Kadi Sarva Vishwavidyalaya
Faculty of Engineering & Technology
Fourth Year Bachelor of EC Engineering
(VIIth sem Academic Year 2020)

Subject Code:EC704A-N	Subject Title:EMBEDDED SYSTEMS

Course Objective:

- To give the fundamental skills knowledge of embedded system, different examples, its characteristics and different processors architecture.
- To give the knowledge of Real time operating system.
- To give the knowledge of Architecture and Programming of ARM Processor.
- To introduce device driver and its application in any embedded system.
- To give detail of different networks which are used in embedded system design and flow of any embedded system design.
- To give the Knowledge of Inter Process Communication and its synchronization.

Teaching scheme				Total Credit	EvaluationScheme		IE Marks	CIA Marks	Pract. Marks	Total Marks
					Theory					
L	T	P	Total		Hrs	Marks				
Hrs	Hrs	Hrs	Hrs							
04	00	02	06	05	03	70	30	20	30	150

Outline Of the Course:

Sr. No	TitleoftheUnit	Hours
1	Introduction to Embedded Systems	07
2	ARM Processor and its Programming	18
3	Wireless Devices and Communication Protocols	14
4	Real Time Operating System	14
5	Interprocess Communication and Synchronization of processes, Thread and Task	07
	Total	60

Total hours (Theory):60
Total hours (Lab):
Total hours:

Detailed Syllabus

Sr. No	Topic	Lecture Hours	Weightage(%)
1.	**Introduction to Embedded Systems:** Embedded system and general purpose computers, Embedded system components, Embedded System Design Process, Classification of an embedded system, and Examples of an embedded system and Applications of an embedded system.	07	**15**
2.	**ARM Processor and its Programming:** Introduction, History of ARM Processors, Basic Architecture and organization of Cortex-M3 processor, ARM Processor (Cortex-M3) Fundamentals: Registers, Application Program Status Register: Current Program Status Register, Pipeline (3-stage pipeline ARM organization, 5-stage pipeline ARM organization), **Instruction Set:** Data Processing, Branch Instructions, Load-Store Instruction, Software interrupt instruction and Program status Register Instruction and Program Related to instruction.	18	**30**
3.	**Wireless Devices and Communication Protocols:** Watchdog Timer, Real Time Clock Serial bus communication protocols: RS232C, RS485, UART, I2C bus, CAN bus, USB Parallel bus device protocols: ISA bus, PCI and PCI/x bus, AMBA bus, Wireless devices: Irda, Bluetooth, GSM, RFID, Zigbee	14	**20**
4.	**Real Time Operating System:** Operating system service, Process management, Timer and Event function, Memory management, Device File and I/O subsystem management, Interrupt routine in RTOS environment and handling of interrupt service calls, Basic design using RTOS, RTOS task scheduling models, Interrupt latency and response of tasks as performance metrics, OS security issue. OS performance, power optimization strategies for process.	14	**20**
5.	**Interprocess Communication and Synchronization of processes, Thread and Task:** Multiple process and thread in application, Task and Task state, Task control block, Task coding, Task scheduling, Semaphores, Semaphores for synchronization, Data sharing and deadlocks, Inter process communication, Sockets and remote procedure call	07	**15**
	Total	**60**	**100**

Instructional Method and Pedagogy:
- At the start of course, the course delivery pattern, prerequisite of the subject will be discussed.
- Lectures will be conducted with the aid of multi-media projector, black board, OHP etc.
- Attendance is compulsory in lecture and laboratory which carries 10 marks in overall evaluation.
- One internal exam will be conducted as a part of internal theory evaluation.
- Assignments based on the course content will be given to the students for each unit and will be evaluated at regular interval evaluation.
- Surprise tests/Quizzes/Seminar/tutorial will be conducted having a share of five marks in the overall internal evaluation.
- The course includes a laboratory, where students have an opportunity to build an appreciation for the concepts being taught in lectures.
- Experiments shall be performed in the laboratory related to course contents.

Learning Outcome:

At the end of this course, the student would be able

- Students will be able to understand the fundamentals of structure and various methods of Analysis.
- Students recognize the role of professional societies in developing new structural software and updating current knowledge.
- Students recognize the need for technical updating on a continuing basis, since the course emphasizes on the changing nature of software.

TEXT BOOKS:

1. Embedded System: Architecture, Programming and Design by Rajkamal, TMH.
2. ARM System on Chip Architecture by Steve Furber, Pearson Education

REFERENCE BOOKS:

1. ARM system developer's guide Book by Andrew N. Sloss, Morgan Kaufmann Publishers.

LIST OF EXPERIMENTS

Sr. No.	Experiment Title
1.	Introduction of EasyMx Pro v7 for STM 32 ARM Processor.
2.	To Study and Perform LED Blinking on Cortex M3 Processor (ARM7).
3.	To Study and Perform TFT(Thin Film Transistor) on Cortex M3 Processor (ARM7).
4.	To Study and Perform ADC on Cortex M3 Processor.
5.	To Study and Perform LED curtain on Cortex M3 Processor
6.	To Study and Perform Sound signal on piezo Buzzer curtain on Cortex M3 Processor.
7.	To Study and Perform Button test on Cortex M3 Processor.
8.	To Study and Perform Reads data from 24C02 EEPROMon Cortex M3 Processor.
9.	To Study and Perform sound test on Cortex M3 Processor.
10.	To Study and Perform features of the joystick input device on Cortex M3 development boards.