V - Semester Detailed Syllabus

Course Code	Course Title						Core/Elective
5PC510EC	Microcontrollers						Core
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
Computer Organization and Architecture	3	-	-	-	40	60	3

COURSE OBJECTIVES :

This course aims to familiarize

1. To understand architecture & programming of 8051 microcontroller.
2. To design Interfacing & Programming of I/O ports, timers and UART using 8051.
3. To design Interfacing of real time devices like ADC, DAC and stepper motor with 8051.
4. To understand architecture of ARM microcontrollers.
5. To design Interfacing of real time devices like RTC and WDT.

COURSE OUTCOMES :

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

1. Explain the architecture of 8051
2. Write Assembly programming using 8051microcontroller.
3. Interface different peripherals to 8051microcontroller.
4. Explain the architecture of ARM controller.
5. Interface different peripherals to ARM controller.

UNIT - I

8051 Microcontroller : Internal architecture and pin configuration, 8051 addressing modes, instruction set, Bit addressable features. I/O Port structures, assembly language programming using data transfer, arithmetic, logical and branch instructions.

UNIT - II

8051 Timers and Interrupts : 8051 Timers/Counters, Serial data communication and its programming, 8051 interrupts, Interrupt vector table, interrupt programming.

UNIT - III

8051 Interfacing: Interfacing of 8051 with LCD, ADC, DAC, external memory, Stepper Motor interfacing

UNIT - IV

ARM Embedded Systems : The RISC design philosophy, The ARM design philosophy, ARM Processor fundamentals, registers, current program status register, pipeline exceptions, interrupts and vector table, core extensions, architecture revisions.

UNIT - V

LPC 21xx microcontroller : Internal memory, GPIOs, Timers, ADC, UART and other serial Interfaces, PWM, RTC, WDT.

TEXT BOOKS :

1. Mazidi M.A, Mazidi J.G & Rolin D. Mckinlay, "The 8051 Microcontroller & Embedded Systems using Assembly and C", 2/e, Pearson Education, 2007
2. Sloss Andrew N, symes dominic, wright Chris "ARM System Developers Guide: Designing and optimizing", Morgan kaufman.
3. Joseph Yiu, "The definitive guide to ARM Cortex-M3", Elsevier, 2nd edition

REFERENCE BOOKS:

1. Ayala K.J, "The 8051 Micro Controller Architecture, programming and Application," Penram International, 2007.
2. Steve Furber, "ARM System-on-Chip Architecture", Second Edition, Pearson 2012.
3. Andrew N. Sloss, Dominic Symes, Chris Wright, "ARM SYSTEM Developer's Guide Designing and Optimizing System Software" Elsevier2015.

Course Code	Course Title						Core/Elective
5PC511EC	Digital Signal Processing						Core
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
Signals and Systems	3	-	-	-	40	60	3

COURSE OBJECTIVES :

1. To describe the necessity and of digital signal processing.
2. To discuss various design methods of FIR & IIR filters.
3. To describe the concepts of multirate signal processing and identify important features of TMS320C67XX DSP processors.

COURSE OUTCOMES :

1. Apply the knowledge of FFT Algorithms for computation of DFT.
2. Design of FIR filters using various methods.
3. Design of IIR filters using various methods.
4. Apply decimation and interpolation concepts for the design of sampling rate converters.

UNIT - I

Discrete Fourier Transform and Fast Fourier Transform : Discrete Fourier Transform (DFT), Computation of DFT, Linear and Circular Convolution, FFT algorithms: Radix- 2 case, Decimation in Time and Decimation in Frequency algorithms, in place computation, bit Reversal.

UNIT - II

Finite Impulse - Response Filters (FIR) : Linear phase filters, Windowing techniques for design of Linear phase FIR filters, Rectangular, Triangular, Bartlett, Hamming, Hanning , Kaiser Windows, Realization of filters, Finite word length effects.

UNIT - III

Infinite Impulse - Response Filters (IIR) : Introduction to filters, comparison between practical and theoretical filters, Butterworth and Chebyshev approximation, IIR digital filter design Techniques, Impulse Invariant technique, Bilinear transformation

technique, Digital Butter worth & Chebyshev filter implementation, Digital filters structures, Comparison between FIR and IIR.

UNIT - IV

Multirate Digital Signal Processing : Introduction, Decimation by factor D and interpolation by a factor I, Sampling Rate conversion by a Rational factor I/D.

Implementation of Sampling Rate Conversion, Multistage implementation of sampling rate conversion, Sampling conversion by an arbitrary factor, Application of Multirate Signal Processing.

UNIT - V

Introduction to DSP Processors : Difference between DSP and other microprocessors architectures, Importance of DSP Processors- General purpose DSP processors, TMS320C67XX processor, architecture, registers, pipelining, addressing modes and introduction to instruction set.

TEXT BOOKS :

1. Nagoor Kani,, Digital Signal Processing,, McGraw-Hill Education, 2nd Edition, 2012
2. Alan V. Oppenheim & Ronald W. Schafer, Digital Signal Processing, PHI, 2nd edition, 2014.
3. B.Venkataramani & M. Bhaskar, ?Digital Signal Processor Architecture, Programming and Application, TMH, 2e 2013.

REFERENCE BOOKS:

1. John G. Proakis & Dimtris G. Manolakis, "Digital Signal Processing Principles, Algorithms and Application", PHI, 4th edition, 2012.
2. Alan V. Oppenheim & Ronald W. Schafer, "Digital Signal Processing", PHI, 2nd edition, 2014.

Course Code	Course Title						Core/Elective
5PC512EC	Analog Communication						Core
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
Signals & Systems	3	-	-	-	40	60	3

COURSE OBJECTIVES :

This course aims to familiarize

1. To analyze the analog communication system requirements.
2. To understand the generation of various analog modulation techniques.
3. To analyze the noise performance of analog modulation techniques.
4. To understand AM and FM receivers.
5. To understand the pulse modulation techniques.

COURSE OUTCOMES :

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

1. Understand analog communication system.
2. Compare and analyze analog modulation techniques.
3. Calculate noise performance of analog modulation techniques.
4. Design AM and FM receivers.
5. Differentiate between pulse modulation & continuous modulation techniques.

UNIT - I

Amplitude Modulation: Need for modulation, Amplitude Modulation (AM), Double Side Band Suppressed Carrier (DSB - SC) modulation, Hilbert transform, properties of Hilbert transform, Single side band (SSB) modulation and Vestigial-sideband (VSB) modulation, Modulation and demodulation of all the modulation schemes, COSTAS Receiver.

UNIT - II

Angle modulation: Frequency Modulation (FM) and Phase modulation (PM), Concept of instantaneous phase and frequency. Types of FM modulation: Narrow band FM and wide band FM, FM spectrum in terms of Bessel functions, Direct and

Indirect (Armstrong's) methods of FM Generation Balanced discriminator, Foster–Seeley Discriminator, Zero crossing detector and Ratio detector for FM demodulation Amplitude Limiter in FM.

UNIT - III

Transmitters and Receivers : Classification of transmitters. High level and low level AM transmitters, FM transmitters, Principle of operation of Tuned radio frequency (TRF) and super heterodyne receivers Selection of RF amplifier, Choice of Intermediate frequency Image frequency and its rejection ratio Receiver characteristics, Sensitivity, Selectivity, Fidelity, Double spotting, Automatic Gain Control.

UNIT - IV

Analog pulse modulation : Sampling of continuous time signals. Sampling of low pass and band pass signals Types of sampling, Pulse Amplitude Modulation (PAM) generation and demodulation. Pulse time modulation schemes: PWM and PPM generation and detection, Time Division Multiplexing.

UNIT - V

Noise : Atmospheric noise, Shot noise and thermal noise. Noise temperature, Noise in two- Port network: noise figure, equivalent noise temperature and noise bandwidth. Noise figure and equivalent noise temperature of cascade stages. Narrow band noise representation S/N ratio and Figure of merit calculations in AM, DSB-SC, SSB and FM systems, Pre-Emphasis and De - Emphasis.

TEXT BOOKS :

1. Simon Haykin, “Communication Systems,” 2/e, Wiley India, 2011.
2. B.P. Lathi, Zhi Ding, “Modern Digital and Analog Communication Systems”, 4/e

REFERENCE BOOKS:

1. “P. Ramakrishna Rao, “Analog Communication,” 1/e, TMH, 2011.
2. T G Thomas and S Chandra Shekar, Communication theory, 2/e, McGraw-Hill Education
3. 3. R.P.Singh, S.D.Sapre, Communication Systems, 2/e McGraw-Hill Education, 2008.
4. H. Taub, D.L. Schilling, "Principles of communication systems", Tata McGraw Hill, 2001.

PROFESSIONAL ELECTIVE - I
(5PE51XEC)

Course Code	Course Title						Core/Elective
5PE511EC	Electronics Measurement and Instrumentation						Core
Prerequisite	Contact Hours Per Week				CIE	SEE	Credits
	L	T	D	P			
NT, EDC	3	0	-	0	40	60	3

COURSE OBJECTIVES

This course aims to familiarize

1. Performance characteristics and various errors present in measuring instruments.
2. Describe the various transducers and their working principles.
3. Understand construction, working principle of display devices, printers, oscilloscopes.
4. Comprehend different types of signal generators, their construction and operation.
5. To address the underlying concepts and methods behind digital instruments.

COURSE OUTCOMES :

At the end of the course the student should be able to:

1. Understand the performance characteristics and various errors of an instrument.
2. Apply the complete knowledge of transducers to measure the physical quantities in the field of science, engineering and technology.
3. Understand construction and working principle of transducers, display devices, printers, Oscilloscopes, signal generators and digital instruments.
4. Illustrate different types of signal generators.
5. Understand the operation of different digital instruments.

UNIT - I

Qualities of Measurements : Introduction, Performance Characteristics, Static Characteristics, Error in Measurements, Types of Static Error, Sources of Error, Dynamic Characteristics of .....

UNIT - II

Transducers : Introduction, Electrical Transducer, Selecting a Transducer, Resistive Transducers, Strain Gauges, Inductive Transducer, LVDT, Capacitive Transducer (Pressure), Load Cell (Pressure Cell), Piezo-Electrical Transducer, Photo Electric Transducer, Photo-Voltaic Cell, Temperature Transducers.

UNIT - III

Display Devices, Printers and Oscilloscope : Introduction, Display Devices, LED, LCD, Other Display Devices,Printers, Classification of Printers, Dot-Matrix Printers, Character at a Time Dot-Matrix Impact Printer, Non-Impact Dot-Matrix (NIDM) Printers.

Introduction to Basic Principle, CRT Features, Block Diagram of Oscilloscope, Simple CRO, Dual Beam CRO, Sync Selector for Continuous Sweep CRO, Dual Trace Oscilloscope, (VHF) Sampling Oscilloscope, Storage Oscilloscope (for VLF Signal), DSO.

UNIT - IV

Signal Generators : Introduction, Fixed Frequency AF Oscillator, Variable Frequency AF Oscillator, Basic Standard Signal Generator (Sine Wave), Modern Laboratory Signal Generator, AF Sine and Square Wave Generator, Function Generator, Square and Pulse Generator (Laboratory Type), Random Noise Generator, Sweep Generator, Wobbluscope, Video Pattern Generator.

UNIT - V

Digital Instruments: Introduction, Digital Multimeters, Digital Frequency Meter, Digital Measurement of Time, Universal Counter, Decade Counter, Electronic Counter, Digital Measurement of Frequency (Mains), Digital Tachometer, Digital pH Meter, Digital Phase Meter, Digital Capacitance Meter.

TEXT BOOKS :

1. H. S. Kalsi, "Electronic Instrumentation", McGraw Hill Education (India) Private Limited, 3rd Edition 2016.
2. Anand, "Electronics Instruments and Instrumentation Technology", PHI.

REFERENCE BOOKS :

1. David A. Bell, "Electronic Instrumentation and Measurements", 3e, Oxford Univ. Press, 2013.
2. A.D. Helbincs. W.D. Cooper, "Modern Electronic Instrumentation and Measurement Techniques", 5th Edition, PHI, 2003.
3. B.M. Oliver, "Electronic Measurements and Instrumentation", J.M. Cage TMH Reprint 2009.
4. K. Lai Kishore, "Electronic Measurements and Instrumentation", Pearson Education 2010.
5. Albert D. Helstrick and William D. Cooper, "Modern Electronics Instrumentation & Measurement Techniques", Pearson Education.
6. Joshph J. Carr, "Elements of Electronics Instrumentation and Measurement", 3rd Edition, Pearson Education.
7. Doebelin, E.O., "Measurement systems", McGraw Hill, Fourth edition, Singapore, 1990.

Course Code	Course Title						Core/Elective
5PE512EC	Scripting Languages						Elective
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
Programming Language skills	3	-	-	-	40	60	3

COURSE OBJECTIVES :

This course aims to familiarize

1. To understand the UNIX and Shell environments.
2. To study the Linux kernel and commands.
3. To understand the ability of PERL scripting language.
4. To study the Python scripting language.

COURSE OUTCOMES :

At the end of the course the student should be able to:

1. Able to use UNIX and Linux based systems to perform various tasks.
2. Able to use shell scripting to run programs of any scripting language.
3. Able to compile large programming sets in the Perl and Python environment.
4. Able to effectively apply knowledge of Perl and Python to new situations and learn from the experience.
5. Able to Use Python scripting language for Web application development.

UNIT - I

Linux : Introduction to Linux, File System of the Linux, General usage of Linux kernel & basic commands, Permissions for file, directory and users, searching a file & directory, zipping and unzipping concepts, Overview of scripting languages.

UNIT - II

Shell : The Shell as a Process, Creating a Command File, VI Editor, UNIX Power Tools, Redirection and Pipelines, Variables, Conditional Constructs, Looping Constructs, Shell Functions, Parameters, Pattern Matching. Exporting, Signals and Traps, Built-In Commands, Bourne-Again Shell, Error Debugging, Advanced Shell Scripting Commands.

UNIT - III

Java Script : Overview, Object Orientation and JavaScript, Syntactic Characteristics, Primitives, Operators, Expressions, Input and Output, Control Statements, Objects Creation and modification, Arrays, Functions, Constructors, Pattern Matching. Manipulating DOM, HTML DOM Events, Basics of AJAX with example.

UNIT - IV

Ruby : Rails, The structure and Execution of Ruby Programs, Package Management with RUBYGEMS, Ruby and web: Writing CGI scripts, Cookies, Choice of Web servers, SOAP and web services. Rubik – Simple Tk Application, widgets, Binding events, Canvas, Scrolling.

Extending Ruby : Ruby Objects in C, Jukebox extension, Memory allocation, Ruby Type System, Embedding Ruby to Other Languages, Embedding a Ruby Interpreter.

UNIT - V

Python : Introduction to Python language, Python-Syntax, Statements, Functions, Built-in- functions and Methods, Modules in python, Exception Handling, Integrated Web Applications in Python – Building Small, Efficient Python Web Systems, Web Application Framework.

TEXT BOOKS :

1. David Barron, "The World of Scripting Languages", Wiley Publications.
2. Larry Wall, Tom Christiansen, John Orwant, "Programming PERL", 3rd Ed, Oreilly publications.

REFERENCE BOOKS :

1. Steve Holden and David Beazley, "Python Web Programming", New Riders Publications.
2. Ruby Programming language by David Flanagan and Yukihiro Matsumoto O'Reilly.

Course Code	Course Title						Core/Elective
5PE513EC	Real Time Operating Systems						Elective
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
Operating Systems	3	-	-	-	40	60	3

COURSE OBJECTIVES :

This course aims to familiarize

1. To illustrate the functions of operating systems.
2. To explain various real time systems and study the scheduling algorithms.
3. To comprehend the concepts of process synchronization.
4. To describe elementary concepts of Vx Works.
5. To introduce the fundamental concepts of UNIX operating system.

COURSE OUTCOMES :

At the end of the course the student should be able to:

1. Classify various types of kernels and operating systems
2. Analyse various scheduling algorithms related to RTOS.
3. Summarize the Inter process communication tools.
4. Understand the elementary concepts of VxWorks.
5. Enumerate the fundamental concepts of UNIX operating system.

UNIT - I

Operating System Introduction: Structures of Operating System (Monolithic, Microkernel, Layered, Exo-kernel and Hybrid kernel structures), Operating system objectives and functions, Virtual Computers, Interaction of OS and Hardware architecture, Evolution of operating systems- Batch, multi programming, Multitasking, Multiuser, parallel, distributed and real-time OS.

UNIT – II

Hard versus Soft Real-Time System: Jobs and Processors, Release time, Deadlines, and timing constraints, Hard and soft timing constraints, Hard real time systems, Uniprocessor Scheduling: Types of scheduling, scheduling algorithms: FCFS, SJF, Priority, Round Robin, UNIX Multi-level feedback queue scheduling, Thread scheduling, Multiprocessor scheduling concept, Real Time scheduling concept.

UNIT - III

Concurrency: Principles of Concurrency, Mutual Exclusion H/W Support, Software approaches, Semaphores and Mutex, Message passing, Monitors, Classical problems of Synchronization. Readers - Writers problem, Producer Consumer problem, Dining Philosopher problem. Deadlock. Principles of deadlock, Deadlock prevention, Deadlock Avoidance, Deadlock detection, An Integrated Deadlock Strategies.

UNIT - IV

Elementary Concepts of VxWorks: Multitasking, Task State Transition, Task Control – Task Creation and Activation, Task Stack, Task Names and IDs, Task Options, Task Information, Task Deletion and Deletion Safety. Comparison of RTOS – VxWorks, μC/OS-II, RT Linux and Xenomai for Embedded RTOS Applications. Case Studies in VxWorks.

UNIT - V

UNIX Kernel : File System (open, create, close, lseek, read, write), Concepts of – Process, Concurrent Execution & Interrupts. Process Management – forks & execution (fork, vfork, exit, wait, exec). Basic level Programming with System calls, Shell programming and filters, UNIX Signals, POSIX Standards.

TEXT BOOKS :

1. Andrew S. Tanenbaum, "Modern Operating Systems," 4/e, Pearson Edition, 2014.
2. Jane W.S. Liu, "Real Time Systems," 1/e, Pearson Education, Asia, 2002.
3. Jean J Labrose, "Embedded Systems Building Blocks Complete and Ready-to-use Modules in C", 2/e, CRC Press 1999.

REFERENCE BOOKS :

1. Karim Yaghmour, Jon Masters, Gilad Ben-Yesset, Philippe Gerum, "Building Embedded Linux Systems", 2/e, O' Reilly Media, 2008.
2. Wind River Systems, "VxWorks Programmers Guide 5.5", Wind River Systems Inc.2002.
3. P. Raghavan, Amol Lad, Sriram Neelakandan "Embedded Linux System Design and Development", 2005 CRC Press.

Course Code	Course Title						Core/Elective
5PE514EC	Neural Networks						Elective
Prerequisite	Contact Hours per Week				CIE	SIE	Credits
	L	T	D	P			
PTSP	3	-	-	-	40	60	3

COURSE OBJECTIVES :

This course aims to familiarize

1. To provide an introduction to neural networks and their classification, enabling students to understand the fundamental concepts and principles.
2. To develop a strong foundation to the mathematical models of artificial neural networks, including the McCulloch-Pitts and perceptron neuron models.
3. To explore the activation and synaptic dynamics of neural networks, and understand different activation models such as additive, shunting, and stochastic models.
4. To familiarize students with the basic learning laws of neural networks, enabling them to understand the principles behind learning and adaptation in neural networks.
5. To provide an overview of pattern recognition tasks and their applications, including pattern association, pattern storage, and neural network memory systems.
6. To introduce feed-forward and feedback neural networks, such as the backpropagation neural network and the Hopfield network, and their respective features, limitations, and applications.

COURSE OUTCOMES :

After completing this course, the student twill be able to

1. Understand the fundamental concepts and classification of neural networks, and apply this knowledge to solve real-world problems related to pattern recognition and memory systems.
2. Analyze and interpret the mathematical models of artificial neural networks, including the McCulloch-Pitts and perception neuron models, and apply them to various learning scenarios.
3. Evaluate and compare different activation models in neural networks, such as additive, shunting, and stochastic models, and select the appropriate model for specific applications.

4. Apply the basic learning laws of neural networks, such as Hebbian and delta rules, to train and adapt neural networks for pattern recognition and recall tasks.
5. Design and implement neural network memory systems, including auto, hetero, and bidirectional associative memory, for storing and retrieving patterns.
6. Develop an understanding of feed-forward and feedback neural networks, including back propagation and Hopfield networks, and apply them to solve complex problems in classification, approximation, and optimization.

UNIT - I

Introduction to Neural Networks, Classification, Mathematical Model of Artificial Neural Network, McCulloch-Pitts Neuron Model, Perceptron Neuron Model, ADALINE Neuron model.

UNIT - II

Activation and Synaptic Dynamics of Neural Networks, Additive, Shunting, and Stochastic Activation Models, Basic Learning Laws, Recall in Neural Networks.

UNIT - III

Pattern Recognition Tasks, Pattern Association, Pattern Storage (LTM & STM), Neural Network Memory: Auto, Hetero and Bidirectional Associative Memory.

UNIT - IV

Feed Forward Neural Networks, Single Layer & Multi-Layer Neural Networks, Perception Neural Networks and Solution of XoR Problem, Back Propagation Neural Networks: Features, Limitations, and Extensions.

UNIT - V

Feedback Neural Networks, Hopfield Network: Capacity and Energy Analysis, Applications.

Radial Basis Function Networks : Training Algorithm, Applications.

TEXT BOOKS :

1. B.Yeganaranarana, "Artificial Neural Networks", Prentice Hall, New Delhi, 2007.
2. J.A.Freeman and D. M.Skapura, "Neural Networks Algorithms, Applications and Programming Techniques", Addison Wesley, NewYork, 1999.

REFERENCE BOOKS :

1. Simon Haykin, "Neural Networks (A Comprehensive Foundation)", McMillan College Publishing Company,NewYork, 1994.
2. S.N.Sivanandam & M.Paul Raj, "Introduction to Artificial Neural Networks", Vikas Publishing House Pvt Limited, 2009.
3. Richard O. Duda, Peter E Heart, David G. Stork, "Pattern Classification", John Wiley & Sons 2002.

OPEN ELECTIVE-I
(XOE5XXXX)

Course Code	Course Title						Core/Elective
2OE501CE	Disaster Mitigation						Open Elective -I
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
-	3	-	-	-	40	60	3

COURSE OBJECTIVES :

This course aims to familiarize

1. Define disaster and explain the different types of disasters.
2. Describe the disaster management cycle and the role of NDMA in disaster management.
3. Analyze the legal aspects of disaster management.
4. Develop disaster mitigation plans.
5. Participate in disaster response and recovery activities.

COURSE OUTCOMES :

After completion of the course, the student will be able to

1. Demonstrate the concepts of disaster management.
2. Identify different types of disasters.
3. Explain the disaster management cycle.
4. Illustrate the role of NDMA in disaster management.
5. Explain the development of disaster mitigation plan.

UNIT - I

Introduction to Disaster Management: Definition of disaster, Types of disasters, History of disaster management in India, National Disaster Management Authority (NDMA) and its role in disaster management, Disaster management cycle. Case studies of disasters in India and the world.

UNIT - II

Disaster Mitigation: Mitigation measures for different types of disasters, Use of technology in disaster mitigation, Disaster risk assessment, Disaster preparedness, Exercises and simulations on disaster mitigation.

UNIT - III :

Disaster Response: Search and rescue operations, Medical relief, Food and shelter, Restoration of essential services, Rehabilitation and reconstruction.

UNIT - IV

Disaster Law and Policy: Disaster management acts of India, Disaster management policies of India, Legal aspects of disaster management.

UNIT - V

Disaster Communication and Public Awareness: Importance of communication in disaster management, Methods of disaster communication, Public awareness programs, Case studies of disaster communication and public awareness in India and the world.

TEXT BOOKS :

1. R.Subramanian, "Disaster Management", Vikas Publishing House, 2018.
2. M. M. Sulphey, "Disaster Management", PHI Learning, 2016.

REFERENCE BOOKS :

1. S. C. Sharma, "Disaster Management: Concepts, Approaches and Techniques", Khanna Book Publishing House, 2017.
2. G. K. Ghosh, "Disaster Management : Theory and Practice", APH Publishing Corporation, 2018.

Course Code	Course Title						Core/Elective
3OE501CS	OOPS Using Java						Elective
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
ATD	3	-	-	-	40	60	3

COURSE OBJECTIVES :

The objective of this course is to make the student to

1. The Java programming language: its syntax, idioms, patterns and styles.
2. Object oriented concepts in Java and apply for solving the problems.
3. How exception handling and multithreading makes Java robust.
4. Explore java Standard API library such as io, util, applet, awt.
5. Building of applications using Applets and Swings..

COURSE OUTCOMES :

After the completion of course the students will be able to:

1. Understand the concept of OOP and analyze relationships among classes, objects.
2. Develop programs using concepts like inheritance, packages, interfaces, Java I/O streams and strings.
3. Utilize exception handling and Multithreading concepts to develop Java programs.
4. Interpret the Java Collection API, Java utility classes, concept of files and serialization.
5. Design GUI applications using concepts like AWT controls and Swings and client server programs using networking concepts.

UNIT - I

Object Oriented Programming: Principles, Benefits of Object Oriented Programming. Introduction to Java: Java buzzwords, bytecode. Java Programming Fundamentals: Applet and Application program using simple java program, data types, variables, arrays, operators, expressions, control statements, type conversion and casting, concepts of classes, objects, constructors, methods, access control, this keyword, garbage collection, overloading methods and constructors, introducing access

control, static, final, nested and inner classes, exploring string class, using command-linear arguments.

Inheritance: Inheritance concept, types of inheritance, Member access rules, use of super and final.

Polymorphism - dynamic binding, method overriding, abstract classes and methods.

UNIT - II

Interfaces: Defining an interface, implementing interfaces, extending interface.

Packages: Defining, Creating and Accessing a Package, importing packages.

Exception handling: Benefits of exception handling, classification, checked exceptions and unchecked exceptions, usage of try, catch, throw, throws and finally, rethrowing exceptions, built in exceptions, creating own exception sub classes.

Multithreading: Java Thread Model, The Main Thread, creating a Thread, creating multiple threads, using is Alive() and join(), thread priorities, synchronization, inter thread communication, deadlock.

UNIT - III

Collections: Overview of Java Collection frame work, commonly used Collection classes – Array List, Linked List, Hash Set, Tree Set, Collection Interfaces – Collection, List, Set. Accessing Collection via iterator, working with Map. Legacy classes and interfaces – Vector, Hashtable, Stack, Dictionary, Enumeration interface.

Other Utility classes: String Tokenizer, Date, Calendar, Gregorian Calendar, Scanner Java.

Input/Output: exploring java.io, Java I/O classes and interfaces, File, Stream classes, byte stream, character stream, serialization.

UNIT - IV

GUI Programming with java: The AWT class hierarchy, MVC architecture.

Applet Revisited: Basics, architecture and skeleton, simple applet program.

Event Handling: Delegation Event Model, Event Classes, Source of Events, Event Listener Interfaces. Handling mouse and keyboard events, Adapter classes.

Database Programming using JDBC: Introduction to JDBC, JDBC Drivers & Architecture, CURD operation Using JDBC, Connecting to non-conventional Databases.

UNIT - V

Exploring Swing: JLabel, ImageIcon, JTextField, the Swing buttons, JTabbedpane, JScrollPane, JList, JComboBox.

Servlet: Life cycle, using tomcat, simple servlet, servlet API, javax.servlet package, reading servlet parameters, javax.servlet.http package, handling HTTP requests and responses

TEXTBOOKS

1. Java: The Complete Reference, X Edition, Herbert Schildt, McgrawHill.
2. Java Fundamentals: A Comprehensive Introduction, Herbert Schildt and Dale Skrien, TMH.
3. Java for Programming, P.J.Dietel X Edition, PearsonEducation

REFERENCE BOOKS

1. The Java Programming Language, Ken Arnold, David Holmes, James Gosling, Prakash Goteti, III Edition, Pearson 2008
2. An Introduction to OOP, T. Budd, IIIEdition, Pearson Education.
3. Introduction to Java Programming, Y. Daniel Liang, X Edition, Pearson Education.

Course Code	Course Title						Core/Elective
1OE501AD	Artificial Intelligence						Elective
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
ATD	3	-	-	-	40	60	3

COURSE OBJECTIVES :

The objective of this course is to make the student to

1. To introduce the AI techniques to solve problems and search strategies to find optimal solution paths from start to goal state.
2. To introduces different knowledge representation methods in AI Programs.
3. To introduce different design techniques for Game Playing Programs.
4. To introduce the AI Agents their design, planning and learning techniques.
5. To introduce the natural language processing and expert systems.

COURSE OUTCOMES:

After the completion of course the students will be able to:

1. Understand fundamental AI concepts and identify a range of symbolic and non symbolic AI techniques.
2. Demonstrate an understanding of various searching algorithms such as adversarial search and game-playing commonly used in artificial intelligence software.
3. Use different knowledge representation techniques used in AI Applications.
4. Demonstrate an understanding of agent based AI architectures, Planning and logic based agents.
5. Exploring Expert systems options.

UNIT - I

Introduction : Artificial Intelligence and its applications, Artificial Intelligence Techniques Problem solving techniques: State space search, control strategies, heuristic search, problem characteristics, production system characteristics., Generate and test, Hill climbing, best first search, A* search, AO* search, Constraint satisfaction problem, Agenda Driven Search, Mean-end analysis, Min- Max Search, Alpha-Beta Pruning, Iterative Deepening.

UNIT - II

Knowledge representation: Mapping between facts and representations, Approaches to knowledge representation, procedural vs declarative knowledge, Forward vs. Backward reasoning, Matching, conflict resolution, Weak and Strong filler structures.

UNIT - III

Non Monotonic and Statistical Reasoning: on monotonic Logic, Default Logic, Circumscription, Bayes Theorem, Bayesian Network, Dempster Shafer Theory, Fuzzy sets, Fuzzy Logic, Defuzzification.

UNIT - IV

Planning and Learning Agents : Intelligent Agents, Nature and structure of Agents, Learning Agents, Introduction to different Forms of Learning, The Planning problem, planning with state space search, partial order planning, planning graphs, planning with propositional logic, Analysis of planning approaches, Hierarchical planning, conditional planning, Continuous and Multi Agent planning.

UNIT - V

Introduction to Learning and Expert system: Expert systems, Expert system examples, Expert System Architectures, Rule base Expert systems, Non Monotonic Expert Systems, Decision tree base Expert Systems.

TEXTBOOKS

1. AI: A Modern Approach Stuart J. Russel, Peter Norvig Pearson Education Latest Edition, 2012
2. Artificial Intelligence Elaine Rich, Knight McGraw Hill Third Edition 2010.
3. Artificial Intelligence, Saroj Kaushik Cengage Learning, First Edition 2011.

REFERENCES

1. Artificial Intelligence, Partick Henry Winston Addison Wesley Latest Edition 2012.
2. Artificial Intelligence George Luger Pearson Education Latest Edition 2010.

Course Code	Course Title	Core/Elective					
4OE501EE	Renewable	Elective					
	Energy Systems	L	T	P/D	Credits	CIE	SEE
	(Open Elective - I)	3	0	0	3	40	60

COURSE OBJECTIVES:

1. To understand the concepts and Importance of renewable energy sources such as solar, wind, biomass, geo and tidal power.
2. To make the students understand the advantages and disadvantages of different renewable energy sources.

COURSE OUTCOMES :

At the end of the course students will be able to

1. Explain the advantages, disadvantages and applications of different non-conventional sources.
2. Acquire the knowledge of various components, principle of operation and present scenario of different conventional and non- conventional sources.

UNIT - I

Review of Conventional and Non-Conventional energy sources - Need for non-conventional energy sources Types of Non- conventional energy sources - Fuel Cells - Principle of operation with special reference to H2 °2Cell - Classification and Block diagram of fuel cell systems - Ion exchange membrane cell - Molten carbonate cells - Solid oxide electrolyte cells - Regenerative system- Regenerative Fuel Cell - Advantages and disadvantages of Fuel Cells- Applications of Fuel Cells.

UNIT- II

Solar energy - Solar radiation and its measurements - Solar Energy collectors -Solar Energy storage systems - Solar Pond - Application of Solar Pond - Applications of solar energy, V-I and P-V curves.

UNIT - III

Wind energy- Principles of wind energy conversion systems - Nature of wind - Power in the Wind-Basic components of WECS - Classification of WECS - Site selection considerations - Advantages and disadvantages of WECS - Wind energy collectors - Applications of Wind energy.

UNIT - IV

Energy from the Oceans - Ocean Thermal Electric Conversion (OTEC) methods - Principles of tidal power generation -Advantages and limitations of tidal power generation -Ocean waves - Wave energy conversion devices -Advantages and disadvantages of wave energy - Geo-thermal Energy - Types of Geo-thermal Energy Systems - Applications of Geo-thermal Energy.

UNIT - V

Energy from Biomass - Biomass conversion technologies / processes - Photosynthesis - Photosynthetic efficiency - Biogas generation - Selection of site for Biogas plant - Classification of Biogas plants - Details of commonly used Biogas plants in India - Advantages and disadvantages of Biogas generation -Thermal gasification of biomass -Biomass gasifiers.

TEXTBOOKS :

1. Rai G.D, "Non-Conventional Sources of Energy", Khandala Publishers, New Delhi, 2011.
2. David M Buchla and Thomas E Kissell, "Renewable Energy Systems", 1st Edition by, Pearson India.

REFERENCES/SUGGESTEDREADING :

1. M.M.El-Wakil, "Power Plant Technology", McGraw Hill, 1984.
2. John Twidell, Tony Weir, "Renewable Energy Resources", 3rd Edition, Taylor and Francis.

Course Code	Course Title						Core/Elective
5OE501EC	Basics of Electronic Communication						Open Elective -I
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
Mathematics, Basic Electronics	3	-	-	-	40	60	3

COURSE OBJECTIVES :

1. To provide an introduction to fundamental concepts in the understanding of communications systems.
2. To describe the network model and some of the network layers including physical layer, data link layer, network layer and transport layer.
3. To discuss the evolution of wireless systems and current wireless technologies.

Course Outcomes :

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

1. Understand the working of analog and digital communication systems.
2. Explain the OSI network model and the working of data transmission.
3. describe the evolution of communication technologies from traditional telephony systems to modern wireless communication systems.
4. Differentiate between analog and digital modulation techniques.
5. Understand the optical fibre communication link, structure, propagation and transmission properties.

UNIT - I

Introduction to Communication systems: Electromagnetic Frequency Spectrum, Signal and its representation, Elements of Electronic Communications System, Types of Communication Channels.

Signal Transmission Concepts: Baseband transmission and Broadband transmission, **Communication Parameters:** Transmitted power, Channel bandwidth and Noise, Need for modulation Signal Radiation and Propagation: Principle of electromagnetic radiation, Types of Antennas, Antenna Parameters and Mechanisms of Propagation.

UNIT - II

Analog and Digital Communications: Amplitude modulation and demodulation, FM modulation and demodulation, Digital converters, Digital modulation schemes - ASK, FSK, PSK, QPSK, Digital demodulation.

UNIT - III

Data Communication and Networking: Network Models, OSI Model, Data Link Layer – Media Access control, Ethernet, Network Layer – Internet Protocol (IPv4/ IPv6), Transport Layer – TCP, UDP.

UNIT - IV

Telecommunication Systems: Telephones, Telephone system, Optical Communications : Optical Principles, Optical Communication Systems, Fiber –Optic Cables, Optical Transmitters & Receivers, Wavelength Division Multiplexing.

UNIT - V

Wireless Communications: Evolution of Wireless Systems: AMPS, GSM, CDMA, WCDMA, OFDM. Current Wireless Technologies: Wireless LAN, Bluetooth, PAN and ZigBee, Infrared wireless, RFID communication, UWB, Wireless mesh networks, Vehicular adhoc networks.

TEXT BOOKS :

1. Louis E. Frenzel, "Principles of Electronic Communication Systems", 3rd edition, McGraw Hill, 2008.
2. George Kennedy, Bernard Davis, "Electronic Communication systems", 4th edition, McGraw Hill, 1999.

REFERENCE BOOKS :

1. Behrouz A. Forouzan, "Data Communications and Networking", 5th edition, TMH, 2012.
2. Rappaport T.S., "Wireless communications", 2nd edition, Pearson Education, 2010.
3. Wayne Tomasi, "Advanced Electronic Communications Systems", 6th edition, Pearson Education.

Course Code	Course Title						Core/Elective
6OE501ME	Start - up and Entrepreneurship						Open Elective
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
	3	-	-	-	40	60	3

COURSE OBJECTIVES :

Students should be able to understand

- To motivate students to take up entrepreneurship in future.
- To learn nuances of starting an enterprise & project management.
- To understand project formulation and choice Technology in Enterprise.
- To understand Intellectual properties, patents, Start-ups.

COURSE OUTCOMES :

After the completion of course students will be able to

1. Understand Entrepreneurship and Economic growth, Small and Large Scale Industries, Types and forms of enterprises.
2. Identify the characteristics of entrepreneurs, Emergence of first generation entrepreneurs, Conception and evaluation of ideas and their sources.
3. Practice the principles of project formulation, Analysis of market demand, Financial and profitability analysis and Technical analysis.
4. Understand the concept of Intellectual Property Rights and Patents
5. Comprehend the aspects of Start-Ups.

UNIT - 1

Entrepreneurship: Definition, functions of Entrepreneurship, Characteristics and qualities of entrepreneurs, Entrepreneur vs. intrapreneur, need of innovation, Economic growth. Small Scale Industry in India, Linkage among small, medium and heavy industries.

UNIT – II

Indian Industrial Environment: Competence, Opportunities and Challenges, Emergence of First generation entrepreneurs, women entrepreneurs. Conception and evaluation of ideas and their sources. Types of enterprises. - Collaborative interaction for Technology development. Corporate Social Responsibility

UNIT – III

Project formulation: Introduction, Elements of Business Plan and its salient features, Analysis of market demand, Financial and profitability analysis and Technical analysis.

UNIT -IV

Intellectual Property Rights: Meaning, Nature, Classification and protection of Intellectual Property, the main forms of Intellectual Property, Concept of Patent, Patent document, Invention protection, Granting of patent, Rights of a patent, Licensing, Transfer of technology.

UNIT - V

Aspects of Start-Up: What is Start-Up, Start-up Policy, start-up strategy, Progress of startups in India, Principles of future organizations, start-up sectors and action plan for start-ups by Govt. of India.

TEXT BOOKS :

1. Vasant Desai, "Dynamics of Entrepreneurial Development and Management", Himalaya Publishing House,
2. Prasanna Chandra, "Project-Planning, Analysis, Selection, Implementation and Review", Tata McGraw-Hill Publishing Company Ltd. 1995.
3. Stephen R. Covey and A. Roger Merrill, "First Things First", Simon and Schuster", Publication, 1994.

REFERENCE BOOKS :

1. G.S. Sudha, "Organizational Behaviour", 1996.
2. Robert D. Hisrich, Michael P. Peters, "Entrepreneurship", Tata Me Graw Hill Publishing Company Ltd., 5lh Ed., 2005.
3. G.B. Reddy, "Intellectual Property Rights and the Law", 5th Ed. 2005 Gogia Law Agency.
4. Ajit Parulekar and Sarita D'Souza, "Indian Patents Law – Legal & Business Implications", Macmillan India Ltd, 2006.

HS 502HS & HS602HS	**Effective Technical Communication** (Common to ECE, ME, CE & EEE –V SEM & CSE & AI & DS – VI SEM)						Core
Prerequisite	Contact Hours Per Week				CIE	SEE	Credits
	L	T	D	P			
	2	-	-	-	40	60	2

Course Objectives :	**Course Outcomes :**
The following are the Objectives of the Course :	**After completion of the course, the student will be able to :**
1. To Understand the process, features and barriers of Communication.	1. Handle Technical Communication effectively by over coming barriers of communication.
2. To learn the aspects of communication and Presentation.	2. Use different types of Professional correspondence to communicate effectively.
3. To comprehend the types of official and business correspondence.	3. Use different types of Business and Inter Office Correspondence.
4. To analyze the techniques of Report Writing	4. Acquire adequate skills to draft reports efficiently.
5. Aspects of data transfer and presentation.	5. Enhance their skills of information transfer.

UNIT - I

Introduction to Communication.

Definition, process and Channels of Communication.

ABC of Technical communication.

Barriers to communication.

Differences between general and Technical writing.

UNIT - II

Aspects of Communication.

Importance of listening and types of Listening.

Types of Technical communication (Oral and Written).

Features of technical communication (Precision, relevance, format, style & Use of visual aids).

Persuasive Techniques.

UNIT - III

Technical Writing-I

Emails

IOM

Business Letters - enquiry and response; compliant and Adjustment; placement of order; Cover letters/Job Application & Resume Writing.

Business Proposals.

UNIT - IV

Technical Writing –II

Types of technical Reports (Informative, analytical, periodic, special, formal and Informal).

Formal Elements of a Report.

Feasibility, Project, Progress and Evaluation reports.

UNIT - V

Information Transfer and Presentations

Non-verbal to verbal

Verbal to Non – Verbal

Important aspects of Oral and Visual Presentations.

SUGGESTED READING:

1. Raman, Meenakshi & Sharma, Sangeeta.(2015). "Technical Communication: Principles and Practice", 3rd ed., New Delhi. OUP.
2. Rizvi, Ashraf, M (2017). "Effective Technical Communication", 2nd ed., New Delhi, Tata McGraw Hill Education.
3. Sharma, R. C & Mohan , Krishna.(2017). "Business Correspondence and Report Writing: A Practical approach to business & technical communication", 4th ed., New Delhi, Tata McGraw Hill Education.
4. Tyagi, Kavita & Misra, Padma.(2011). "Advanced Technical Communication". New Delhi, PHI Learning.
5. Jungk, Dale.(2004). "Applied Writing for Technicians", Newyork, McGraw Hill Higher Education.

Course Code	Course Title						Core/Elective
5PC551EC	Microcontrollers Lab						Core
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
Computer Organization and Architecture	0	-	-	2	40	60	1

COURSE OBJECTIVES :

This course aims to familiarize

1. To develop and execute the assembly programming concepts of 8051.
2. To Design and develop 8051 based programs for various interface modules.
3. To develop and execute the embedded C programming concepts of ARM.
4. To Design and develop ARM based programs for various interface modules.

COURSE OUTCOMES:

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

1. To write assembly language programs using 8051 controller.
2. To develop interfacing applications using 8051 controller.
3. To develop embedded C programming concepts of ARM.
4. To develop ARM based programs for various interface modules.

List of Experiments

PART-A

[Experiments for 8051 Microcontroller kit]

1. Familiarity and use of 8051 microcontroller trainers, and execution of programs.
2. Instruction set for simple programs (using 4 to 5 lines of instruction code).
3. Timer and counter operations and programmingusing8051.
4. Serial communications using UART.
5. Programming using interrupts.
6. Interfacing 8051 with DAC to generate waveforms.
7. Interfacing traffic signal control using 8051.
8. Program to control stepper motor using 8051.

9. ADC interfacing with 8051.
10. Serial RTC interfacing with 8051.
11. LCD interfacing with 8051.

PART-B

Interfacing Programs using embedded C on ARM Microcontroller Kit

1. Program to interface 8-bit LED and switch interface
2. Program to implement Buzzer interface on IDE environment
3. Program to display message in a 2 line x 16 characters LCD display and verify the result in debug terminal Stepper motor interface.
4. ADC & Temperature sensor LM35 interface
5. Transmission from kit and reception from PC using serial port.

NOTE : 1. At least ten experiments to be conducted in the semester.
2. Minimum of 5 from Part A and 5 from Part B is compulsory.
3. In Part-B, perform the experiments using assembler simulator like Keil software.

TEXT BOOKS :

1. Mazidi M.A, Mazidi J.G & Rolin D. Mckinlay, "The 8051 Microcontroller & Embedded Systems using Assembly and C," 2/e, Pearson Education, 2007
2. Joseph yiu, "The definitive guide to ARM Cortex-M3", Elsevier, 2nd edition.

Course Code	Course Title						Core/Elective
5PC552EC	Signals and Systems Lab						Core
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
Signals & Systems	-	-	-	2	40	60	1

COURSE OBJECTIVES :

1. To develop C & MATLAB programs for operation of sequences.
2. To implement the algorithms of DFT, IDFT, FFT and IFFT on discrete time signals.
3. To design and obtain the frequency response of various digital filters.

COURSE OUTCOMES :

1. Develop MATLAB files for the verification of system response.
2. Design and analyze the digital filters using MATLAB.
3. Verify the functionality of FFT algorithms.
4. Experiment with multirate techniques using MATLAB & CCS.
5. Design and implement the digital filters on DSP processor.

PART-A

List of Signal Processing Experiments

Perform the following programs using MATLAB Simulator.

1. Introduction to MATLAB and signal generation.
2. Perform Linear Convolution.
3. Perform Circular Convolutions.
4. Perform DFT and FFT algorithm.
5. Perform FIR filters design using different window functions.
6. Perform IIR filters design: Butterworth and Chebyshev, LPF, HPF, BPF & BSF filter.
7. Perform Interpolation and Decimation.
8. Implementation of multi-rate systems.

PART-B

List of DSP Processor Experiments

Implement the following experiments using DSK (TMS320C67XX)

1. Introduction to DSP processors and Study of procedure to work in real-time.
2. Implement Solution of difference equations.
3. Implement Impulse Response.
4. Implement Linear Convolution.
5. Implement Circular Convolution.
6. Implement Fast Fourier Transform Algorithms.
7. Design of FIR (LP/HP) USING windows: (a) Rectangular (b) Triangular (c) Hamming windows.
8. Design of IIR (HP/LP) filters.

NOTE :

1. Atleast ten experiments to be conducted in the semester.
2. Minimum of 5 from Part A and Part B is compulsory.

TEXT BOOKS :

1. A. Nagoor Kani, "Digital Signal Processing", McGraw-Hill Education , 2nd Edition, 2012
2. John Leis, "Digital Signal Processing - A MATLAB - Based Tutorial Approach", Overseas Press, 1st Edition, 2008.

Course Code	Course Title						Core/Elective
5PW571EC	Mini Project						Core
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
EDC, Microcontroller, H/W Skills	-	-	-	2	40	60	1

COURSE OBJECTIVES :

1. To conceive a problem statement either from rigorous literature survey or from the requirements raised from need analysis.
2. To provide training in soft skills and also train them in presenting seminars and technical report writing.
3. To design, implement and test the prototype/algorithm in order to solve the conceived problem.

COURSE OUTCOMES :

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

1. Get practical experience of software design and development, and coding practices within Industrial/R&D Environments.
2. Gain working practices within Industrial/R&D Environments
3. Prepare reports and deliver effective presentation.
4. Demonstrate effective written and oral communication skills.
5. Innovate in various engineering disciplines and nurture their entrepreneurial ideas.

Guidelines for Mini Project

1. The mini-project is a team activity having maximum of 3 students in a team. This is electronic product design work with a focus on electronic circuit design.
2. The mini project may be a complete hardware or a combination of hardware and software. The software part in mini project should be less than 50% of the total work.
3. Mini Project should cater to a small system required in laboratory or real life.

4. It should encompass components, devices, analog or digital ICs, micro controller with which functional familiarity is introduced.
5. After interactions with course coordinator and based on comprehensive literature survey/ need analysis, the student shall identify the title and define the aim and objectives of mini-project.
6. Student is expected to detail out specifications, methodology, resources required, critical issues involved in design and implementation and submit the proposal within first week of the semester.
7. The student is expected to exert on design, development and testing of the proposed work as per the schedule.
8. Art work and Layout should be made using CAD based PCB simulation software. Due considerations should be given for power requirement of the system, mechanical aspects for enclosure and control panel design.
9. Completed mini project and documentation in the form of mini project report is to be submitted at the end of semester.
10. The tutorial sessions should be used for discussion on standard practices used for electronic circuits/product design, converting the circuit design into a complete electronic product, PCB design using suitable simulation software, estimation of power budget analysis of the product, front panel design and mechanical aspects of the product, and guidelines for documentation /report writing.