

Course Name : Electronics Engineering Group

Course Code : ET/EJ/EN/EX/ED/EI/IS/IC/IE/IU

Semester : Sixth for ET/EJ/EN/EX/IS/IC/IE and Seventh for ED/EI/IU

Subject Title : Embedded Systems (Elective-II)

Subject Code : 9168

Teaching and Examination Scheme:

Teaching Scheme			Examination Scheme						
TH	TU	PR	PAPER HRS	TH	TE	PR	OR	TW	TOTAL
03	--	02	03	80	20	--	25#	25@	150

Rationale:

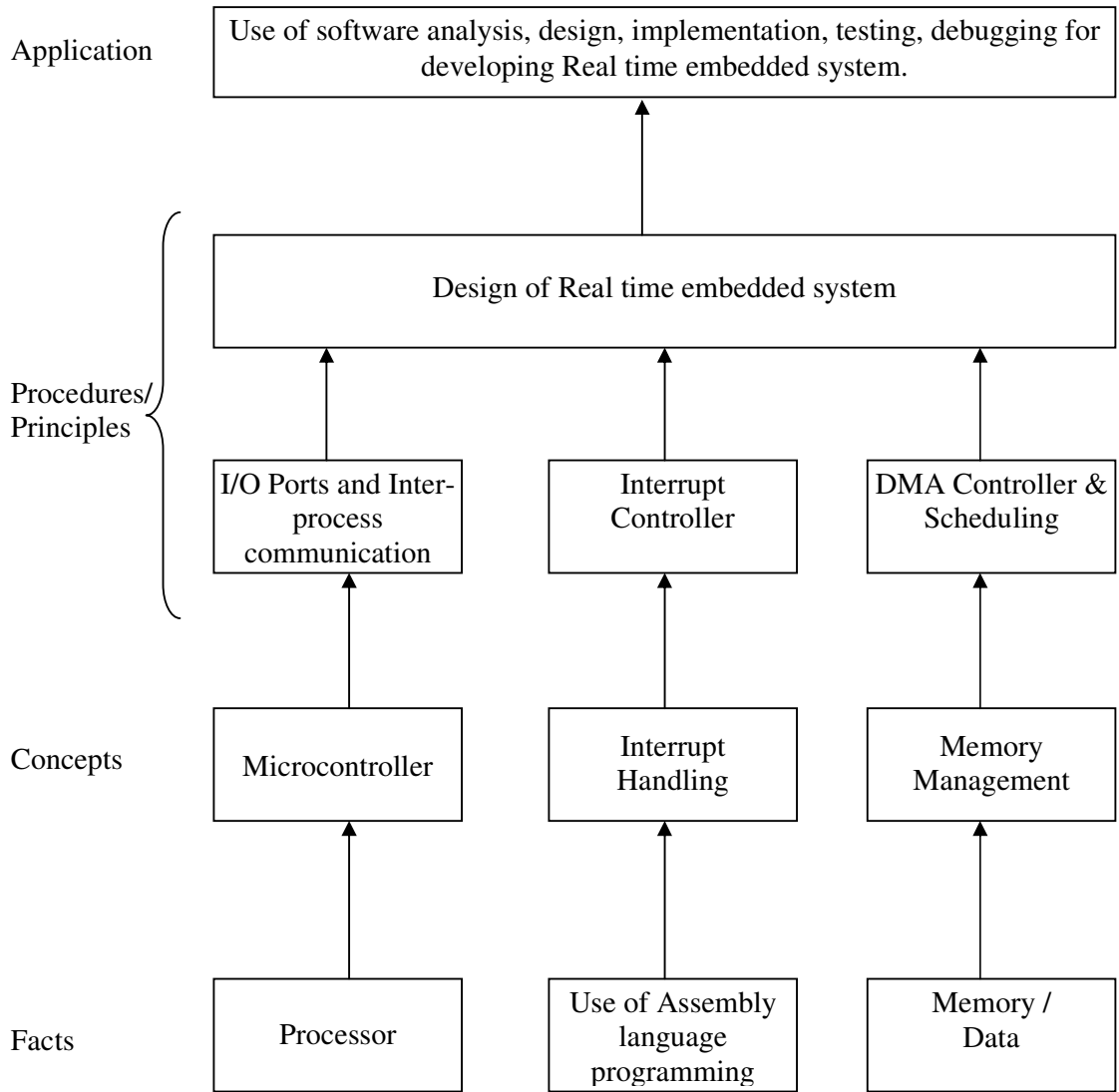
The study of embedded systems is essential part of Computer Science. It deals with computer hardware with software embedded in it. This subject will enable student to develop logical thinking and use of “Firmware”. It is practical oriented subject having theoretical prerequisites of Microprocessor, Digital Techniques, Data Structures and Computer Architecture. Students will be able to develop Real Time Systems, Device drivers, use interrupt service mechanism, program timing and counting devices and develop embedded C-Programs for Microcontroller.

Objectives:

The student will be able to:

1. Access embedded systems hardware units like processor, I/O device, On-chip and Off-chip device, Power supply etc.
2. Interface various devices using ports.
3. Write embedded program.
4. Develop programmable interrupt controller.
5. Perform software analysis, design, implementation, testing, debugging for embedded systems.

Learning Structure:



Contents: Theory

Chapter	Name of the Topic	Hours	Marks
01	8051 I/O Ports & Interrupts 1.1 8051 Parallel I/O Ports 1.2 Interrupt handling & programming : concept of synchronous & asynchronous interrupts, ISR, programming external hardware interrupt & Timer interrupt.	08	16
02	Introduction to Communication Protocol 2.1 Serial Communication – Study of SBUF, SMOD, SCON, PCON registers & programming for serial communication. Introduction of RS-232, Study of RS-232 Pinout 2.2 Serial protocols: I2C, CAN, Fire wire, USB introduction & Comparison 2.3 Parallel protocols–PCI bus, PCI-X bus, introduction & comparison 2.4 Introduction to ARM7-TDMI	12	20
03	Embedded System 3.1 Introduction, different Hardware Units, advantages like Reliability, efficiency and cost, Applications. 3.2 Software & Hardware development tools , IDE, Compiler, Debugger, Simulator, Emulator, In circuit Emulator(ICE),Target Board, Device Programmer 3.3 Embedded software development cycle	06	10
04	Device Driver & Interfacing Applications 4.1 Concept of Device Driver 4.2 Interfacing of seven segment display & LCD display Interfacing diagram & pin out of LCD (Demonstration & programming in practical session only) 4.3 Interfacing of Key board, ADC & DAC- interfacing diagram & programming. 4.4 Interfacing of stepper motor- interfacing diagram & programming	14	24
05	RTOS & Interprocess Communication 5.1 Concepts of RTOS 5.2 Requirement, Need, Specification of RTOS in Embedded systems 5.3 Multitasking 5.4 Task synchronization & Mutual Exclusion 5.5 Starvation, Deadlock, Multiple Process	08	10
Total		48	80

Practical:

Skills to be developed:

Intellectual skills:

1. Use of programming language constructs in program implementation.
2. To be able to apply different logics to solve given problem.
3. To be able to write program using different implementations for the same problem
4. Study different types of errors as syntax semantic, fatal, linker & logical
5. Debugging of programs
6. Understanding different steps to develop program such as
 - Problem definition

- Analysis
- Design of logic
- Coding
- Testing
- Maintenance (Modifications, error corrections, making changes etc.)

Motor skills:

1. Proper handling of Computer System.

List of Practical

Students undertaking project based on Microcontroller should perform any 8 practical from the list given.

Students not undertaking Microcontroller based project should perform 9 practical in which practical number 10 & 11(Stepper Motor interfacing & ADC Interfacing) are compulsory.

1. Development and execution of the program for sending data on port lines.
2. Development and execution of the program for arithmetic operation and time delay.
3. Development and execution of the program for input and output operation.
4. Development and execution of the program for interface LEDs to particular port.
5. Development and execution of the program to generate a square wave on port.
6. Development and execution of the program for logical operators and data conversion.
7. Development and execution of the program PWM waveform generation.
8. Development and execution of the program to display “MSBTE” message on LCD (16x2).
9. To write 8051 C program to send “WELCOME” on serial port continuously.
10. Interface Stepper Motor to Microcontroller 8051 and development and execution of the program to run stepper motor.
11. Interface ADC to Microcontroller 8051 and development and execution of the program to display digital equivalent of analog input
12. Interface DAC to Microcontroller 805 and development and execution of the program to generate specified voltage.

Learning Resources:

Books:

Sr. No.	Author Title Publisher	Title	Publisher
1	Raj Kamal	Embedded Systems	Tata McGraw Hill
2	Muhammad Ali Mazidi, Janice Gillispie Mazidi	The 8051 Microcontroller And Embedded Systems	PHI
3	Ajay V Deshmukh	Microcontrollers (Theory And Applications)	Tata McGraw Hill
4	Kenneth J. Ayala	The 8051 Microcontroller	PRI
5	Frank Vahid, Toney Givargis	Embedded System Design: A unified Hardware/Software Introduction	John Wiley
6	David E. Simon	An Embedded Software Primer	Pearson Education