Transfer Functions, Time-domain Behaviour from the Pole & zero plot, Introduction to band pass, low pass, high pass and band reject filters.

[11] TWO PORT NETWORKS

Relationship of two port variables, short circuit admittance parameters, the open circuit impedance parameters, transmission parameters, the hybrid parameters, relationship between parameter sets, parallel connection of two port networks.

TEXT / REFERENCE BOOKS

1) Network Analysis, M.E. Van Valkenburg, 3rd Edition, Prentice Hall of India Private Limited
2) Network Analysis and Synthesis, U. A. Patel, 3rd Edition, Mahajan Publication House.
3) Circuit Theory - Analysis & Synthesis, A. Chakraborty, 1st Edition, Dhanpatrai publication

COURSE OUTCOMES

At the end of the course,students should be able to

CO1. Apply KVL, KCL and Ohm's Laws to complex RLC networks as well as coupled networks to find response in any part of the network in form of node voltages and loop currents for given excitation.
CO2. Compute response of the network for given excitation using classical method (solving differential equations).
CO3. Apply Laplace transformation and network theorem to complex RLC networks in order to simplify the network and determine load voltage/current.
CO4. Find Laplace transform of given time domain function/waveform and obtain response of the network using Laplace transform method.
CO5. Synthesized a stable electrical network with the help of network theorem and poles & zeros.
CO6. Find two port parameters for given network.

COURSE MATRIX

Course Outcome (CO's)	Program Outcomes (PO's)											
	Domain Specific (PSO)					Domain Independent (PO)						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2		2			1				2
CO2	3	2				1	1					2
CO3	2	3	2					1	1			2
CO4	3	2	3		2			1	1	1		2
CO5	2	3	2	2	2				1	1		2
CO6	2	2	3	2								1
1: Slight (Low) , 2: Moderate (Medium), 3: Substantial (High)												

B. TECH. SEMESTER – III (EC/IC)

SUBJECT: (CI310) DIGITAL ELECTRONICS (w. e. f. 2022-23)

Teaching Scheme (Hours/Week)				Credits	Examination Scheme				
Lect	Tut	Prac	Total		Ext	Sess.	TW	Prac	Total
3	1	2	6	5	60	40	25	25	150

COURSE OBJECTIVES

The objective of this course is to provide the concepts associated with the digital logic and circuit design that are basic building blocks of a digital computer system. To apply the laws involved in the Boolean algebra for the simplification of logic functions and minimization of hardware requirements. To design and analyze of combinational and sequential circuits involved in the different digital circuits and systems.

DETAILED SYLLABUS

[1] INTRODUCTION TO LOGIC CIRCUITS

Logic Gates & Networks, Truth Tables, Boolean Algebra, Synthesis using AND, OR and NOT Gates, NAND – NOR Logic Networks, Sum of Products and Product of Sums Forms, Introduction to Verilog.

[2] IMPLEMETATION TECHNOLOGY

Transistor Switches, NMOS & CMOS Logic Gates, Negative Logic Systems, Introduction to PAL, PLA, CPLD & FPGAs, Voltage Levels in Logic Gates, Noise Margin, Dynamic Operation & Power Dissipation in Logic Gates, Fan-in and Fan-out, Transmission Gates, Transistor-Transistor Logic, Emitter - Coupled Logic.

[3] OPTIMIZED IMPLEMENTATION OF LOGIC FUNCTIONS

Karnaugh Map Strategy for Minimization, Minimization of POS Forms, Multiple Output Circuits, Multilevel Synthesis, Analysis of Multilevel Synthesis.

[4] COMBINATIONAL CIRCUITS

Multiplexers, Decoders, Encoders, Code Converters, Arithmetic Comparison Circuits

[5] SEQUENCIAL CIRCUITS

Basic Latch, Gated SR Latch, Gated D Latch, Master Slave & Edge Triggered D Flip-Flops, T & JK Flip Flops, Registers, Counters, Reset Synchronization, BCD- Ring –Johnson Counters.

[6] SYNCHRONOUS SEQUENCIAL CIRCUITS

Basic Design Steps, Mealy State Model, Design of Counter, FSM as an Arbiter Circuit, Analysis of Synchronous Sequential Circuits.

TEXT / REFERENCE BOOKS

1) Fundamentals of Digital Logic with Verilog Design, Stephen Brown &ZvonkoVrenesic, Tata McGraw Hill
2) Digital Logic and Computer Design, Morris Mano, Prentice Hall of India
3) Fundamental of Digital Circuits, Anand Kumar, Prentice Hall of India

COURSE OUTCOMES

At the end of the course, students should be able to

CO1. Analyse and calculate parameters such as noise margin, input –output voltages, fan-out, and speed power product, power dissipation for ECL and TTL logic families. Implement the Boolean functions using CMOS gates.
CO2. Attempt SOP to POS conversion (& vice versa) for implementation of Boolean expressions using AND-OR-INVERT functions as well as universal gates. Also to optimize the Boolean expressions either by applying Boolean algebra or by using minimization techniques as K-Map method and Tabulation Method with "don't care" conditions up to 6 variables.
CO3. Implement various combinational circuits like Multiplexers, Decoders, Encoders, Code Converters, and Arithmetic Comparison Circuits using basic gates. Design and Implement basic combinational blocks of a digital computer using multiplexers, decoder, PLA, PAL and verify the circuit implementations with the help of simulation tool.
CO4. Implement a basic memory element using flip-flops and understand the characteristics of various flip-flop designs and compare them with respect to their timing relationship, hardware requirement and limitations.
CO5. Differentiate Combinational and Sequential circuits. Design and analyse FSMs using sequential circuits. Reduce hardware requirement of FSMs by minimizing state table. Analyse Mealy and Moore machine designs using timing waveforms.
CO6. Construct sequential circuits like asynchronous/ synchronous counters, shift registers and counters for timing signal generation.

COURSE MATRIX

Course Outcome (CO's)	**Program Outcomes (PO's)**											
	Domain Specific (PSO)					**Domain Independent (PO)**						
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	2	3	2		1	1					
CO2	3	3	3	2		1	3				1	1
CO3	3	3	2	1		1	3				1	1
CO4	3	3	3	1		1	1				1	1
CO5	3	1	3	3	3	2	3		1		1	
CO6	3	3	3	2	3	1	3		1		2	
1: Slight (Low) , 2: Moderate (Medium), 3: Substantial (High)												

B. TECH. SEMESTER – III (EC)

SUBJECT: (BS307) MATHEMATICAL COMPUTING LABORATORY (w. e. f. 2022-23)

Teaching Scheme (Hours/Week)				Credits	Examination Scheme				
Lect	Tut	Prac	Total		Ext	Sess.	TW	Prac	Total
0	0	2	2	1	-	-	25	25	50

COURSE OBJECTIVES

Availability of simulation tools help students to visualize mathematical concepts studied as part of in Mathematics subjects and understand its relevance to their core engineering. Considering wide spread use of Python as a programming language, students should have hands on practices on this language at early stage of engineering studies. The objective of the course is to fulfil the requirements by implementing the mathematical formulas and concepts through Python programming.

DETAILED SYLLABUS

[1] INTRODUCTION TO PYTHON

Introduction to syntax & programming environment, Functions, Looping and plotting.

[2] SIMULATIONS

AC analysis of circuit, Power factor calculations, Matrix operations, Linear equations solving using matrix operations, Fourier Series, Limit and Partial derivative solutions and KCL and KVL application on network circuits are included.

TEXT / REFERENCE BOOKS

1) Principles of Electronics, V. K. Mehta &Rohit Mehta, 11th Edition, S. Chand & Company.

2) Electrical & Electronic Measurement & Measuring Instruments, A.K. Sawhney, 17th Edition, Dhanpat Rai Publishing.

3) Digital logic and Computer Design, M. M. Mano, Pearson Education India.

COURSE OUTCOMES

At the end of the course, students should be able to

CO1. Write python codes including necessary features such as looping and functions, run and troubleshoot the same.

CO2. Write python code to implement mathematical formulas and show the results with single and multiple graphs in single and / or multiple plots

CO3. Find circuit parameters and response in the Resistive network using KVL and KCL using python.

CO4. Write python code to execute mathematical formula for derivative and limit of a given function and synthesize the periodic waveform for given Fourier series representation of a signal.

COURSE MATRIX

Course Outcome (CO's)	Program Outcomes (PO's)											
	Domain Specific (PSO)					Domain Independent (PO)						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	-	1	1	3	1	1	1	-	1	-	-
CO2	2	-	1	1	3	1	1	1	-	1	-	-
CO3	2	2	1	1	3	1	1	1	-	1	-	-
CO4	2	2	1	1	3	1	1	1	-	1	-	-
1: Slight (Low) , 2: Moderate (Medium), 3: Substantial (High)												

B. TECH. SEMESTER – IV (EC)

SUBJECT: (EC410) SIGNAL& SYSTEMS (w. e. f. 2022-23)

Teaching Scheme (Hours/Week)				Credits	Examination Scheme				
Lect	Tut	Prac	Total		Ext	Sess.	TW	Prac	Total
2	1	2	5	4	40	40	25	25	130

COURSE OBJECTIVES

Signals and systems is a topic that forms an integral part of engineering systems in many diverse areas like communication, image processing, speech processing etc. This subject offer in depth understanding of time domain and frequency domain analysis of continuous time and discrete time signals and systems.

DETAILED SYLLABUS

[1] INTRODUCTION

Signals and systems as seen in everyday life, and in various branches of engineering and science. Energy and power signals, continuous and discrete time signals, continuous and discrete amplitude signals. System properties: linearity: additivity and homogeneity, shift-invariance, causality, stability, realizability

[2] LINEAR SHIFT- INVARIANT SYSTEMS

Linear shift-invariant (LSI) systems, impulse response and step response, convolution, input-output behaviour with aperiodic convergent inputs. Characterization of causality and stability of linear shift invariant systems, System representation through differential equations and difference equations, Periodic and semi-periodic inputs to an LSI system, the notion of a frequency response and its relation to the impulse response, Fourier series representation

[3] THE FOURIER TRANSFORM

The Fourier Transform, convolution/multiplication and their effect in the frequency domain, magnitude and phase response, Fourier domain duality. The Discrete-Time Fourier Transform (DTFT) and the Discrete Fourier Transform (DFT), Parsvale's Theorem, The idea of signal space and orthogonal bases

[4] THE z – TRANSFORM

The z-Transform for discrete time signals and systems- Eigen functions, region of convergence, z-domain analysis. State-space analysis and multi-input, multi-output representation. The state-transition matrix and its role.

TEXT / REFERENCE BOOKS

1) B. P. Lathi, “Linear Systems and Signals”, Oxford University Press, 2009.

2) A. V. Oppenheim, A. S. Willsky and S. H. Nawab, “Signals and systems”, Prentice Hall India,1997.

3) J. G. Proakis and D. G. Manolakis, “Digital Signal Processing: Principles, Algorithms, and Applications”, Pearson, 2006.

4) H. P. Hsu, “Signals and systems”, Schaum’s series, McGraw Hill Education, 2010.

5) S. Haykin and B. V. Veen, "Signals and Systems", John Wiley and Sons, 2007.
6) A. V. Oppenheim and R. W. Schafer, "Discrete-Time Signal Processing", Prentice Hall, 2009.
7) M. J. Robert "Fundamentals of Signals and Systems", McGraw Hill Education, 2007.

COURSE OUTCOMES

At the end of the course,students should be able to

CO1. Characterize and classify Continuous Time (CT) and Discrete Time (DT) signals and systems.
CO2. Find the response of linear shift invariant continuous and discrete time systems.
CO3. Analyze and transform systems using z -Transform, DTFT and DFT.
CO4. Apply Fourier series to any periodic continuous time signals.
CO5. Find spectra of aperiodic signal using Fourier Transform.

COURSE MATRIX

Course Outcome (CO's)	**Program Outcomes (PO's)**											
	Domain Specific (PSO)					**Domain Independent (PO)**						
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	3	1	2	2	1	1	1	1	1	1	1
CO2	3	3	1	2	2	1	1	1	1	1	1	1
CO3	3	3	1	2	2	1	1	1	-	1	1	1
CO4	3	3	1	2	2	1	1	1	-	1	1	1
CO5	3	3	1	2	2	1	1	1	-	1	1	1
1: Slight (Low) , 2: Moderate (Medium), 3: Substantial (High)												

B. TECH. SEMESTER – IV (EC)

SUBJECT: (EC408) LINEAR ELECTRONICS – II (w. e. f. 2022-23)

Teaching Scheme (Hours/Week)				Credits	Examination Scheme				
Lect	Tut	Prac	Total		Ext	Sess.	TW	Prac	Total
4	0	2	6	5	60	40	25	25	150

COURSE OBJECTIVES

This course involves the in-depth understanding of the analog electronics circuits which can enable students to interpret, analyses, design, and apply electronics and communication-based circuits. This core subject understanding is useful to the students in the projects and in the field of Power Electronics, Electronics Communication, and audio-video engineering. The objective of this course is to offer in-depth understanding of the analysis, design, and applications for analog electronics circuits.

DETAILED SYLLABUS

[1] POWER CIRCUITS AND SYSTEMS

Amplifier Classification, Distortion in Amplifiers, Large-Signal Amplifiers, Harmonic Distortion, Efficiency of a Class A Amplifier, Push-Pull Amplifiers, Class B amplifiers, Class AB Operation, Regulated Power Supplies, Series Voltage Regulator.

[2] FEEDBACK AMPLIFIER CHARACTERISTIC

Classification of Amplifiers, The Feedback Concept, The Transfer Gain with Feedback, General Characteristics of Negative-Feedback Amplifiers, Input Resistance, Output Resistance, Method Analysis of a Feedback Amplifier, Voltage-Series Feedback, Current-Series Feedback, Current-Shunt Feedback, Voltage-Shunt Feedback.

[3] OSCILLATORS USING TRANSISTOR

Sinusoidal Oscillators, The Phase-Shift Oscillators, Resonant-Circuit Oscillators, A General Form of Oscillator Circuits, Colpitt's Oscillator, Hartley's Oscillator, Clapp's Oscillator, Crystal Oscillators.

[4] OPERATIONAL AMPLIFIER CHARACTERISTICS

Differential Amplifier, DC and AC Analysis of Bipolar Differential Amplifier, The ideal Operational Amplifier, Inverting and Non-Inverting Amplifiers, Op-Amp Parameters, Measurement of Op-Amp Parameters, General Description of Various Stages of Op-Amp, Open-Loop and Closed-Loop Frequency Response, Op-Amp Stability, Frequency Compensation.

[5] LINEAR APPLICATIONS OF OP-AMP

Summing and Difference Amplifiers, Integrator and Differentiator, Current-to-Voltage Converters, Voltage-to-Current Converters, Current Amplifiers, Voltmeters and Current Meters, Instrumentation Amplifiers, Transducer Bridge Amplifiers, Ideal and Realistic Frequency Response of Various Filters, Basic First-Order Low-Pass and High-Pass Filters, First Order Wideband Band Pass Filters (Phase-Shifter), Second-Order Low-Pass Filters, Second-Order High-Pass Filters, Second-Order Band-Pass Filters, Second-Order Band-Reject Filters.

[6] NON-LINEAR APPLICATIONS OF OP-AMP

Precision Half-Wave Rectifiers, Precision Full Wave Rectifiers, Log Amplifiers, Antilog Amplifiers, Zero Crossing Detector, Level Detectors, Voltage Magnitude Comparator and Window Detector, Basic Peak Detectors Using Op-Amps and Comparators, Basic Sample and Hold Circuits, Digital to Analog (D/A) Converters, Analog to Digital (A/D) Converters.

[7] WAVE SHAPING & WAVEFORM GENERATORS

The Op-Amp as Voltage Comparator, Some Applications of a Comparator using Op-Amp, Schmitt Trigger Circuit, Basic Triangular Wave Generator, Astable and MonostableMultivibrator Using Op-Amp, Introduction to 555 Timer, Timer 555 Used in Astable and Monostable Mode.

TEXT / REFERENCE BOOKS

1) Integrated Electronics, Millman&Halkians, Tata McGraw Hill

2) Op - Amp and Linear Integrated Circuits, RamakantA. Gayakwad, 4th Edition, Pearson Education

3) Integrated Circuits, K. R. Botkar, 9thEdition, Khanna Publications

COURSE OUTCOMES

At the end of the course,students should be able to

CO1. Compute transfer gain, input and output impedance of various types of negative feedback amplifier.

CO2. Analyse class A, Class B, Class AB and Push-Pull amplifier in terms of operating characteristics, harmonic distortion and power efficiency.

CO3. Design regulated power supply, sinusoidal oscillator circuits and Multivibrator circuits using IC555 timer for the given specifications.

CO4. Develop analog circuits using OPAMP to achieve desired/given basic parameters like gain, BW,CMRR and SR as well as to perform mathematical operations like addition, subtraction.

CO5. Develop analog circuits like integrator, differentiator, logarithm, antilogarithm, comparators, instrumentation amplifier, voltmeter, current meter and analog computers using OPAMP.

CO6. Design and develop different types of rectifier circuits, waveform generators, ADC, DAC and active filters using OPAMP.

COURSE MATRIX

Course Outcome (CO's)	**Program Outcomes (PO's)**											
	Domain Specific (PSO)					**Domain Independent (PO)**						
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	3		2	2	-	-	-	-	1	-	-
CO2	3	3		2	2	-	-	-	-	-	-	-
CO3	3	3	3	2	2	1	-	-	-	1	-	1
CO4	3	3		2	2	3	-	-	-	2	-	1
CO5	3	3	1	1	2		2	-	-	2	-	3
CO6	3	3		2	2	2	1	-	-	2	-	2
1: Slight (Low) , 2: Moderate (Medium), 3: Substantial (High)												

B. TECH. SEMESTER – IV (EC)

SUBJECT: (EC411) CONTROL THEORY (w. e. f. 2022-23)

Teaching Scheme (Hours/Week)				Credits	Examination Scheme				
Lect	Tut	Prac	Total		Ext	Sess.	TW	Prac	Total
3	1	2	6	5	60	40	25	25	150

COURSE OBJECTIVES

The objective of this course is to introduce basics of control theory and establish the fundamentals of devices in control applications as required by electronics engineering students. To introduce different types of systems and model a complicated system into a more simplified form to interpret different physical and mechanical systems in terms equivalent electrical models for analysis. To employ time domain analysis to predict and analyze transient performance parameters of the system for various standard input test functions. Demonstrate system stability concept and learn methods for examining system stability in both time and frequency domains including determining the system stability margins.

DETAILED SYLLABUS

[1] INTRODUCTION

Openloop and closed loop control system, Servomechanism, Historical development of control system, sampled data & digital control system, Multivariable control system, Application in nonengineering field.

[2] MATHEMATICAL MODELS OF PHYSICAL SYSTEMS

Introduction, Differential equation of physical systems, Transfer functions, Block diagram algebra, signal flow graph. (Note: Problems on electrical, mechanical & electromechanical systems only.)

[3] FEEDBACK CHARACTERISTICS OF CONTROL SYSTEMS

Feedback and non feedback systems, reduction of parameter variations by use of feedback, control over system dynamics by use of feedback, effects of disturbance signals by use of feedback, lineraizing effect of feedback, regenerative feedback, Basics of Feed forward Control System with example.

[4] TIME RESPONSE ANALYSIS AND CONCEPTS OF STABILITY

Introduction, standard test signals, time response of first order system, time response of second order system, steady state errors and error constants, effects of adding zero to a system, design specifications and constructions for second and higher order systems, performance indices, examples, concepts and conditions for stability, Huwitz's and Routh's stability criteria, relative stability criteria.

[5] THE ROOT LOCUS TECHNIQUE

Introduction, Rules of construction of root loci, sketching of root locus and applications

[6] FREQUENCY DOMAIN ANALYSIS & STABILITY

Freq. domain specifications, correlation bet time & frequency domain specifications, Bode plot, Polar plot, Nichols chart, Nyquist stability criterion, Constant M& N circles

TEXT / REFERENCE BOOKS

1) Feedback Control Systems, D. K. Theckedath , R. A. Barapate, Tech-Max Publication.
2) Control System Engineering, U. A. Patel, Mahajan Publication House.
3) Modern Control Engineering, K. Ogata, 4th Edition, Prentice Hall of India

COURSE OUTCOMES

At the end of the course, students should be able to

CO1. Compute the range of system gain to ensure the stability of the control system.
CO2. Derive mathematical model of various physical systems for analysis.
CO3. Analyzethe system using Bode plot for the estimation of the relative stability of the system in terms of the gain margin and phase margin.
CO4. Determine transient and steady state response of the system.
CO5. Evaluate the closed loop stability of the control systems using Nyquist and polar plot.
CO6. Illustrate the impact of the system gain on the pole locations of control system and understand the effect of feedback on the system.

COURSE MATRIX

Course Outcome (CO's)	**Program Outcomes (PO's)**											
	Domain Specific (PSO)					**Domain Independent (PO)**						
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	2	-	-	1	-	2	-	-	3	1	1
CO2	3	2	-	-	-	-	2	-	-	2	1	1
CO3	1	3	-	3		-	3	-	-	-	-	-
CO4	3	2	1		1	-	2	-	-	1	1	1
CO5	1	3		1	-	-		1	-	-	-	-
CO6	2	2	3	2	-	-	1	-	-	-	-	-
1: Slight (Low) , 2: Moderate (Medium), 3: Substantial (High)												

B. TECH. SEMESTER – IV (EC)
SUBJECT: ( ) CONTROL THEORY (w. e. f. 2023-24)

Teaching Scheme (Hours/Week)				Credits	Examination Scheme				
Lect	Tut	Prac	Total		Ext	Sess.	TW	Prac	Total
3	1	0	4	4	60	40	-	-	100

COURSE OBJECTIVES

The objective of this course is to introduce basics of control theory and establish the fundamentals of devices in control applications as required by electronics engineering students. To introduce different types of systems and model a complicated system into a more simplified form to interpret different physical and mechanical systems in terms equivalent electrical models for analysis. To employ time domain analysis to predict and analyze transient performance parameters of the system for various standard input test functions. Demonstrate system stability concept and learn methods for examining system stability in both time and frequency domains including determining the system stability margins.

DETAILED SYLLABUS

[1] INTRODUCTION
Openloop and closed loop control system, Servomechanism, Historical development of control system, sampled data & digital control system, Multivariable control system, Application in nonengineering field.

[2] MATHEMATICAL MODELS OF PHYSICAL SYSTEMS
Introduction, Differential equation of physical systems, Transfer functions, Block diagram algebra, signal flow graph. (Note: Problems on electrical, mechanical & electromechanical systems only.)

[3] FEEDBACK CHARACTERISTICS OF CONTROL SYSTEMS
Feedback and non feedback systems, reduction of parameter variations by use of feedback, control over system dynamics by use of feedback, effects of disturbance signals by use of feedback, lineraizing effect of feedback, regenerative feedback, Basics of Feed forward Control System with example.

[4] TIME RESPONSE ANALYSIS AND CONCEPTS OF STABILITY
Introduction, standard test signals, time response of first order system, time response of second order system, steady state errors and error constants, effects of adding zero to a system, design specifications and constructions for second and higher order systems, performance indices, examples, concepts and conditions for stability, Huwitz's and Routh's stability criteria, relative stability criteria.

[5] THE ROOT LOCUS TECHNIQUE
Introduction, Rules of construction of root loci, sketching of root locus and applications

[6] FREQUENCY DOMAIN ANALYSIS & STABILITY
Freq. domain specifications, correlation bet time & frequency domain specifications, Bode plot, Polar plot, Nichols chart, Nyquist stability criterion, Constant M& N circles

TEXT / REFERENCE BOOKS

4) Feedback Control Systems, D. K. Theckedath , R. A. Barapate, Tech-Max Publication.
5) Control System Engineering, U. A. Patel, Mahajan Publication House.
6) Modern Control Engineering, K. Ogata, 4th Edition, Prentice Hall of India

COURSE OUTCOMES

At the end of the course, students should be able to

CO1. Compute the range of system gain to ensure the stability of the control system.
CO2. Derive mathematical model of various physical systems for analysis.
CO3. Analyzethe system using Bode plot for the estimation of the relative stability of the system in terms of the gain margin and phase margin.
CO4. Determine transient and steady state response of the system.
CO5. Evaluate the closed loop stability of the control systems using Nyquist and polar plot.
CO6. Illustrate the impact of the system gain on the pole locations of control system and understand the effect of feedback on the system.

COURSE MATRIX

Course Outcome (CO's)	**Program Outcomes (PO's)**											
	Domain Specific (PSO)					**Domain Independent (PO)**						
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	2	-	-	1	-	2	-	-	3	1	1
CO2	3	2	-	-	-	-	2	-	-	2	1	1
CO3	1	3	-	3		-	3	-	-	-	-	-
CO4	3	2	1		1	-	2	-	-	1	1	1
CO5	1	3		1	-	-		1	-	-	-	-
CO6	2	2	3	2	-	-	1	-	-	-	-	-
1: Slight (Low) , 2: Moderate (Medium), 3: Substantial (High)												

B. TECH. SEMESTER – IV (EC)

SUBJECT: (CI413) ELECTRICAL MACHINES & POWER (w. e. f. 2022-23)

Teaching Scheme (Hours/Week)				Credits	Examination Scheme				
Lect	Tut	Prac	Total		Ext	Sess.	TW	Prac	Total
3	0	2	5	4	60	40	25	25	150

COURSE OBJECTIVES

This course provides fundamental concepts associated with working and analysis of electrical machines. This also includes concepts to analyze the mechanism of electrical power generation, transmission and distribution. This course teaches on how to identify and troubleshoot electrical faults in switchgear. The objective of this course is to exposé the students to the concepts of various types of electrical machines and their applications. Besides to introduce them with the fundamental of generation, transmission and distribution of the electrical power and power system protection.

DETAILED SYLLABUS

[1] DC MACHINES

DC Generator & DC Motor

Operating Principle and Types of DC generator &motor, Losses in DC Generator, Power Stages in DC Generator, Maximum Efficiency and Power in DC Generator, Generator Characteristics, Speed control of DC motor

[2] AC MACHINES

Single Phase Transformer

Working Principle, Construction, Characteristics of an Ideal Transformer, EMF Equation, Transformer Load Analysis, Transformer Parameters, Equivalent Circuit, Open Circuit & Short Circuit Tests, Efficiency, Regulation, All day efficiency, Parallel Operation of transformer.

Three Phase Induction Motors

Working Principle, Construction, Relation between Torque & Rotor Power Factor, Starting Torque and Running Torque of Motor, Effect of Change in Supply Voltage on Starting Torque, Torque Slip Characteristics, Induction Motor as a Generator, Power Stages, Starting Methods of Induction Motor, Speed Control of Induction Motors

Single Phase Motors

Introduction and Broad Classifications, Self-Starting Mechanism, AC Series Motor and Universal Motors.

Alternators

Working Principle, Construction, Factors Affecting Alternator Size, Alternator on Load, Synchronous Reactance, Vector Diagrams, Voltage Regulation by EMF Method, Parallel Operation of Alternators.

[3] ELECTRICAL POWER GENERATION

Schematic Arrangement of Various Power Plants - Thermal, Hydro, Nuclear, Diesel and Gas Turbine Based Power Plant, Structure of Electric Power System, Load Curves, Important Terms and Factors, Load Duration Curves, Types of Loads, Wind energy: types, power in the wind, types of wind turbine generators, Solar Energy: types of solar cell, A generic photovoltaic cell, from cells to modules to array, physics of shading, Introduction to major types of PV system, Maximum Power point tracker, Concentrating Solar Power (CSP) Technologies, Introduction to smart grid

[4] POWER FACTOR IMPROVEMENT

Power Triangle, Disadvantages and Causes of Low Power Factor, KVAR Calculations, Importance of Power Factor Improvement, Most Economical Power Factor.

[5] TRANSMISSION LINE & UNDER GROUND CABLES

Classification of Transmission Line & Under Ground Cables, Main Components, Conductor Materials, Types of Insulators, String Efficiency and Its Improvement, Construction of underground Cables

[6] INTRODUCTION TO SWITCH GEAR

Essential Features of Switchgear, Switchgear Equipment - Circuit Breaker, Fuses, Relay, Principle and Methods of *arc* Quenching in Circuit Breaker, Desirable Characteristics of Fuse Element, Fuse Element Materials, Theory of Protective Relays, Fundamental Requirements of Protective Relay, Calculation of Relay Operating Time, The Bus Bar Arrangement, Faults in Power System.

TEXT / REFERENCE BOOKS

1) Electrical Technology (Vol: II), B. L. Theraja& A. K. Theraja, 23rd Edition, S. Chand & Company Ltd.
2) Principles of Power System, V. K. Mehta &Rohit Mehta, 4th Edition, S. Chand & Company Ltd.
3) Theory and Performance of Electrical Machine, V.B. Gupta, 13th Edition, Laxmi Publications
4) Electrical Engineering, R.K. Rajput, 1st Edition, Laxmi Publications
5) Course in Power System, J. B. Gupta, 10th Edition, S. K. Kataria& Sons.
6) Switchgear and Protection, J. B. Gupta, 2nd Edition, S. K. Kataria& Sons.

COURSE OUTCOMES

At the end of the course,students should be able to

CO1. Evaluate important parameters such as efficiency and regulation of transformer.
CO2. Analyze the operation of induction motor and determine important parameters.
CO3. Analyze the operation of generator and determine its voltage, current, power.
CO4. Analyze the operation of various power stations and find out load curves parameter.
CO5. Understand the importance of power factor improvement in power system and compute the transmission line parameter.
CO6. Apply the knowledge of various protective devices against electrical faults.

COURSE MATRIX

Course Outcome (CO's)	Program Outcomes (PO's)											
	Domain Specific (PSO)					Domain Independent (PO)						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1						1	2		
CO2	3	2			1				2	1		
CO3	3	2							1	1		
CO4	3	2								1		
CO5	3	2	2				2					
CO6	3	2	2			1	1	1				1
1: Slight (Low) , 2: Moderate (Medium), 3: Substantial (High)												

B. TECH. SEMESTER – IV (EC)

SUBJECT: (EC409) CMOS VLSI DESIGN (w. e. f. 2022-23)

Teaching Scheme (Hours/Week)				Credits	Examination Scheme				
Lect	Tut	Prac	Total		Ext	Sess.	TW	Prac	Total
3	1	2	6	5	60	40	25	25	150

COURSE OBJECTIVES

Very large scale integration (VLSI) is the process of creating an integrated circuit (IC) by combining millions of transistors together in a small silicon chip. In this subject, students learn to design, analyze and optimize the digital logic circuitry it in terms of PDA (Power, Delay and Area) and understand the architectural choices and performance trade-offs involved in designing and realizing the CMOS circuits. This course teaches the importance of testability and basic techniques for test vector generation. This course provides an overview of chip design techniques using programmable devices. This course offers a profound understanding of the design, simulations and functional verification of complex digital VLSI circuits (using EDA tools like ALTERA/XILINX).

DETAILED SYLLABUS

[1] LOGIC DESIGN WITH MOSFETS

Complexity and Design, Basic Concepts, Types of IC, VLSI Design Flow, MOSFET as a Switching Element, Basic and Complex Logic Gates in CMOS, Transmission Gate Circuits, Clocking and Dataflow Control.

[2] FABRICATION OF CMOS INTEGRATED CIRCUITS

Physical Structure of CMOS Integrated Circuits, CMOS Patterning – Silicon Layout and Stick Diagrams, Fabrication of CMOS Integrated Circuits – Process Flow and Design Rules, Layout of Basic Structures, FET Sizing.

[3] ELECTRICAL CHARACTERISTICS OF CMOS LOGIC

MOS Physics,FET RC Model, DC and Transient Characteristics of CMOS Gates, Power Dissipation, Analysis of Complex Logic Gates.

[4] DESIGNING HIGH SPEED CMOS LOGIC NETWORKS

Driving Large Capacitive Loads, Delays Estimate for Logic Cascade, Delay Optimization Using Logical Effort, Branching Effort, Advanced Techniques in CMOS Logic Circuits.

[5] ADVANCED CMOS CIRCUITS

BiCMOS Drivers, Mirror Circuits, Pseudo-nMOS, Tri-state Circuits, Clocked CMOS, Dynamic CMOS Logic Circuits, Domino Logic Cell Dual-Rail Logic Networks. (DCVSL, CPL)

[6] THE DESIGN OF VLSI SYSTEM

Memories and Programmable Logic, Interconnect Delay Modelling, Crosstalk, Interconnect Scaling, Floor Planning and Routing, Input and Output Circuits, Power Distribution and Consumption, Low Power Design Considerations, VLSI Clocking and System Design, Reliability and Testing of VLSI Circuits.

[7] INTRODUCTION TO HDL

Introduction to Verilog & System Verilog, Basic Building Blocks &Datatypes, Randomization.

TEXT / REFERENCE BOOKS

1) Introduction to VLSI Circuits& Systems, John P. Uyemura, John Wiley & Sons Inc.
2) CMOS logic Circuit Design, John P. Uyemura, Springer Private limited
3) Digital Integrated Circuits - A Design Perspective, J.M. Rambaey, A. Chandrakassan& B. Nikolic, 2nd Edition, Prentice Hall of India.
4) Principles of CMOS VLSI Design - A System Perspective, N. H. E. Weste& K. Eshraghian, 2nd Edition, Prentice Hall of India.
5) Modern VLSI design - System On Chip Design, W. Wolf, 3rd Edition, Pearson Asia
6) Introduction to System Verilog, Ashok D Mehta, Springer.
7) Introduction to Verilog HDL, Samir Palnitkar, PHI

COURSE OUTCOMES

At the end of the course,students should be able to

CO1. Identify conduction state of given MOSFET and derive RC model by recognizing physical properties of MOSFET.
CO2. Prepare schematic and Si layout of CMOS digital logic circuitry and compare their physical design parameters with the reference Inverter design.
CO3. Describe pros & cons of various IC fabrications processes and also appraise requirements of various design rules. Assess switching performance & reliability of CMOS Digital Logic circuits.
CO4. Apply logical effort theory for improving the Speed of CMOS logic cascade and understand advanced techniques for logic implementation using FET & BJTs.
CO5. Designing of high density structure like memory array to enhance its performance. Understand system-level physical design of VLSI chip.
CO6. Test the CMOS based circuits using various testing methods to identify physical defects in a given chip.

COURSE MATRIX

Course Outcome (CO's)	**Program Outcomes (PO's)**											
	Domain Specific (PSO)					**Domain Independent (PO)**						
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	1	3	1	3	1	1	1	1	1		2
CO2	3	2	1	1	3	1	1	1	1	2		1
CO3	3		2		2	3	2	1	1	2		1
CO4	2	1	3	3		1	2	1	1	2		2
CO5	2	2	3	2	1	2	2	1	2	2		2
CO6	3	1	2	2		3	2	1	2	2		2
1: Slight (Low) , 2: Moderate (Medium), 3: Substantial (High)												

B. TECH. SEMESTER – IV (EC)

SUBJECT: (HS404) UNIVERSAL HUMAN VALUES (w. e. f. 2022-23)

Teaching Scheme (Hours/Week)				Credits	Examination Scheme				
Lect	Tut	Prac	Total		Ext	Sess.	TW	Prac	Total
2	1	0	3	3	40	0	0	0	40

COURSE OBJECTIVES

This course is intended to provide a much needed orientation input in value education to the young enquiring minds. It presents a universal approach to value education by developing the right understanding of reality (i.e. a worldview of the reality "as it is") through the process of self-exploration. The whole course is presented in the form of a dialogue whereby a set of proposals about various aspects of the reality are presented and the students are encouraged to self-explore the proposals by verifying them on the basis of their natural acceptance within oneself and validate experientially in living. The prime focus throughout the course is toward affecting a qualitative transformation in the life of the student rather than just a transfer of information. While introducing the holistic worldview and its implications, a critical appraisal of the prevailing notions is also made to enable the students discern the difference on their own right.

DETAILED SYLLABUS

[1] INTRODUCTION TO VALUE EDUCATION

Understanding Value Education, Self-exploration as the Process for Value Education, Continuous Happiness and Prosperity – the Basic Human Aspirations, Right Understanding, Relationship and Physical Facility, Happiness and Prosperity – Current Scenario, Method to Fulfill the Basic Human Aspirations

[2] HARMONY IN THE HUMAN BEING

Understanding Human being as the Co-existence of the Self and the Body, Distinguishing between the Needs of the Self and the Body, The Body as an Instrument of the Self, Understanding Harmony in the Self, Harmony of the Self with the Body, Programme to ensure self-regulation and Health

[3] HARMONY IN THE FAMILY AND SOCIETY

Harmony in the Family – the Basic Unit of Human Interaction, Values in Human-to-Human Relationship, 'Trust' – the Foundational Value in Relationship, 'Respect' – as the Right Evaluation, Understanding Harmony in the Society, Vision for the Universal Human Order

[4] HARMONY IN THE NATURE/EXISTENCE

Understanding Harmony in the Nature, Interconnectedness, self-regulation and Mutual Fulfilment among the Four Orders of Nature, Realizing Existence as Co-existence at All Levels, The Holistic Perception of Harmony in Existence

[5] IMPLICATIONS OF THE HOLISTIC UNDERSTANDING – A LOOK AT PROFESSIONAL ETHICS

Natural Acceptance of Human Values, Definitiveness of (Ethical) Human Conduct, A Basis for Humanistic Education, Humanistic Constitution and Universal Human Order, Competence in Professional Ethics, Holistic Technologies, Production Systems and Management Models-Typical Case Studies, Strategies for Transition towards Value-based Life and Profession

TEXT / REFERENCE BOOKS

1) Dr. Rajneesh Arora ,Dr.Shishir Gaur , Dr.Ruchir Gupta , Student Induction ProgramHandbook v2AICTE NCC-IP sub-committee. (e-version)

2) Dr. Rajneesh Arora , Dr.Shishir Gaur, Sh. BP Singh, Sh. Rajul Asthana and Sh. JitenderNarula, Universal Human Values-I (UHV-I) Mentors' Manual, Version 2.1, AICTENCC-IP sub-committee. (e-version), July 2020

3) UHV Handouts 1 to 5, AICTE NCC-IP sub-committee. (e-version).https://drive.google.com/drive/folders/1eZ6R-VrAFvHwlQ91iDaPkLhk9CPjCH_o?usp=sharing

4) RR Gaur, R Asthana and GP Bagaria, Class Notes on UNIVERSAL HUMAN VALUESAND ETHICS, Part 1 to Part 4, AICTE NCC-IP sub-committee. (e-version).

COURSE OUTCOMES

At the end of the course,students should be able to

CO1. Become familiar with the ethos and culture of the institution
CO2. Set a healthy daily routine, create bonding in batch as well as between faculty members and students
CO3. Get an exposure to a holistic vision of life, develop awareness, sensitivity and understanding of the Self---family---Society---Nation---International---Entire Nature
CO4. Facilitate them in creating new bonds with peers and seniors who accompany them through their college life and beyond
CO5. Overcome weaknesses in some essential professional skills
CO6. Practice professional ethics and holistic strategies for Transition towards Value-based Life and Profession

COURSE MATRIX

Course Outcome (CO's)	**Program Outcomes (PO's)**											
	Domain Specific (PSO)					**Domain Independent (PO)**						
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3		3		3	1					3	
CO2	3	2		3		1			1	2		
CO3	3	3	2		2					2		
CO4	2		3			1					3	
CO5	3		2	3				3			2	
CO6	3		2			1						
1: Slight (Low) , 2: Moderate (Medium), 3: Substantial (High)												

B. TECH. SEMESTER – V (EC)

SUBJECT: ( ) MICROCONTROLLER APPLICATIONS (w. e. f. 2023-24)

Teaching Scheme (Hours/Week)				Credits	Examination Scheme				
Lect	Tut	Prac	Total		Ext	Sess.	TW	Prac	Total
4	0	2	6	5	60	40	25	25	150

COURSE OBJECTIVES

The objective of this course is to provide details of the 8051 microcontroller architecture, interfacing techniques and to be able to develop simple real-world microcontroller's applications with the help of accessing peripherals using lower level language and optimization to meet the system requirements.

DETAILED SYLLABUS

NO TOPIC

[1] MICROPROCESSORSAND MICROCONTROLLERS
Introduction, Microprocessors and Microcontrollers, The Z80 and the 8085, A Microcontroller survey, Development systems for Microcontrollers.

[2] THE 8051 ARCHITECTURE
Introduction, 8051 Microcontroller Hardware, Input/output pins, ports and circuits, External memory, Counter and timers, Serial data input/output, Interrupts.

[3] MOVING DATA
Introduction, Addressing Modes, External data moves, Code memory read only data moves, Push and Pop, Data exchanges.

[4] LOGICAL OPERATIONS
Introduction, Byte-level logical operations, Bit-level logical operations, Rotate and Swap operations.

[5] ARITHMETIC OPERATIONS
Introduction, Flags, Incrementing and Decrementing, Addition, Subtraction, Multiplication and Division, Decimal arithmetic.

[6] JUMP AND CALL INSTRUCTIONS
Introduction, The jump and call program range, Jump types, Call and Subroutines, Interrupts and Returns, Enabling, Disabling & Priority in interrupts.

[7] AN 8051 MICROCONTROLLER DESIGN
Introduction, A Microcontroller specification, A Microcontroller Design, Testing the design, Subroutines, Lookup tables for the 8051, Serial data transmission.

[8] APPLICATIONS
Introduction, Keyboards, Displays, Pulse Measurement, D/A and A/D conversions, Case Study.

[9] SERIAL DATA COMMUNICATION
Serial I/O Modes of Operation, serial data input output programming.

[10] 8006/97 OVERVIEW
8096/97 (16-bit Microcontroller) Architecture overview and additional features.

RECOMMENDED TEXT / REFERENCE BOOKS

1) The 8051 Microcontroller based Embedded Systems, Manish K. Patel, McGraw Hill Education.
2) The 8051 Microcontroller Architecture, Programming & Applications, Kenneth J Ayala,2nd Edition, Penram International Publication.
3) The 8051 Microcontroller & Embedded Systems, Muhammad A. Mazidi& Janice G. Mazidi, 2nd Edition, Pearson Education

COURSE OUTCOMES

At the end of the course, students should be able to

CO1. Analyse assembly language instruction behaviour and execution with reference to the architecture of the 8051 microcontroller, peripheral support and the timing divisions
CO2. Develop assembly language programs to implement common algorithms and attempt optimization of the code
CO3. Utilize serial section of the 8051 to establish the communication between 8051 microcontroller external systems and also demonstrate multitasking environment using interrupt programming.
CO4. Determine requirement of hardware components and design memory subsystem as per given specifications.
CO5. Design applications related to real life needs using support of I/O ports and timers particularly in case of timing constraints
CO6. Design and implement the simple applications involving input devices like switches, keyboards, sensors, ADC and output devices like LED, 7-segment display, LCD, DAC

COURSE MATRIX

Course Outcome (CO's)	**Program Outcomes (PO's)**											
	Domain Specific (PSO)					**Domain Independent (PO)**						
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	3	3	2	1			1	1	1		1
CO2	3	3	3	3	1		1	1	1	1		
CO3	3	3	3	3	2			1	1	1		1
CO4	3	3	2	3			1					
CO5	3	2	3	2	2			1	1	1		1
CO6	3	3	2	3	3			1	1	1		
1: Slight (Low) , 2: Moderate (Medium), 3: Substantial (High)												

B. TECH. SEMESTER – V (EC)

SUBJECT: ( ) ELECTRONIC COMMUNICATION (w. e. f. 2023-24)

Teaching Scheme (Hours/Week)				Credits	Examination Scheme				
Lect	Tut	Prac	Total		Ext	Sess.	TW	Prac	Total
3	0	2	5	4	60	40	25	25	150

COURSE OBJECTIVES

Electronic communication is inevitable part of our day to day life. The objective of this course is tomake aware the students about fundamental concepts of communication technologies and itsapplications. To fulfill the objective, course covers detailed concepts of the circuits used for basiccommunications. It also covers various types of noise affecting to electronic communication.Further, it emphasis on the techniques of transmitting and receiving information signals usinganalog modulation techniques (AM, FM, PM). This course also includes in-depth understanding ofdifferent applications of Analog Communication systems such as Satellite Communication.

DETAILED SYLLABUS

NO TOPIC

[1] RESONANT CIRCUITS

Series and Parallel Equivalence, Series RLC Circuit, Parallel Tuned Circuit, Skin Effect, Mutual Inductance, Coupling Circuits.

[2] NOISE

Introduction, Thermal Noise, Shot Noise, Partition Noise, Low- Frequency or Flicker Noise, High frequency or Transmit Time Noise, Equivalent Noise Resistance, Signal to Noise Ratio, Noise Factor, Noise Temperature.

[3] RF AMPLIFIER

Tuned RF Amplifiers, Neutralization, Special RF Amplifiers, Frequency Conversion and Mixers.

[4] RECEIVERS

Introduction, Super heterodyne Receivers, Choice of Intermediate and Oscillator Frequencies, Image Rejection, Adjacent Channel Selectivity, Spurious Responses, Tracking Automatic Gain Control, Double Conversion Receivers, HF Communications Receivers.

[5] AMPLITUDE MODULATION

Introduction, Amplitude Modulation, Amplitude Modulated Transmitters, AM Receivers

[6] SINGLE SIDEBAND MODULATION

Introduction, Single Sideband Principles, The Balanced Modulator SSB Generation, SSB Reception, Modified SSB Systems.

[7] ANGLE MODULATION

Introduction, Frequency Modulation, Phase Modulation, Equivalence between FM and PM, Angle Modulator Circuits, Angle Modulation Detectors.

[8] SATELLITE COMMUNICATION

Introduction, Orbits, Antenna Look Angles, Elevation, azimuth angle and range calculations, Saturation Flux Density, Effective Isotropic Radiated Power, Uplink and down link power budget calculations.

RECOMMENDED TEXT / REFERENCE BOOKS

1) Electronic Communication, Dennis Roddy & John Coolen, 3rd Edition, Prentice Hall of India.

2) Electronic Communications, George Kennedy, 4th Edition, Tata McGraw Hill

COURSE OUTCOMES

At the end of the course, students should be able to

CO1. Analyse Amplitude modulated signal in terms of frequency spectrum, average power, effective voltage and current as well as amplitude modulator, demodulator circuit and receiver.

CO2. Analyse LC tank circuit as well as RF amplifier in terms of resonant frequency, dynamic impedance and -3 dB bandwidth

CO3. Do detailed analysis of AM receiver, SSB transmission and reception

CO4. Determine the overall noise factor and noise temperature of the systems connected in tandem and choose the one which offers minimum noise factor.

CO5. Analyse Angle Modulation, demodulation and transmission.

CO6. Analyse signal transmission and reception in satellite communication system.

COURSE MATRIX

Course Outcome (CO's)	**Program Outcomes (PO's)**											
	Domain Specific (PSO)					**Domain Independent (PO)**						
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	3	1	2	2	2			1	2		1
CO2	3	3		2	2	2						
CO3	3	3	2	2		3			1	2		1
CO4	3	3			2	1	3					1
CO5	3	2	1	3		2						1
CO6	3	3	1	1		2						
1: Slight (Low) , 2: Moderate (Medium), 3: Substantial (High)												

B. TECH. SEMESTER – V (EC)

SUBJECT: ( ) ELECTROMAGNETIC FIELDS (w. e. f. 2023-24)

Teaching Scheme (Hours/Week)				Credits	Examination Scheme				
Lect	Tut	Prac	Total		Ext	Sess.	TW	Prac	Total
3	1	0	4	4	60	40	50	-	150

COURSE OBJECTIVES

The objective of this subject is to provide a platform for students to combine their knowledge in mathematics and relates in an electromagnetic engineering.This subject built a strong foundation of the static as well as time varying electromagnetic fields, to help the students identify, formulate and solve the problems related to electromagnetic fields and wave propagation. The concept of this subject is useful to the students for understanding the electromagnetic radiation in wireless communication.

DETAILED SYLLABUS

NO TOPIC

[1] VECTOR ANALYSIS& COORDINATE SYSTEMS
Scalars and Vectors, Vector Algebra, The Cartesian coordinate system, Vector Components and Unit Vectors, The Vector Field, The Dot Product, The Cross Product, Other Coordinate Systems; Circular Cylindrical Coordinates, The Spherical Coordinate System.

[2] COULOMB'S LAW AND ELECTRIC FIELD INTENSITY
The Experimental Law of Coulomb, Electric Field Intensity, Field Due to a Continuous Volume Charge Distribution, Field of a Sheet of Charge.

[3] ELECTRIC FLUX DENSITY, GAUSS'S LAW, AND DIVERGENCE
Electric Flux Density, Gauss's Law, Application of Gauss's Law Some Symmetrical Charge, Distributions, Application of Gauss's Law, Differential Volume Element, Divergence, Maxwell's First Equation (Electrostatics)and Divergence Theorem.

[4] CONDUCTORS, DIELECTRICS AND CAPACITANCE
Current and Current Density, Continuity of Current, Metallic Conductors, Conductor Properties and Boundary Conditions, Boundary Conditions for Perfect Dielectric Materials and Magnetic Boundary Conditions.

[5] THE STEADY MAGNETIC FIELD
Biot-Savart Law, Ampere's Circuital Law, Curl, Stokes' Theorem, Magnetic Flux and Magnetic Flux Density, The Scalar and Vector Magnetic potential.

[6] TIME-VARYING FIELDS AND MAXWELL'S EQUATIONS
Faraday's Law, Displacement Current, Maxwell's Equations in Point Form, Maxwell's Equations in Integral Form, The Retarded Potentials.

[7] THE UNIFORM PLANE WAVE
Wave Motion in Free Space, Wave Motion in Perfect Dielectrics, Plane Waves in Lossy Dielectrics, The Poynting Vector and Power Considerations, Propagation in Good Conductors: Skin Effect, Reflection of Uniform Plane Waves, Standing-Wave Ratio.

[8] **TRANSMISSION LINES**

Equations of Voltage and Current on TX line, Propagationconstant and characteristic impedance, Basic Principles, Reflection co-efficient, Transmission co-efficient,VSWR and Equation of the impedance on the transmission line.

RECOMMENDED TEXT / REFERENCE BOOKS

1) Engineering Electromagnetics, William H. Hayt, 7th Edition, Tata McGraw Hill
2) Electronic Communication Systems, George Kenedy, 3rd Edition, Tata McGraw Hill
3) Theory and Problems in Electromagnetics, Joseph Edminister, Tata McGraw Hill
4) Principles of Electromagnetics, Mathew N.O. Sadiku, 3rd Edition, Oxford University Press
5) Electromagnetics, John D. Kraus, 3rd Edition, Tata McGraw Hill
6) Elements of Electromagnetics, Mathew N.O. Sadiku, 4thEdition, Oxford University Press
7) Electromagnetic Waves,R.K. Shevgaonkar, Tata McGraw Hill India, 2005

COURSE OUTCOMES

At the end of the course, students should be able to

CO1. Compute vector functions, operators and use different methods of solving line, surface and volume integrals.
CO2. Use different coordinate systems, Coulomb's Law and Gauss Law for the evaluation of electric fields produced by different charge configurations.
CO3. Evaluate the static and time varying electromagnetic fields that satisfy the boundary conditions based on Maxwell's equation in wireless communication.
CO4. Compute magnetic vector potential and evaluate radiation in free space.
CO5. Initiate the design of a range of field theory applications such as transmission line, antennas, wave propagation so on.
CO6. Understand characteristics and wave propagation on high frequency transmission lines

COURSE MATRIX

Course Outcome (CO's)	**Program Outcomes (PO's)**											
	Domain Specific (PSO)					**Domain Independent (PO)**						
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	3	1	1	3							
CO2	3	3	1	1	1							
CO3	3	3	3	1	1					2		
CO4	3	3	2	1	1	3	3	3			2	
CO5	3	3	3	3	3	1	2	2				2
CO6	3	3	3	3	3	1						
1: Slight (Low) , 2: Moderate (Medium), 3: Substantial (High)												

B. TECH. SEMESTER – V (EC)

SUBJECT: ( ) POWER ELECTRONICS (w. e. f. 2023-24)

Teaching Scheme (Hours/Week)				Credits	Examination Scheme				
Lect	Tut	Prac	Total		Ext	Sess.	TW	Prac	Total
4	0	2	6	5	60	40	25	25	150

COURSE OBJECTIVES

This course involves understanding of the power electronics circuits which can enable students to interpret, analyse, design, and apply power electronics based circuits. The subject understanding is useful to the students for different power applications by offering deep insight into characteristics and functioning of various power semiconductor devices. This course aims to prepare students for analysis and designing power converter circuits for different power applications by offering deep insight into characteristics and functioning of various power semiconductor devices.

DETAILED SYLLABUS

NO TOPIC

[1] INTRODUCTION TO POWER ELECTRONICS

Overview of Power Electronics, Power Semiconductor Devices, Control Characteristics of Power Devices, Characteristic & Specifications of Switches, Types of Power Circuits, Reverse Recovery Characteristics, Types of Power Diodes, Freewheeling Diodes, Structure and Volt-Current Characteristics of Power MOSFETS, COOLMOS, SITs, Structure and Volt-Current Characteristics of IGBTs, SiC – MOSFET, SiC – IGBT.

[2] THYRISTORS

Thyristor Characteristics, Two Transistor Model of Thyristor, Thyristor Turn-on, Thyristor Turn-off, Types of Thyristors, Series & Parallel Connection of Thyristors, di/dt& dv/dt Protection, Gate Drive Circuits.

[3] UNCONTROLLED AND CONTROLLED RECTIFIERS

Multiphase Star Rectifiers, Three-Phase Bridge Rectifiers, Three-Phase Bridge Rectifier With RL Load, 3-Phase Rectifier Design, Principal of Phase Controlled Converter, Single Phase Semi Converter, Single Phase Full Converter, Three Phase Half Wave Converters, Three Phase Semi Converter, Three Phase Full Converter. (Without Analysis for RL Load), Power Factor Improvement, Pulse Width Modulation using IGBT, Single Phase Sinusoidal PWM using IGBT, Three Phase PWM Control using IGBT.

[4] INVERTERS

Principal of Operation of Pulse Width Modulated Inverters, Performance Parameters, Single-Phase Bridge Inverters, Voltage Control of Single-Phase Inverters, Current Source Inverter, Multilevel Concept, Applications & Features of Multilevel Inverter.

[5] DC-DC CONVERTERS

Principal of Step Down Converter, Principal of Step Up Converter, Performance Parameters, Converter Classification, Switch Mode Buck, Boost, Buck-Boost &Cuk.

[6] AC CONTROLLERS

Principal of On-Off Control, Principal of Phase Control, Cycloconverters, PWM Controlled AC Voltage Controllers.

[7] PROTECTION OF DEVICES & CIRCUITS

Cooling and Heat Sinks, Snubber Circuits, Reverse Recovery Transients, Supply & Load Side Transients, Current & Voltage Protection, Magnetic Interference, Protection of IGBT.

[8] POWER SUPPLIES

Switched-Mode Power Supplies, UPS, CVT.

RECOMMENDED TEXT / REFERENCE BOOKS

1) Power Electronics circuits, Devices and Applications, Muhammad H. Rashid, 3rd Edition, Pearson Education and PHI.
2) Power Electronics, M. D. Singh and K. B. Khanchandani, 2nd Edition, TheMcGrow Hill.
3) Power Electronics, Dr.P.S.Bhimbhara, 4th Edition, Khanna Publication.
4) Power Electronics, B. R. Gupta & V. Singhal, 2nd Edition, S. K. Kataria& Sons

COURSE OUTCOMES

At the end of the course, students should be able to

CO1. Illustrate the construction, operation, working, and characteristics of various power semiconductor devices like MOSFET and IGBT.
CO2. Evaluate performance of single phase and three phase controlled rectifier circuits, three phase uncontrolled rectifier circuits.
CO3. Analyse the performance of PWM inverters, analyse and design various protection circuits.
CO4. Understand fundamentals and applications of SCR, DIAC, and TRIAC, and design triggering circuits
CO5. Design thyristor series and parallel network, design of gate triggering circuit, Evaluate AC voltage controller circuits
CO6. Evaluate DC - DC regulators and chopper circuits and develop power electronics applications.

COURSE MATRIX

Course Outcome (CO's)	**Program Outcomes (PO's)**											
	Domain Specific (PSO)					**Domain Independent (PO)**						
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	2	3			1	1	1		1		1
CO2	3	2	2			1	1	1		1		1
CO3	3	2	2			1	1	1		1		1
CO4	3	3	3			1	1	1		1		1
CO5	3	3	3			1	1	1		1		1
CO6	3	3	2			1	1	1		1		1
1: Slight (Low) , 2: Moderate (Medium), 3: Substantial (High)												

B. TECH. SEMESTER – V (EC)

SUBJECT: ( ) AUDIO VIDEO ENGINEERING (w. e. f. 2023-24)

Teaching Scheme (Hours/Week)				Credits	Examination Scheme				
Lect	Tut	Prac	Total		Ext	Sess.	TW	Prac	Total
1	1	2	4	3	-	-	50	-	50

OBJECTIVES

Audio video engineer plays major roles in setting up, configuring, troubleshooting & maintaining system in organization. The state of art in audio video system will enable the student to comprehend concept, working principle and its application used in various type of modern electronic multi-media system. Moreover, students will study & compare various type of microphones, loudspeakers and the need of audio & video compression techniques in real life. The knowledge acquired by students will help them to become familiar with modern multimedia system and troubleshooting of audio video system.

DETAILED SYLLABUS

NO TOPIC

[1] TELEVISION FUNDAMENTALS
Elements of TV communication system, Scanning, Synchronization, Aspect ratio, Pixels, Resolution, Bandwidth, Composite video signal, Modulation of video and audio signals, Monochrome and colour cameras, Compatibility, Luminance and Chrominance signal.

[2] SECAM, NTSC & PAL FUNDAMENTALS
TV standards, Basic principle of QAM (Quadrature Amplitude Modulation)

[3] LIQUID CRYSTAL AND PLASMA SCREEN TELEVISION
LCD television screen technology, Plasma television screens, Introduction to LED TV, RGB dynamic LEDs, Edge -LEDs, Differences between LED -backlit and Backlit LCD displays, Comparison of LD TV, Plasma TV and LED TV.

[4] ELECTRO ACOUSTIC TRANSDUCERS
Microphones-carbon, condenser, moving coil, crystal, ribbon and lavaliere microphones, their construction and basic working principles, frequency response, impedance, sensitivity and directional patterns, typical applications of different types of microphones. Idea of other commercial microphones. Loudspeakers-direct radiating and horn loader type their construction, working principles characteristics and applications. Baffles and Enclosures. Introduction to tweeters and woofers and crossover networks.

[5] DIGITAL TELEVSION TRANSMISSION AND RECEPTION
Digital satellite television, Direct-To-Home (DTH) satellite television, Digital TV receiver, Merits of digital TV receivers.

COURSE OUTCOMES

At the end of the course, students should be able to

CO1. Study of television fundaments and TV standards.
CO2. Explore advanced Digital colour Television systems (LCD, LED, Plasma, OLED, DTH

System)

CO3. Describe & compare different type of microphone and loudspeaker with their operating principle, characteristic and application.

TEXT / REFERENCE BOOKS

1) Modern Television Practice, R. R. Gulati, New age international publisher
2) Audio and Video Systems, R. G. Gupta, Technical education series.

COURSE MATRIX

Course Outcome (CO's)	**Program Outcomes (PO's)**											
	Domain Specific (PSO)					**Domain Independent (PO)**						
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3				3					1		1
CO2	3				3					1		1
CO3	3				3					1		1
1: Slight (Low) , 2: Moderate (Medium), 3: Substantial (High)												

B. TECH. SEMESTER – V (EC)

SUBJECT: ( ) ELECTRONIC CIRCUITS PROJECT (w. e. f. 2023-24)

Teaching Scheme (Hours/Week)				Credits	Examination Scheme				
Lect	Tut	Prac	Total		Ext	Sess.	TW	Prac	Total
0	0	2	2	1	-	-	50	-	50

COURSE OBJECTIVES

Students will select hardware based electronics project and be a self-learner. Project activities include design, construction, computer simulation, and analysis of the project's circuit. These activities assist students in obtaining a better understanding of the operation of transistor circuits, amplifiers, current drivers and other semiconductor circuits. Weekly presentation of project progress work improves Communication skill and overcome stage fear.

DETAILED SYLLABUS

NO TOPIC

[1] Plan, design and implement hardware projects or microelectronics circuits
[2] Analyze and interpret output either on Testbed or through Simulations.
[3] Implement hardware prototype

RECOMMENDED TEXT / REFERENCE BOOKS

COURSE OUTCOMES

At the end of the course, students should be able to

CO1. Identify the problem statement that solve societal, health and safety issues, through literature survey for project work and Arrive at conceptual project design through brainstorming.
CO2. Develop design strategy for the project work& also acquire presentation and interpersonal communication skills.
CO3. Evaluate outcome and application of project work with appropriate societal, health and safety consideration.

COURSE MATRIX

Course Outcome (CO's)	Program Outcomes (PO's)											
	Domain Specific (PSO)					Domain Independent (PO)						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	1			3			3	2	1	
CO2	3	2	3	3	2				3	3		
CO3	3	2	3	2	2	3	2	2	3	3	3	3
1: Slight (Low) , 2: Moderate (Medium), 3: Substantial (High)												

B. TECH. SEMESTER – V (EC)

SUBJECT: ( ) TECHNICAL COMMUNICATION (w. e. f. 2023-24)

Teaching Scheme (Hours/Week)				Credits	Examination Scheme				
Lect	Tut	Prac	Total		Ext	Sess.	TW	Prac	Total
1	1	2	4	3	-	-	50		50

OBJECTIVES

The course intends to train the learners in using both verbal and non-verbal communication effectively. It also exposes them to different nuances of writing effectively for various professional purposes.

DETAILED SYLLABUS

NO TOPIC

[1] TECHNICAL COMMUNICATION SKILLS

Understanding the process and scope of Communication, Relevance, & Importance of Communication in a Globalized world, Forms of Communication, Role of Unity, Brevity and Clarity in various forms of communication,Verbal& Non-verbal Communication, Classification of NVC, Barriers to Communication, Communicating Globally, Culture and Communication

[2] SOFT SKILLS

Interpersonal Communication, Listening, Persuasion, Negotiation, Communicating bad news/messages, communicating in a global world, Group Discussion.

[3] WRITING SKILLS

Traits of Technical Writing, Principles of Business Writing, Style of Writing, Writing Memos, Letters, Reports, and Writing Research Papers

[4] SPEAKING SKILLS

Audience-awareness, Voice, Vocabulary and Para-language, Group Discussion, Combating Nervousness, Speaking to one and to one thousand, Mock Presentations

[5] JOB INTERVIEWS

Preparing for interviews, assessing yourself, Drafting Effective Resume, Dress, decorum and Delivery techniques, Techniques of handling interviews, Use of Non-verbals during Interviews, Handling turbulence during interviews.

[6] PROFESSIONAL PRESENTATIONS

Individual Presentations (Audience Awareness, Body Language, Delivery and Content of Presentation), Presentation Preparation tools & Styles, Professional Ethics

RECOMMENDED TEXT / REFERENCE BOOKS

1) Sharon Gerson and Steven Gerson. Technical Writing: Process and Product (8th Edition), London: Longman, 2013
2) Rentz, Kathryn, Marie E. Flatley& Paula Lentz. Lesikar's Business Communication Connecting in a Digital world, McGraw-Hill, Irwin.2012

3) Allan & Barbara Pease. The Definitive Book of Body Language,New York, Bantam,2004
4) Jones, Daniel. The Pronunciation of English, New Delhi, Universal Book Stall.2010
5) Sharma, Sangeeta& Mishra, Binod. Communication Skills for Engineers and Scientists, New Delhi: PHI Learning, 2009, rpt 2012

COURSE OUTCOMES

At the end of the course, students should be able to

CO1. Describe Verbal and Non Verbal aspects of Communication
CO2. Prepare technical documents for professional communication
CO3. Practice etiquette in communication at workplace
CO4. Demonstrate ethics and moral reasoning in engineering

COURSE MATRIX

Course Outcome (CO's)	**Program Outcomes (PO's)**											
	Domain Specific (PSO)					**Domain Independent (PO)**						
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	1		2	2					3	3		
CO2	1	3	1	3	3	3	3		2	1	1	
CO3								1	3	3	3	1
CO4							3	3	2		2	
1: Slight (Low) , 2: Moderate (Medium), 3: Substantial (High)												

B. TECH. SEMESTER – VI (EC)

SUBJECT: ( ) ADVANCED MICROPROCESSORS (w. e. f. 2023-24)

Teaching Scheme (Hours/Week)				Credits	Examination Scheme				
Lect	Tut	Prac	Total		Ext	Sess.	TW	Prac	Total
4	0	2	6	5	60	40	25	25	150

COURSE OBJECTIVES

The objective of this course is to introduce performance enhancement techniques for advanced processor architectures, interfacing techniques and real-world applications design using 8086 and ARM7 based microprocessors. To familiarize students with the assembly language and high level programming to optimize machine language code with reference to timing and resource constraints of the modern commonly battery-powered and portable systems.

DETAILED SYLLABUS

NO TOPIC

[1] THE MICROPROCESSOR AND ITS ARCHITECTURE
Internal Architecture, Real mode memory addressing, protected mode memory addressing, memory paging.

[2] ADDRESSING MODES
Data addressing mode, program memory addressing mode, stack memory addressing mode

[3] 8086/8088 HARDWARE SPECIFICATIONS
Pin-outs, pin functions, clock generator, bus buffering and latching, bus timing, ready and the wait state, minimum mode versus maximum mode.

[4] MEMORY INTERFACE
Memory devices, address decoding, 8086 and 8088 memory interface

[5] INTERRUPTS
Basic interrupt processing, Hardware interrupts, Expanding the interrupt structure

[6] THE PENTIUM MICROPROCESSOR
Protected mode, paging mode, virtual 8086 mode, memory management mode with Pentium.

[7] INTRODUCTION TO ARM
Overview of ARM Processor, Fundamental of RISC & CISC, Evolution of RISC, Comparison of RISC & CISC, Design for LPC.

[8] ARM ARCHITECTURE
Architectural inheritance, Programmer's model, ARM development tools, Software Assembler (ARM), 'C' Language Complier, Simulator, Hardware Board, Board organization, Communication with external world. 3-stage pipeline ARM organization, ARM instruction execution, ARM implementation

[9] ARM ASSEMBLY LANGUAGE PROGRAMMING

Data processing instructions, Data transfer instructions, Control flow instructions, Programs based on assembly language. Introduction, Exceptions, Conditional execution, Branch and Branch with Link (B, BL), Branch, Branch with Link and eXchange (BX, BLX), Software Interrupt (SWI), Data processing instructions, Multiply instructions, Count leading zeros (CLZ), Single word and unsigned byte data transfer instructions, Half-word and signed byte data transfer instructions, Multiple register transfer instructions, Swap memory and register instructions (SWP), Status register to general register transfer instructions, General register to status register transfer instructions, Coprocessor instructions.

[10] THE THUMB INSTRUCTION SET

The Thumb bit in the Current Program Status Register (CPSR), The Thumb programmer's model, Thumb branch instructions, Thumb software interrupt instruction, Thumb data processing instructions, Thumb single register data transfer instructions, Thumb multiple register data transfer instructions, Thumb breakpoint instruction, Thumb implementation, Thumb applications.

[11] INTRODUCTION TO VECTORED INTERRUPT CONTROLLER

IRQ and FIQ using Vectored interrupt controller of LPC23xx

RECOMMENDED TEXT / REFERENCE BOOKS

1) The Intel Microprocessors 8086, 8088, 80186, 80188, 80286, 80386, 80486, Pentium, Pentium Pro Processors, Berry B Brey, 6th Edition, Prentice Hall of India.
2) ARM - System-On- Chip Architecture, Steve Furber, 2nd Edition, Prentice Hall of India.
3) Microprocessors and Interfacing-Programming & Hardware, Douglas V. Hall, 2nd Edition, Tata McGraw Hill.
4) IBM PC Assembly Language Programming, Peter Abel, 2nd Edition, Prentice Hall of India.
5) ARM System Developer Guide, AntrewSloss, Dominic Symes, Chris Wright, Morgan Kaufmann.
6) Technical Ref. Manual, ARM7TDMI (3) UM10211 LPC 2364/66/68/78 User Manual, NXP Ltd.

COURSE OUTCOMES

At the end of the course, students should be able to

CO1. Being familiar and analyze the architectural aspects of 8086 like specifications, programming model, pipeline, prefetch queue, pin configuration and role of this features to build microprocessor based systems

CO2. Develop assembly language program to satisfy executional requirements as per given problem statement with reference to programming model of 8086, instruction set. Also simulate and analyse the assembly language and C programs simulation tools

CO3. Determine requirement of hardware components and Design 16-bit memory subsystem with the 8086 as per system specifications

CO4. Demonstrate multitasking environment using interrupt programming and vectored interrupt controller. Use protected mode memory addressing, memory paging to extend addressing capacity of the system.

CO5. Introduce architecture and programming model of ARM7 architecture and compare it with 8086 architecture..

CO6. Develop ARM7 based assembly language and C programs to implement common algorithms and attempt optimization of the code, also use the machine language code templates to generate machine codes for different types of instructions.

COURSE MATRIX

Course Outcome (CO's)	**Program Outcomes (PO's)**											
	Domain Specific (PSO)					**Domain Independent (PO)**						
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	3	3	2		2	1	1	2	2		1
CO2	3	3	3	3	3	2	1	1	2	2		1
CO3	3	3	3	3		2	1	1	2	2		1
CO4	3	3	2	3	3	2	1	1	2	2		1
CO5	3	3	3	2		2	1	1	2	2		1
CO6	3	3	2	3	3	2	1	1	2	2		1
1: Slight (Low) , 2: Moderate (Medium), 3: Substantial (High)												

B. TECH. SEMESTER – VI (EC)

SUBJECT: ( ) COMMUNICATION SYSTEMS (w. e. f. 2023-24)

Teaching Scheme (Hours/Week)				Credits	Examination Scheme				
Lect	Tut	Prac	Total		Ext	Sess.	TW	Prac	Total
3	1	2	6	5	60	40	25	25	150

COURSE OBJECTIVES

The main objective of this course is to provide fundamental knowledge of communication system which is necessary to understand recent communication technologies. This course helps student to analyze signal in time domain as well as frequency domain. It also develop understanding of sampling theorem, digital baseband and passband signal transmission and reception. This course also includes performance analysis of linear and non-linear modulation and demodulation techniques.

DETAILED SYLLABUS

NO TOPIC

[1] INTRODUCTION

Overview of Communication System, Analog and Digital messages, Signal-to-Noise Ratio (SNR), Channel Bandwidth, Rate of Communication, Modulation, Randomness, Redundancy, and Coding.

[2] ANALYSIS AND TRANSMISSION OF SIGNALS

Signal Analysis

Periodic signal representation by Fourier Series, Exponential representation of non-periodic signals, Fourier Transforms and its properties, Sampling theorem.

Signal Transmission

Distortion less transmission through a linear system, Signal distortion over a channel, Bandwidth and the rate of pulse transmission, Energy Spectral Density(ESD) of a signal, Power Spectral Density(PSD) of a signal.

[3] DIGITAL COMMUNICATION SYSTEMS

Conversion of analog signal to digital form: Pulse code and Delta modulation, Digital multiplexing, Line coding, Pulse shaping, Scrambling of data, The regenerative repeater, Detection error probability, M-ary communication, Digital carrier systems.

[4] DIGITAL MODULATION TECHNIQUES

Coherent Binary Phase Shift Keying, Coherent Binary Frequency Shift Keying, Coherent Qudra-Phase Shift Keying, Coherent Minimum Shift Keying, Non-Coherent Orthogonal Modulation, Non-Coherent Binary Frequency Shift Keying, Differential Phase Shift Keying, Comparison of Binary and Quaternary modulation schemes, M-ary modulation techniques.

[5] MODULATION

Amplitude (Linear) Modulation

Amplitude Modulation: Single Side Band (SSB) signal equation, Hilbert's Transform of a signal, Effects of frequency and phase errors in synchronous demodulation, Digital carrier systems, Interference and noise in AM systems, Frequency-Division Multiplexing.

Angle (Exponential) Modulation
Interference and Noise in Angle-Modulated systems, Stereo FM receiver.

RECOMMENDED TEXT / REFERENCE BOOKS

1) Modern Digital and AnalogCommunicationSystem, B. P. Lathi, 2nd Edition, Oxford Publication
2) Communication Systems, Simon Haykin, 3rd Edition, John Wiley&sons.
3) Electronic Communication System-Fundamental through Advance, Tomas W, 3rd Edition, Wisley.
4) Communication System Analog&Digital, R. P. Singh, TataMcGrawHill.

COURSE OUTCOMES

At the end of the course, students should be able to

CO1. Analyze of digital pulse modulation techniques in terms of SNR and Bandwidth
CO2. Analyze digital baseband binary data transmission.
CO3. Analyze constellation diagrams and BER for digital passband transmission and reception.
CO4. Evaluate the essential bandwidth required for transmitting the binary pulse signal.
CO5. Analyze and compare DSBSC, SSBSC, AM and FM techniques in presence of noise and interference.
CO6. Analyze and compare DSBSC, SSBSC, AM and FM techniques in presence of noise, interference, phase error and frequency error.

COURSE MATRIX

Course Outcome (CO's)	**Program Outcomes (PO's)**											
	Domain Specific (PSO)					**Domain Independent (PO)**						
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	3	2	1		1	1					1
CO2	3	3	3	1		2				1		1
CO3	3	3	3	1	1	2				1		
CO4	3	3	3	1	1	2	1	1		2		1
CO5	3	3	2	1		1						
CO6	3	3	2			1						
1: Slight (Low) , 2: Moderate (Medium), 3: Substantial (High)												

B. TECH. SEMESTER – VI (EC)

SUBJECT: ( ) DIGITAL SIGNAL PROCESSING (w. e. f. 2023-24)

Teaching Scheme (Hours/Week)				Credits	Examination Scheme				
Lect	Tut	Prac	Total		Ext	Sess.	TW	Prac	Total
3	1	2	6	5	60	40	25	25	150

COURSE OBJECTIVES

The field of Digital Signal Processing (DSP) continues to evolve and play a central role in modern electronics. In fact, DSP is so ubiquitous that the field is somewhat disappearing as a discrete entity. Many systems developed today related to wireless communication, speech processing, image and video processing, which are now integral part of everyday life of virtually everyone in this world, use powerful DSP concepts as their foundations.The objective of the course is to offer in depth understanding of time domain and frequency domain analysis of discrete time signals and systems and design of IIR and FIR digital filters with the overview of DSP architectures.

DETAILED SYLLABUS

NO TOPIC

[1] INTRODUCTION

Signal and Signal Classification (Analog, Digital), Types of Signal Processing, Advantages and Disadvantages of DSP, Review of discrete Signals & Systems, Discrete convolution and Correlation

[2] THE Z-TRANSFORM and its Applications

Definition, Properties, Z-Plane Representation, The Transfer Function, Inverse-Z Transform, System Analysis, Frequency Response, Time Domain Analysis, Frequency Response - Graphical Interpretation, Stability analysis, Digital filter realizations, Minimum phase systems, All pass filters.

[3] IIR FILTER DESIGN

Introduction, Analog filter design, IIR Filter Design: Butterworth,Chebyshev and Elliptic Approximations, Low Pass Filter, High Pass Filter, Band Pass Filter, Band Stop Filter, Response Matching, Matched-Z Transforms, Mappings, Bilinear Transformation.

[4] FIR FILTERS DESIGN

Linear Phase Requirement and Symmetric Sequences, FIR Design By Fourier Series & Windowing Method,Park-McClellan's method.

[5] THE DFT AND FFT

Fourier Series, Fourier Transform, Connections between frequency domain transforms, DTFT, DFT - Definitions, Properties, Use of DFT in linear filtering, overlap add, overlap save methods, The FFT, DIT- FFT, DIF-FFT.

[6] ADVANCE DSP CONCEPTS AND DSP PROCESSORS

Multirate Signal Processing, Adaptive Signal Processing, Finite Word Length Effect, Introduction to Digital Signal Processors: Characteristics of DSP Algorithms and Hardware Requirements, Parallelism And Hardware Units of Typical Digital Signal Processor.

Architectural Details of TMS320C6x.

[7] APPLICATIONS OF DSP

Application of DSP in Speech Processing & Biomedical Signal Processing

RECOMMENDED TEXT / REFERENCE BOOKS

1) Analog and Digital Signal Processing, Ashok Ambardar, 2nd Edition, Thomson Brooks-Cole.
2) Digital Signal Processing, G. Proakis&Dimitris G. Manolakis, 3rd Edition, Prentice Hall of India
3) Digital Filters- Analysis, Design and Applications, Andreas Antonion, 2nd Edition, Tata McGraw Hill.
4) Digital Signal Processing - A Computer Based Approach, Sanjit K Mitra, 3rd Edition, Tata McGraw Hill.

COURSE OUTCOMES

At the end of the course, students should be able to

CO1. Find Response of Discrete time LTI Systems.
CO2. Design FIR Filters.
CO3. Design IIR filters using bilinear transformation
CO4. Analyze the discrete time systems using z Transform.
CO5. Represent Discrete Time Signal in Frequency Domain through DFT and Calculate it by FFT Algorithms.
CO6. Understand specialized features of DSP Processors and compute errors due to finite word length effects.

COURSE MATRIX

Course Outcome (CO's)	**Program Outcomes (PO's)**											
	Domain Specific (PSO)					**Domain Independent (PO)**						
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	3	1	1	1	3	1	1	1	1		2
CO2	3	3	3	1	3	3	2	1	1	1		1
CO3	3	3	3	1	3	3	2	1	1	1		1
CO4	3	3	1	3	1	3	1	1	1	1		2
CO5	3	3	1	2	1	3	1	1	1	1		2
CO6	3	3	1	2	1	3	1	1	1	1		2
1: Slight (Low) , 2: Moderate (Medium), 3: Substantial (High)												

B. TECH. SEMESTER – VI (EC)

SUBJECT: ( ) MICROCONTROLLER & IOT PROJECT (w. e. f. 2023-24)

Teaching Scheme (Hours/Week)				Credits	Examination Scheme				
Lect	Tut	Prac	Total		Ext	Sess.	TW	Prac	Total
0	0	2	2	1	-	-	50	-	50

COURSE OBJECTIVES

To offer a profound understanding and implementation of Microcontroller based embedded systems in an elementary and integrated manner. The objectives of this course is to make students capable of developing a small-scale Microcontroller based embedded system to fulfill the requirements of hardware implementation with the necessary simulation (design, troubleshoot and optimization).

DETAILED SYLLABUS

NO TOPIC

[1] Identify the project definition
[2] Design and implement hardware and software/ algorithm
[3] Analyze, troubleshoot and interpret output
[4] Presentation
[5] Designing of PCB and implement hardware prototype

RECOMMENDED TEXT / REFERENCE BOOKS

Not applicable

COURSE OUTCOMES

At the end of the course, students should be able to

CO1. Identify the problem statement that solve societal issues real life problems, through literature survey for project work and arrive at conceptual project statement. Develop presentation and interpersonal communication skills through project work

CO2. Decide design specifications, Design PCB and develop hardware prototype.

CO3. Analyze, test and troubleshoot designed circuits and codes for desired outcome. Evaluate outcome and application of project work with appropriate societal, health and safety consideration.

COURSE MATRIX

Course Outcome (CO's)	Program Outcomes (PO's)											
	Domain Specific (PSO)					Domain Independent (PO)						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2			3		1	3	2	1	
CO2	3	3	3	3	2			1	3	3		
CO3	3	2	3	2	2	3	2	2	3	3	3	3
1: Slight (Low) , 2: Moderate (Medium), 3: Substantial (High)												

B. TECH. SEMESTER – VI (EC)

SUBJECT: ( ) MICROWAVE & ANTENNAS (w. e. f. 2023-24)

Teaching Scheme (Hours/Week)				Credits	Examination Scheme				
Lect	Tut	Prac	Total		Ext	Sess.	TW	Prac	Total
3	1	2	6	5	60	40	25	25	150

COURSE OBJECTIVES

The objective of this subject is to provide a platform for students to apply their knowledge of electromagnetic fields in antenna and microwave system design. This subject built a strong foundation in designing and analyzing radiation parameters of antennas in numerous practical applications. Besides, the concept of this subject is useful to the students to enhance their knowledge in the area of microwave waveguides, devices, and tubes.

DETAILED SYLLABUS

NO TOPIC

[1] INTRODUCTION TO MICROWAVES&ANTENNAS

History of Microwaves, Microwave Frequency bands;Applications of Microwaves& Antennas

[2] TRAMSMISSSION LINE

Introduction, Concept of distributed elements, Equation of Voltage and Current, Standing Waves and Impedance Transformations, Loss less and Low loss Transmission lines, Analysis of Transmission lines in terms of Admittances, Graphical Representation of a Transmission line, Quarter Wave Transformer, The Smith Chart & its Applications, Applications of Transmission Lines as a Circuit element and Resonant Circuits, Microstrip Transmission Line.

[3] WAVEGUIDES AND RESONATOR

Rectangular Waveguides, Visualization of fields inside Rectangular Waveguides, Cavity Resonator, Introduction to Circular Waveguides.

[4] MICROWAVE DEVICES

Waveguide Microwave Junctions, Introduction to S Parameters, S parameters of Microwave components (E plane Tee, H plane Tee, Magic Tee), Microwave Passive components: Directional Coupler, Power Divider,Circulator, and Isolator, Microwave tubes: Two-Cavity Klystron, Reflex Klystron.

[5] ANTENNAFUNDAMENTAL

Physical concept of radiation, Radiation from the Hertz Dipole, Near and Far Field Analysis, Radiation pattern, Radiation Parameters of Antenna: Directivity, Gain, Side Lobe Level of Antenna, polarization, efficiency, Friis transmission equation, Thin Linear Antenna

[6] ANTENNA ARRAYS

Array of Point Sources, Broad side & End Fire Array, Array Synthesis, Schelkunoff Zero Placement Method, Binomial Array, Folded dipole, Yagi-Uda Array, Log Periodic Dipole Array Antenna

[7] BASIC CONCEPTS OF SMART ANTENNAS

Concept and benefits of smart antennas, fixedweight beam forming basics, Adaptive beam forming.

[8] MICROWAVE FREQUENCY ANTENNA

Micro strip Antennas, Design of rectangular and circular patch antennas, Horn Antennas, Parabolic Reflector Antenna.

RECOMMENDED TEXT / REFERENCE BOOKS

1) Electromagnetic Waves, R. K. Shevgaonkar, Tata McGraw Hill.
2) Microwave Devices and Circuits, S. Y. Liao, 3rd Edition, Prentice Hall of India.
3) Electronic Communication systems, George Kennedy, 3rd Edition, Tata McGraw Hill.
4) Antennas, C. A. Balani, 3rd Edition, Tata McGraw Hill.
5) Antennas & Wave Propagation, K. D. Prasad, 2nd Edition, Khanna Publication.

COURSE OUTCOMES

At the end of the course, students should be able to

CO1. Design microwave matching networks using single-double stub and quarter wave transformer in transmission lines.
CO2. Illustrate the basic philosophy of radiation parameters of antenna and the concept of radiation is introduced.
CO3. Study and analyze different types of metallic waveguides and their respective modes of propagation.
CO4. Analyzeand design various antenna parameters necessary for building an RF system.
CO5. Investigate the performance measures of microwave devices to identify their applications.
CO6. Recommend various antenna configurations according to the applications in radar and mobile communication.

COURSE MATRIX

Course Outcome (CO's)	**Program Outcomes (PO's)**											
	Domain Specific (PSO)					**Domain Independent (PO)**						
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	3	1	1	3							
CO2	3	3	1	1	1							
CO3	3	3	3	1	1					2		
CO4	3	3	2	1	1	3	3	3			2	
CO5	3	3	3	3	3	1	2	2				2
CO6	3	3	3	3	3	1						
1: Slight (Low) , 2: Moderate (Medium), 3: Substantial (High)												

B. TECH. SEMESTER – VI (EC)

SUBJECT: ( ) AUTOMATED ELECTRONICS (w. e. f. 2023-24)

Teaching Scheme (Hours/Week)				Credits	Examination Scheme				
Lect	Tut	Prac	Total		Ext	Sess.	TW	Prac	Total
2	0	2	4	3	40	-	25	25	90

COURSE OBJECTIVES

Automation is playing a key role in Industries. Industries rely heavily on automation for economic viability and mass production. It is important for the students to learn basic of automation, how system works and importance of PLC, SCADA and robotics in automation. This course will provide opportunity to learn industrial automation techniques to understand basic components of automation in Industries, to learn various industry automation techniques, to apply knowledge of automation components for practical application, and to study different systems based on PLC, SCADA and robots in automation.

DETAILED SYLLABUS

NO TOPIC

[1] PROGRAMMABLE LOGIC CONTROLLERS

Programmable controllers, Programmable logic controllers, Analog digital input and output modules, PLC programming, Ladder diagram, Sequential flow chart, PLC Communication and networking, PLC selection, PLC Installation, Advantage of using PLC for Industrial automation, Application of PLC to process control industries.

[2] AUTOMATION COMPONENTS AND COMPUTER AIDED MEASUREMENT

Introduction of supervisory control and data acquisition (SCADA), Industrial bus systems: Modbus &Profibus, Sensors for temperature, pressure, force, displacement, speed, flow, level, Actuators, Data acquisition and Data transfer techniques, Internet of things (IoT).

[3] DISTRIBUTED CONTROL SYSTEM AND INDUSTRIAL AUTOMATION

Overview of DCS, DCS integration with PLC and Computers, Features of DCS, Basic construction and configuration of robots**,** Pick and place robot.

RECOMMENDED TEXT / REFERENCE BOOKS

1) Industrial Instrumentation and Control, S. K. Singh, 3rd Edition, Tata McGraw Hill Companies.
2) PC based Instrumentation –Concepts and practice, N. Mathivanan, 3rd Edition, PHI Publications.
3) Programming Logic Controllers -Principles and applications, John W. Webb & Ronald Reis, 5th Edition, PHI Publications.
4) Process Control Instrumentation Technology, C. D. Johnson, 8th Edition, PHI Publications.
5) Programmable logic controller, Dunning & Delmar, 3rd Edition, Thomas Dilmar Publications.
6) Industrial control handbook, Parr & Newman, 3rd Edition, Industry Press.

COURSE OUTCOMES

At the end of the course, students should be able to

CO1. Analysis and design of programmable logic controllers based programming for textual and graphical languages
CO2. Analyse the different sensors input, Signal conditioning, Control the plant automation process with the help of Elements of computer aided measurement, and Internet of things (IoT).
CO3. Illustrate basic distributed control system and its features. Describe Basic construction and configuration of robot, Pick and place robot.

COURSE MATRIX

Course Outcome (CO's)	**Program Outcomes (PO's)**											
	Domain Specific (PSO)					**Domain Independent (PO)**						
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	3	3			2		1		1		1
CO2	3	3	1			2		1		1		1
CO3	3	2	1			2		1		1		1
1: Slight (Low) , 2: Moderate (Medium), 3: Substantial (High)												

Provisional Syllabus

(Semester VII – VIII)