

**SRINIVAS**



**UNIVERSITY**

Mukka, Mangaluru – 574146

Web : [www.srinivasuniversity.ac.in](http://www.srinivasuniversity.ac.in)

**[In compliance of University Grants Commission  
(Minimum Standards and Procedures for Award of  
Ph.D. Degree) Regulations, 2022]**

**COURSEWORK SYLLABUS OF  
Ph.D. PROGRAMME IN  
ELECTRONICS AND COMMUNICATION**

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**INSTITUTE OF ENGINEERING AND TECHNOLOGY  
SRINIVAS UNIVERSITY  
Mukka Mangaluru – 574146.**

**A. COURSE WORK PATTERN****400 M**

<b>Sl. No.</b>	<b>Subjects</b>	<b>Credits</b>	<b>Internal Marks</b>	<b>External Marks</b>	<b>Marks</b>
1	Research Methodology (22SPHDRM001)	4	50	50	100
2	Advanced Embedded System (22SPHDECE02)	4	50	50	100
3	Analysis And Presentation Of Proposed Research Topic (22SPHD PUB003)	4	50	50	100
4	Review Of Literature (22SPHD PUB004)	4	50	50	100
<b>Total</b>		<b>16</b>	<b>200</b>	<b>200</b>	<b>400</b>

## COURSE WORK SYLLABUS

### 1. RESEARCH METHODOLOGY (22SPHDRM001)

#### Module-1

Meaning, Objectives and Characteristics of research - Research methods Vs Methodology - Types of research - Descriptive Vs. Analytical, Applied Vs. Fundamental, Quantitative Vs. Qualitative, Conceptual Vs. Empirical - Research process - Criteria of good research - Developing a research plan. Defining the research problem - Selecting the problem - Necessity of defining the problem - Techniques involved in defining the problem - Importance of literature review in defining a problem - Survey of literature - Primary and secondary sources – Development of working hypothesis.

#### Module -2

Research design and methods – Research design – Basic Principles- Need of research design – Features of good design – Important concepts relating to research design – Observation and Facts, Laws and Theories, Prediction and explanation, Induction, Deduction, Development of Models - Developing a research plan - Exploration, Description, Diagnosis, and Experimentation- Determining experimental and sample designs.

#### Module -3

Sampling design - Steps in sampling design - Characteristics of a good sample design - Types of sample designs - Measurement and scaling techniques - Methods of data collection – Collection of primary data - Data collection instruments Testing of hypotheses - Basic concepts - Procedure for hypotheses testing flow diagram for hypotheses testing - Data analysis with Statistical Packages – Correlation and Regression - Important parametric test - Chi-square test - Analysis of variance and Covariance

#### Module -4

Data Analysis using MS Excel Introduction to Spreadsheets Spreadsheet Functions to Organize Data, Introduction to Filtering, Pivot Tables, and Charts, Advanced Graphing and Charting. Interpretation and report writing - Techniques of interpretation - Structure and components of scientific reports - Different steps in the preparation - Layout, structure and language of the report - Illustrations and tables - Types of report - Technical reports and thesis

#### Module-5

**Ethics in Research:** Importance, Principles, Developing a code of ethics, Ethics and Respondents, Ethics and Clients, Ethics and research firm. Plagiarism. Patent and Copyrights

#### REFERENCES:

1. Garg, B.L., Karadia, R., Agarwal, F. and Agarwal, U.K., 2021. An introduction to Research Methodology, RBSA Publishers.
2. Kothari, C.R., 2015. Research Methodology: Methods and Techniques. New Age International. 418p.
3. Anderson, T. W., An Introduction to Multivariate Statistical Analysis, Wiley Eastern Pvt., Ltd., New Delhi
4. Sinha, S.C. and Dhiman, A.K., 2012. Research Methodology, EssEss Publications. 2 volumes. se knowledge base, Atomic Dog Publishing.
5. Trochim, W.M.K., 2015. Research Methods: the conci 270p.
6. Fink, A., 2019. Conducting Research Literature Reviews: From the Internet to Paper. Sage Publications

7. Intellectual Property Rights in the Global Economy: Keith Eugene Maskus, Institute for International Economics, Washington, DC, 2019

8. Subbarau NR Handbook on Intellectual Property Law and Practice Publishing Private Limited.2008 S Viswanathan Printers

9. Research Methodology, Shashi k Gupta and Praneet Rangi. Kalyani Publishers, 6<sup>th</sup> edition

## ADVANCED EMBEDDED SYSTEM (22SPHDECE02)

### Module I

**Embedded System:** Embedded vs General computing system, classification, application and purpose of ES.

**Core of an Embedded System:** Memory, Sensors, Actuators, LED, Optocoupler, Communication Interface, Reset circuits, RTC, WDT, Characteristics and Quality Attributes of Embedded Systems.

### Module 2

**Hardware Software Co-Design:** embedded firmware design approaches, computational models, embedded firmware development languages, Integration and testing of Embedded Hardware and firmware, Components in embedded system development environment (IDE), Files generated during compilation, simulators, emulators and debugging.

### Module 3

**Real Time Operating System:** Task and Task states – Task and data – Semaphore and shared data operating system services – Message queues timing functions – Events – Memory management – Interrupt routines in an RTOS environment – Basic design using RTOS.

### Module 4

**ARM-32 bit Microcontroller:** Thumb-2 technology and applications of ARM, Architecture of ARM Cortex M3, Various Units in the architecture, General Purpose Registers, Special Registers, exceptions, interrupts, stack operation, reset sequence.

### Module 5

**Instruction Sets:** Assembly basics, Instruction list and description, useful instructions, Memory Systems, Memory maps, Cortex M3 implementation overview, pipeline and bus interface.

Exceptions, Nested Vector interrupt controller design, SysTick Timer, Cortex-M3 Programming using assembly and C language, CMSIS .

### TEXT BOOKS:

1. K. V. Shibu, "Introduction to embedded systems", TMH education Pvt. Ltd. 2009.
2. Joseph Yiu, "The Definitive Guide to the ARM Cortex-M3", 2nd edn, Newnes, (Elsevier), 2010.

### REFEENCE BOOKS:

1. James K. Peckol, "Embedded systems- A contemporary design tool", John Wiley, 2008
2. David. E.Simon, "An Embedded Software Primer", Pearson Education, 2001
3. Rajkamal, Embedded Systems, 211d Edition, McGraw hill Publications, 2010.

### **3. ANALYSIS AND PRESENTATION OF PROPOSED RESEARCH TOPIC (22SPHDPUB003)**

The candidates should publish the proposed work in the conference abstract book/ proceedings/ Journal.

Article quality and its presentation carries 50% weightage as internal marks and final end exam carries 50% weightage.

Exam descriptive. Questions will be general. Answers can be in relation to his/her published

### **4. REVIEW OF LITERATURE (22SPHDPUB004)**

The candidate should publish the review article of his/her proposed work and they should submit the proof of published paper. Review article quality and its presentation carries 50% weightage as internal marks and final end exam carries 50% weightage.

Exam Descriptive. Questions will be General. Answers can be in relation to the published review paper.

## **NOTE:**

### **IA Components**

DDLr completion certificate

One MOOCs/Online certificate on Research methodology

One review paper with ISSN No (Connected to fourth paper of coursework)

One paper presented in conference – Proof (Connected to third paper)

Assignment for Second paper (given by the Guide or Coordinator)

Assignment for first paper (given by the Guide or Coordinator)