

Mangalore University

PhD Syllabus

Department of Electronics

Ph.D Course Work

Paper 1: Research Methodology and Computation Techniques

Unit I: What Is Research? Exploring Research in Your Field, Browsing Periodical Section of Library, Finding Journals on Internet.

Tools of Research: Library And Its Resources, Computer And Its Software As Tool of Research, Measurement As A Tool Of Research, Human Mind As A Tool Of Research, Language As A Tool Of Research

Unit II: Focusing Research Efforts: Finding A Problem, Stating A Research Problem, Evaluating A Research Problem, Identifying Sub Problems And Its Characteristics, Stating The Hypothesis of Research Question.

Review of Literature: Role of Review, Locating Related Literature, Using Library Catalogue, Indexes, Abstracts and Other References, Using Online Database, Organising Information Collected, Evaluating and Synthesising The Literature.

Unit III: Planning A Research Proposal: Basic Format of Research, Research Planning And Methodology, General Criteria For Research Project, Role of Data in Research, Linking Data in Research Methodology, Writing Research Proposal, Strengthening Research Proposal
Preparing the Research Report: Planning Research Report, Description of Problem, Description of Method, Presentation And Interpretation of Data, Preliminary Pages And Notes, Foot Notes, Reference List, Appendix, Organising The Research Report.

Unit IV: MATLAB: Matlab Environment, Variables And Arrays, Initialising Variables In Matlab, Multidimensional Arrays, Subarrays, Special Values, Displaying Output Data, Data Files, Scalar And Array Operations, Hierarchy of Operations, Built-in Matlab Functions, Introduction to Plotting.

Branching Statements And Program Design: Introduction to Top-Down Design Techniques, Use of Pseudocode, Relational And Logic Operators, Branches, Additional Plotting Features
Loops: The *While* Loop, The *For* Loop, Logic Arrays And Vectorization

Unit V: User Defined Functions: Introduction to Matlab Functions, Variable Passing in Matlab: The Pass-By-Value Scheme, Optional Arguments, Sharing Data Using Global Memory, Preserving Data Between Calls To A Function, Function Functions, Sub-function And Private Functions.

Unit VI: Complex Data, Character Data And Additional Plot Types: Complex Data, String Functions, Multidimensional Arrays, Additional Two-Dimensional Plots, Three-Dimensional Plots.

Input/ Output Functions: The Text Read Function, Load And Save Commands, Matlab File Processing, File Opening And Closing, Binary I/O Functions, Formatted I/O Functions, Comparing Formatted And Binary I/O Functions, File Positioning And Status Functions, Function ui Import.

Unit VII: Handle Graphics; The Matlab Graphics System, Object Handles, Examining And Changing Object Properties, Using *Set* to List Possible Property Values, User Defined Data, Finding Objects, Selecting Objects With the Mouse Position And Units, Printer Positions, Default And Factory Properties, Graphics Object Properties.

GUI: How Does A GUI Work? Creating and Displaying A GUI, Object Properties, GUI Components, Dialog Boxes, Menus, Tips for Creating Efficient GUIs

Text Books:

1. Practical Research: Planning And Design – Paul D. Leedy And Jeanne Ellis Ormrod, 9th Edition, Pearson Publications ISBN – 978-0-13-715242-1, 2010.
2. Matlab Programming For Engineers – Stephen J Chapman, 2nd Edition Brooks/Cole Publications

Paper 2: Theoretical Foundations
Digital Systems and Hardware description Language

Unit I: Introduction to digital logic design, number systems, binary data manipulation

Unit II: Combinational Logic Design, Sequential Logic Design, Memory

Unit III: Modeling Digital Systems, Domains and levels of modelling, modelling languages, VHDL modelling concepts and variables, scalar types, type classification, attributes of scalar types.

Unit IV: If statements, Case Statements, Null statements, Loop statements, Assertion and Report statements, Arrays, Unconstrained Arrays, Array operations and referencing, records.

Unit V: Entity Declarations and Architecture Bodies, behavioural Descriptions, Structural Descriptions, Design Processing, Procedures, Procedure Parameters, Concurrent Procedure Call Statements, Functions, Overloading, Visibility of Declarations.

Unit VI: Package Declarations, Package Bodies, Use Clauses, basic resolved Signals, Resolved Signals, Ports and Parameters, The predefined packages Standard and Env, IEEE Standard Packages, Aliases for Data Objects, Aliases for non-data items, generic Constants.

Unit VII: Components, Configuring Component Instances, generating iterative structures, conditionally generating structures, synthesizable subset, Use of Data Types, Interpretation of Standard Logic values, Modelling Combinational logic, Modelling Sequential Logic, Modelling memories, Synthesis Attributes, Metacomments.

Text Books:

1. Digital Systems Design with FPGAs and CPLDs – Ian Grout, Elsevier Publications, 2009, Indian reprint.
2. The Student's Guide to VHDL – Peter j Asheden, Second Edition, Elsevier Publications.

Paper 3: Recent Developments

Digital System Design

Unit I: Electronics Circuits: Analogue and Digital, History of Digital Logic, Programmable Logic Versus Discrete Logic, Types of Programmable Logic, Programmable Logic Versus Processors, Types of Programmable Logic, PLD Configuration Technologies, Programmable Logic Design Methods and Tools, Technology Trends.

Unit II: Sequential Product Development Process versus Concurrent, Flow Charts, Block Diagrams, Gajski-Kuhn Chart, Hardware-Software Co-Design, Formal Verification, Embedded systems and real Time Operating Systems, Electronic System- Level Design, Creating A Design Specification, Unified Modelling Language, Reading A Component Data Sheet, Digital Input/Output, System on A Chip and System in A Package, Mechatronic Systems.

Unit III: Designing with HDLs, Design Entry Methods, Logic Synthesis, Entities, Architectures, Packages and Configurations, A First Design, Signals Versus Variables, generics, Reserved Words, Data Types, Concurrent versus Sequential Statements, Loop and Program Control, Coding Styles for VHDL.

Unit IV: Combinational Logic Design, Sequential Logic Design, Memories, Unsigned Versus Signed Arithmetic, Testing The Design: The VHDL test Bench, File I/O for the test Bench Development.

Unit V: Digital-to-Analogue Conversion, Analogue-to-Digital Conversion

Unit VI: Integrated Circuit Testing, Printed Circuit Board Testing, Boundary Scan Testing, Software testing.

Unit VII: Electronic System- Level Design, Case Study 1: DC Motor Control, Case Study 2: Digital Filter Design.

Text Book:

Digital Systems Design with FPGAs and CPLDs – Ian Grout, Elsevier Publications, 2009, Indian reprint.

Paper 4: Literature Review