Kadi Sarva Vishwavidyalaya

Faculty of Engineering & Technology

Third Year Bachelor of Engineering (CE/IT)

(In Effect From Academic Year 2019-20)

Subject Code: CT604C-N	**Subject Title: Embedded Systems**
Pre-requisite	

Teaching Scheme (Credits and Hours)

Teaching scheme				**Total Credit**	**Evaluation Scheme**					
L	**T**	**P**	**Total**		**Theory**		**Mid Sem Exam**	**CIA**	**Pract.**	**Total**
Hrs	**Hrs**	**Hrs**	**Hrs**		**Hrs**	**Marks**	**Marks**	**Marks**	**Marks**	**Marks**
03	00	02	05	04	03	70	30	20	30	150

Course Objective:

- To learn the concepts of Embedded System and implement these concepts into practice. .

Outline Of the Course:

Sr. No	**Title of the Unit**	**Minimum Hour**
1	Introduction	4
4	Custom single-purpose processors: Hardware	6
2	General-purpose processors: Software	5
3	Standard single-purpose processors: Peripherals	7
5	Memory	6
6	Interfacing	7
7	State Machine and Concurrent Process Models	8
8	RTOS	5

Total hours (Theory): 48
Total hours (Lab): 32
Total hours: 80

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Detailed Syllabus

Sr. No	Topic	Lecture Hours	Weightage(%)
1	**Introduction** Embedded systems overview, Design challenge – optimizing design metrics, Embedded processor technology, IC technology.	4	9
2	**Custom single-purpose processors: Hardware** Introduction, Combinational logic design, Sequential logic design, Custom single-purpose processor design, RT Level Custom Single Purpose Processor Design, Optimizing Custom Single Purpose Processors.	6	13
3	**General-purpose processors: Software** Introduction, Basic architecture, Operation, Programmer's view, Development Environment, Application Specific Instruction Set Processors, Selecting a microprocessor.	5	10
4	**Standard single-purpose processors: Peripherals** Introduction, Timers, counters, and watchdog timers, UART, Pulse width modulator, LCD controller, Keypad controller, Stepper motor controller, Analog-digital converters, Real-time clocks.	7	14
5	**Memory** Read-only memory – ROM, Read-write memory – RAMS Composing memories, Memory hierarchy and cache.	6	13
6	**Interfacing** Introduction, Communication Basics, Microprocessor Interfacing: I/O Addressing, Microprocessor Interfacing: Interrupts, Microprocessor Interfacing: Direct Memory Access, Arbitration, Multilevel Bus Architecture, Advanced Communication Principles	7	14
7	**State Machine and Concurrent Process Models** Introduction, Models vs. Languages, Text vs. Graphics, Finite State Machines, Finite State machine with Data path Model: FSMD, Using State Machines, HCFSM and the state charts Language, Program State Machine Model (PSM), Concurrent Process Model.	8	17
8	**RTOS** Introduction to RTOS, Process management & memory management in RTOS along with Real time scheduling.	5	10
	Total	48	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.

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- 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

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Learning Outcome:

On successful completion of this course, the student should be able to:

- Understand the Concepts of Embedded System.
- Understand the Implementation of different Sensors using Arduino Board.

Reference Books:

1. Computers as Components: Principles of Embedded Computing System Design, Wayne Wolf, 2nd Edition, Morgan Kaufmann Publishers
2. Embedded System Design: A Unified Hardware Software Approach, Frank Vahid and Tony Givargis
3. Michael J. Pont, “Embedded C”, Pearson Education , 2007.
4. Embedded Systems: Architecture, Programming and Design, Raj Kumar
5. Embedded Software: The works, Colin walls.

List of experiments

No	Name of Experiment
1.	Introduction of Arduino kit with reference to embedded system
2.	Perform LED ON Without Delay.
3.	Perform LED on with Delay.
3.	Perform Big Sound Sensor.
4.	Perform Flame Sensor.
5.	Perform IR Sensor.
6.	Displaying a Text on LCD Display.
7.	Introducing a Sensor- Flex Sensor
8.	Perform the keyes laser module(ky-008) and laser receiver/detector module
9.	Perform Experiment on Humidity and Temperature Sensor.
10.	Generate Pattern by Running LEDs using PWM
11.	Introducing GSM Interfacing Board
12.	Introduction of EasyMx Pro v7 for STM 32 ARM7.
13.	Write a code for perform LED Blinking on Cortex M3 Processor(ARM 7).