SYLLABI BOOK

BACHELOR OF TECHNOLOGY
ELECTRONICS & COMMUNICATION ENGINEERING

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

http://www.ddu.ac.in
ec@ddu.ac.in

With effect from
2021 - 2022

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	4	0	2	6	**5**	60	40	25	25	**150**
2	Software Project	0	0	2	2	**1**	-	-	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

SUBJECT: MATHEMATICS - I

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

Reference Code BSC102

DETAILED SYLLABUS

[1] CALCULUS

Evolutes 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.

B. TECH. SEMESTER – I (EC/CE/IT)
SUBJECT: BASIC ELECTRICAL ENGINEERING

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

Reference Code ESC101

*TW Marks includes Viva based on TW

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

B.TECH. SEMESTER – I (EC/CE/IT)
SUBJECT: PROGRAMMING FOR PROBLEM SOLVING - I

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**

Reference Code ESC201
*TW Marks includes Viva based on TW

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.

Department of Electronics & Communication Engineering, Dharmsinh Desai University, Nadiad

[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 Yashvant Kanetkar, 12th Ed., BPB Publication
6) Programming in C by Ashok N. Kamthane, 2nd Ed., Pearson Education

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

Reference Code ESC102

*TW Marks includes Viva based on TW

DETAILED SYLLABUS

[1] 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 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 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 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 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 Covering, listing the computer technologies that impact on graphical communication, demonstrating knowledge of the theory of CAD software.

[7] 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 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

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

Reference Code ESC202

*TW Marks includes Viva based on TW

DETAILED SYLLABUS

[1]   OPERATING SYSTEM BASICS

Introduction to Operating System and Linux Architecture

[2]   SOFTWARE INSTALLATION

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

[3]   SHELL COMMANDS

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]   SHELL SCRIPTING

Basic Shell commands, Looping and Branching,

[6]   SHELL UTILITIES

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

SUBJECT: MATHEMATICS-II

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

Reference Code BSC301

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.

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

Reference Code ESC201
*TW Marks includes Viva based on TW

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

B. TECH. SEMESTER II (EC/CE/IT)
SUBJECT: PHYSICS

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

Reference Code BSC101
*TW Marks includes Viva based on TW

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.

SUBJECT: HARDWARE WORKSHOP

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

Reference Code ESC202

*TW Marks includes Viva based on TW

DETAILED SYLLABUS

[1] ELECTRONIC COMPONENTS
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] COMPUTER HARDWARE
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] WEB INFRASTRUCTURE
Basic Components of Web Sites, Front end & back end tools and technology. HTML & CSS, Developing, Configuring and deploying a website.

[6] IOT BOARDS AND CIRCUIT SIMULATION
Introduction to IOT boards like Arduino, Raspberry Pie etc. Interfacing, Circuit designing and PCB designing.

[7] MINI PROJECT
Student will develop a mini project related to the topics listed above.

TEXT / REFERENCE BOOKS

1) Electronic Components and Materials Principles, Dr. Madhuri A Joshi, 2nd Edition, Shroff Publishers & Distributors PVT. LTD.
2) A Textbook of Computer Hardware and Networking, Jyotika Deshmukh, D J Publications
3) Learning Web Design, Jennifer Robbins, 4th edition, O'Reilly Media

SUBJECT: ENGLISH

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

Reference Code HSMC201
*TW Marks includes Viva based on TW

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

SUBJECT: ENVIRONMENTAL STUDIES

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

Reference Code MC-II

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) Erach Bharucha 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.

SUBJECT: APPLIED MATHEMATICS

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

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, expand $\sin n\theta$, $\cos n\theta$ and $\tan n\theta$ in powers of $\sin \theta$, $\cos \theta$, and $\tan \theta$ respectively, expand $sin^m\theta$, $cos^m\theta$, $or\ sin^m \theta \cdot cos^m\theta$ in a series of sines or cosines of multiples of θ.

[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.

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

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, 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&Louis Nashelsky, 8th Edition, Prentice Hall of India.
3) Integrated Circuits, K. R. Botkar, 9th Edition, Khanna Publications

SUBJECT: ELECTRONICS INSTRUMENTATION

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

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

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**

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

B. TECH. SEMESTER – III (EC/IC)
SUBJECT: DIGITAL ELECTRONICS

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

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 & Zvonko Vrenesic, 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

B. TECH. SEMESTER – III (EC)
SUBJECT: MATHEMATICAL COMPUTING LABORATORY

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

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.

B. TECH. SEMESTER – IV (EC)
SUBJECT: SIGNAL & SYSTEMS

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

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.

<div align="center">

B. TECH. SEMESTER – IV (EC)
SUBJECT: LINEAR ELECTRONICS – II

</div>

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

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 Monostable Multivibrator 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, Ramakant A. Gayakwad, 4th Edition, Pearson Education
3)   Integrated Circuits, K. R. Botkar, 9th Edition, Khanna Publications

B. TECH. SEMESTER – IV (EC)
SUBJECT: CONTROL THEORY

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

DETAILED SYLLABUS

[1] INTRODUCTION
Open-loop and closed loop control system, Servomechanism, Historical development of control system, sampled data & digital control system, Multivariable control system, Application in non-engineering 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

B. TECH. SEMESTER – IV (EC)
SUBJECT: ELECTRICAL MACHINES & POWER

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

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.

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

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

SUBJECT: UNIVERSAL HUMAN VALUES

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

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 Program Handbook v2AICTE NCC-IP sub-committee. (e-version)
2) Dr. Rajneesh Arora , Dr.Shishir Gaur, Sh. BP Singh, Sh. Rajul Asthana and Sh. Jitender Narula, Universal Human Values-I (UHV-I) Mentors' Manual, Version 2.1, AICTE NCC-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 VALUES AND ETHICS, Part 1 to Part 4, AICTE NCC-IP sub-committee. (e-version).