

# GUJARAT TECHNOLOGICAL UNIVERSITY

**Subject Name: Embedded Computing (Elective)**

**Subject Code: 3735206**

## Semester III

**Type of course:** ME - Electronics & Communication Engineering (VLSI & Embedded Systems Design)

**Prerequisite:** Basic knowledge in computer architecture.

**Rationale:** NA

### Teaching and Examination Scheme:

Teaching Scheme			Credits C	Examination Marks				Total Marks
L	T	P		Theory Marks		Practical Marks		
			ESE (E)	PA (M)	PA (V) ESE	PA (I)		
4	2#	0	5	70	30	30	20	150

L- Lectures; T- Tutorial/Teacher Guided Student Activity; P- Practical; C- Credit; ESE- End Semester Examination; PA- Progressive Assessment;

### Content:

Sr. No.	Content	Total Hrs	% Weightage
1	Introduction to Embedded Processing, Overview of VLIW and ILP	6	<b>10</b>
2	Overview of ISA design, Architectural Structures in ISA design, Micro architecture Design	6	<b>10</b>
5	Disciplined Development, Firmware Standards, Sample Drawing System	7	<b>20</b>
4	Runtime System, Application Design and Customization	7	20

### Reference Books:

1. Embedded Computing a VLIW Approach to Architecture, Compilers and Tools By Joseph A. Fisher, Elsevier publication
2. The Art of Designing Embedded Systems By Jack Ganssle, Elsevier publication

### Course Outcome:

1. After learning the course the students should be able to:
2. Explain the fundamentals of embedded computing and VLIW architecture.
3. Describe the VLIW architecture and pipelining.
4. Describe the term system on chip, simulation techniques for processor cores and the entire systems and development tools.
5. Describe the performance enhancement approaches like code compression, embedded OS, and multithreading.
6. Describe the process of high quality firmware and hardware development.

### **List of Experiments: (with Open Ended Problems)**

1. Study MISRA C coding standards & prepare a presentation (at least 10 slides) for the same. The presentation should cover at least the following topic
  - a. Need for coding standards in automobile electronics.
  - b. Purpose & scope of MISRA C standards.
  - c. Specifications & recommendations of MISRA C.
  - d. Compilers implementing coding
2. Modify the matrix assignment given in previous session for **N x M size** instead of 3x3 hardcoded matrices. Use dynamic memory allocation. Implement the specifications of MISRA C for the same.
3. Give appropriate comments to your code. Refer *stm32f3* code given earlier. The commenting should be compatible with Doxygen document format as mentioned in the last session. Comments should approximately account for 60% of the total lines of code (No of lines of comment should be more than lines of Code)
4. Generate Doxygen document in HTML and PDF format for the same. The documentation should contain interactive Flow diagrams & dependency diagrams.

### **List of Open Source Software/learning website:**

1. **Linux-opensuse 11.3**

**Review Presentation (RP):** The concerned faculty member shall provide the list of peer reviewed Journals and Tier-I and Tier-II Conferences relating to the subject (or relating to the area of thesis for seminar) to the students in the beginning of the semester. The same list will be uploaded on GTU website during the first two weeks of the start of the semester. Every student or a group of students shall critically study 2 papers, integrate the details and make presentation in the last two weeks of the semester. The GTU marks entry portal will allow entry of marks only after uploading of the best 3 presentations. A unique id number will be generated only after uploading the presentations. Thereafter the entry of marks will be allowed. The best 3 presentations of each college will be uploaded on GTU website