

AC –11-03-25  
Item No. – 04

Approved by the BoS in Information Technology on 05-03-2025 Item No. 04

**As Per NEP 2020**

**Tolani College of  
Commerce  
(Autonomous)**



**Title of the Course: Introduction to Embedded Systems**

**Programme: B.Sc.(Information Technology)  
Semester IV**

**Syllabus for 4 credits**

**From the academic year-2025-2026**

Sr. No.	Heading	Particulars
1	<b>Description of the course :</b>	An embedded system is a computer system—a combination of a computer processor, computer memory, and input/output peripheral devices—that has a dedicated function within a larger mechanical or electronic system.
2	<b>Vertical :</b>	Minor
3	<b>Type :</b>	Theory and Practical
4	<b>Credit:</b>	4 credits
5	<b>Hours Allotted :</b>	60 Hours
6	<b>Marks Allotted:</b>	100 Marks Continuous Evaluation =40 Semester End =60
7	<b>Course Objectives:</b>	<ol style="list-style-type: none"> <li>1. To provide the idea of decomposing the given problem into Analysis, Design, Implementation, Testing and Maintenance phases.</li> <li>2. To provide an idea of using various process models in the software industry according to given circumstances.</li> <li>3. To gain the knowledge of how Analysis, Design, Implementation, Testing and Maintenance processes are conducted in a software project.</li> <li>4. To develop software applications for improving quality, budget, and time efficiency.</li> </ol>
8	<b>Course Outcomes:</b>	<ol style="list-style-type: none"> <li>1. Learners should be able to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics</li> <li>2. Learners should be able to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors</li> <li>3. Learners should be able to communicate effectively with a range of audiences</li> <li>4. Learners should be able to acquire and apply new knowledge as needed, using appropriate learning strategies.</li> </ol>

9

**Modules:-**

1

**Module 1: Introduction to embedded systems, Core of embedded , Characteristics and quality attributes of embedded systems: (15 hours)**

- Embedded Systems and general purpose computer systems, history, classifications, applications and purpose of embedded systems
- **systems:** microprocessors and microcontrollers, RISC and CISC controllers, Big endian and Little endian processors, Application specific ICs, Programmable logic devices, COTS, sensors and actuators, communication interface, embedded firmware, other system components.
- Characteristics, operational and non-operational quality attributes.

**Module 2: – Embedded Systems – Application and Domain Specific, Embedded Hardware, Peripherals (15 hours)**

- Application specific – washing machine, domain specific –automotive
- Memory map, i/o map, interrupt map, processor family, external peripherals, memory – RAM , ROM, types of RAM and ROM, memory testing ,Flash memory.
- Control and Status Registers, Device Driver, Timer Driver - Watchdog Timers..

**Module 3: The 8051 Microcontrollers, 8051 Programming in C (15 hours)**

- Microcontrollers and Embedded processors, Overview of 8051 family.8051 Microcontroller hardware, Input/output pins, Ports, and Circuits, External Memory.
- Data Types and time delay in 8051 C, I/O Programming, Logic operations, Data conversion Programs.

**Module 4: Designing Embedded System with 8051 Microcontroller, Programming embedded systems, Design and Development (15 hours)**

- Factors to be considered in selecting a controller, why 8051 Microcontroller, Designing with 8051.
- Structure of embedded program, infinite loop, compiling, linking and debugging.
- Embedded system development Environment – IDE, types of file generated on cross compilation, disassembler/ de-compiler, simulator, emulator and debugging, embedded product development life-cycle, trends in embedded industry.

**Reference Books:**

- 1) Author: James K. Peckol, **Title:** Embedded Systems: A Contemporary Design Tool, **Publisher:** Wiley, **Year:** 2024
- 2) Author: N. Senthil Kumar, S. Jeevananthan, **Title:** Embedded Systems with 8051, **Publisher:** Wiley India, **Year:** 2024

12	<b>Internal Continuous Assessment: 40%</b>	<b>Semester End Examination : 60%</b>
13	<b>Continuous Evaluation through:</b>	<b>Practical Assessment</b>
14	<b>Format of Question Paper:</b>	

**Scheme of Evaluation Pattern**  
**Table 1A: Scheme of Continuous Evaluation (CE/Practical)**  
**Scheme of Evaluation Pattern**

Sub-components	Maximum Marks	Conditions for passing
1) Practical exam	30	a) A learner must be present for each of the sub- components
2) Journal and Viva	10	
Total	40	

**Table 1B: Scheme of Semester End Examination (SEE)Evaluation**  
**Question Paper Pattern for Semester End Examination (SEE)**  
**Maximum Marks: 60** **Duration: 2 Hrs.**

Note: All questions are compulsory. Each question has an internal choice.

Question Number	Nature of Questions	Maximum Marks
1)	<b>Attempt any 3</b>	
	a)	15
	b)	
	c)	
	d)	
	e)	
2)	<b>Attempt any 3</b>	
	a)	15
	b)	
	c)	
	d)	
	e)	
3)	<b>Attempt any 3</b>	
	a)	15
	b)	
	c)	
	d)	
	e)	
4)	<b>Attempt any 3</b>	
	a)	15
	b)	
	c)	
	d)	
	e)	