Embedded firmware design and development (excluding C language).

Text 2: Ch-3, Ch-4 (4.1, 4.2.1 and 4.2.2 only), Ch-7 (Sections 7.1, 7.2 only), Ch-9 (Sections 9.1, 9.2, 9.3.1, 9.3.2 only) **L1,L2,L3**

Module -5

RTOS and IDE for Embedded System Design:

Operating System basics, Types of operating systems, Task, process and threads (Only POSIX Threads with an example program), Thread preemption, Preemptive Task scheduling techniques, Task Communication, Task synchronization issues – Racing and Deadlock, Concept of Binary and counting semaphores (Mutex example without any program), How to choose an RTOS, Integration and testing of Embedded hardware and firmware, Embedded system Development Environment – Block diagram (excluding Keil), Disassembler/decompiler, simulator, emulator and debugging techniques **(Text 2: Ch-10 (Sections 10.1, 10.2, 10.3, 10.5.2 , 10.7, 10.8.1.1, 10.8.1.2, 10.8.2.2, 10.10 only), Ch-12, Ch-13 (a block diagram before 13.1, 13.3, 13.4, 13.5, 13.6 only)**

Trends in the Embedded Industry: Processor Trends in Embedded System, Embedded OS Trends, Development Language Trends, Open Standards, Frameworks and Alliances, Bottlenecks.

Text2: 16.1 to 16.5

Course Outcomes: At the end of the course, students will be able to:

- **Describe** the architectural features and instructions of 32 bit microcontroller ARM Cortex M3.
- **Apply** the knowledge gained for Programming ARM Cortex M3 for different applications.
- **Understand** the basic hardware components and their selection method based on the characteristics and attributes of an embedded system.
- **Develop** the hardware software co-design and firmware design approaches..
- **Explain** the need of real time operating system for embedded system applications and **Ability** to learn the embedded systems related to industry.

Text Book:

- **Joseph Yiu, "The Definitive Guide to the ARM Cortex-M3",** 3rd Edition, Newnes, (Elsevier), 2010.
- **Shibu K V, "Introduction to Embedded Systems**", Tata McGraw Hill Education Private Limited, 3rd Edition.

Reference Books:

- **James K. Peckol, "Embedded systems- A contemporary design tool**", John Wiley, 2008, ISBN: 978-0- 471-72180-2.
- **Yifeng Zhu, "Embedded Systems with Arm Cortex-M Microcontrollers in Assembly Language and C**", 2nd E -Man Press LLC ©2015 ISBN:0982692633 9780982692639.
- **Embedded Systems by Rajkamal**, 2nd Edition, McGraw hill Publications, 2010

Semester	VI	Course Title	Artificial Intelligence and Machine Learning	Course Code	18 EC 63
Teaching Period	50 Hours	L – T – P – TL*	3– 1 – 0 – 4	Credits	3
CIE*	40 Marks	SEE*	60 Marks	Total	100 Marks

CREDITS- 03

Course Objectives:

- Gain a historical perspective of AI and its foundations.
- Become familiar with basic principles of AI toward problem solving, inference, perception, knowledge representation, and learning.
- Understand some concepts and techniques that are core to Machine Learning and decision tree.
- Acquire knowledge of neural networks, Bayesian techniques and instant based learning.
- Understand analytical learning and reinforced learning.

Module 1

Introduction: Introduction and Intelligent systems, What Is AI, The Foundations of Artificial Intelligence, The History of Artificial Intelligence, Applications of A.I.

Solving Problems by Searching, Study and analysis of Various searching algorithms. Implementation of Depth-first search Problem Solving Agents, Searching for Solutions, Uninformed Search Strategies: Breadth-first search, Uniform-cost search, Depth-first search.

Module 2

Logical Agents: Knowledge representation structures: Frames, semantic net, Scripts, Logic: Prepositional Logic, Prepositional Theorem Proving, Inference and proofs, Proof by resolution, Conjunctive normal form, Horn clauses and definite clauses, Forward and backward chaining, A complete backtracking algorithm, Syntax and Semantics of First-Order Logic, Symbols and interpretations, Knowledge Engineering in First-Order Logic, Unification, Resolution, Introduction to logic programming (PROLOG) Natural language processing and Expert systems.

Module 3

Introduction: Learning Problems, Designing Learning systems, Perspectives and Issues.

Concept Learning: Concept Learning task and concept learning as search, Find-S, Version Spaces and Candidate Elimination Algorithm.

Decision Tree learning: Representation, Basic Algorithm and Hypothesis Space Search.

Module 4

Artificial Neural Networks: Introduction, Neural network representation, perceptron's, Multilayer network and the back propagation algorithm.

Bayesian learning: Bayes Theorem, Bayes Theorem Concept Learning, Maximum Likelihood,