BCA (IOT): SENSING AND ACTUATING DEVICES

Total Teaching Hours : 48

No. Of Lecture Hours/Week:3

Max Marks:60

Course Objective:

This course enables students to understand:

a): Remember the concept of transducers. Understanding where the concept can be applied in real time and its applications in different domains. Recognising the differences between sensors and transducers.

b): Understand to implement sensors basics in different applications of industry domain. Understanding the evolution of IoT

c):Apply the basics of sensors in IOT applications

d):Analyze the sensors need in todays emerging wireless technology and analyse various sensors in industry applications which has revolutionized IoT

Course Outcome:

- Understand the fundamentals of transducers and types
- Understand sensors and actuators and types
- Understanding generations of sensors
- Understanding real time applications of sensors in todays technology

UNIT 1: TRANSDUCERS Teaching Hours :12
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Introduction, Electrical transducers, Selecting a transducer, Resistive transducer, Resistive position transducer, Strain gauges, Thermistor, Piezo-electric Transducers, Differential output transducers and LVDT. Piezoelectric transducer, photoelectric transducer, Photovoltaic transducer, Temperature transducers-RTD, Thermocouple. Bolometer and RF power measurement using Bolometer.

UNIT 2: Introduction to Sensors and Actuators

Teaching Hours :12

SENSORS: Introduction to Sensors, Types of Sensors : BERO Sensors, Proximity Sensors (Inductive, Capacitive, Ultrasonic), Atmospheric Sensors: Pressure and Density Sensors. Actuators :Types

UNIT 3: GENERATIONS OF IOT SENSORS:

Teaching Hours :12

Industrial sensors – Description & Characteristics

Integrated IoT Sensors – Description & Characteristics, Polytronics Systems – Description & Characteristics, Printed Electronics. Wireless sensors. RF module :Transmitter and Receiver.

UNIT 4: IOT DEVELOPMENT EXAMPLES

Teaching Hours :12

ACOEM Eagle – EnOcean Push Button – NEST Sensor – Ninja Block. Focus on wearable electronics.

Essential Text Books:

Text Books:

1.Dr. Guillaume Girardin , Antoine Bonnabel, Dr. Eric Mounier, 'Technologies & Sensors for the Internet of Things Businesses & Market Trends 2014 - 2024', Yole Développement Copyrights ,2014 2.Peter Waher, 'Learning Internet of Things', Packt Publishing, 2015

Reference Books:

1.Editors Ovidiu Vermesan Peter Friess, Internet of Things – From Research and Innovation to Market Deployment', River Publishers, 2014

2. N. Ida, Sensors, Actuators and Their Interfaces, Scitech Publishers, 2014.

WEB REFERENCE:

http://web.dev

http://www.researchgate.net

http://en.m.wikipedia.org

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WEB REFERENCE:

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	TITLE: SENSING AND ACTUATING LAB				
	Max Marks: 40	CREDITS : 2	NO OF HRS: 4hrs/week		
1.	Introduction to sensors				
2.	Load Measurement				
э. 1	LVDI Strain Measurement				
+. 5	Piezoelectric Sensor				
5. 6.	LDR Measurement.				
7.	Temperature Measurement.				
Ardı a. b. c. d. e. f.	ino Uno Interfacing LED Blinking. Ultrasonic sensor Touchscreen Stepper Motor IR Buzzer				

TITLE: 8051 MICROCONTROLLER				
Max mar	Max marks: 60CREDITS : 3TOTAL NO OF HRS: 48			
Course Obj This course ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓	ectives: enables students to u Basics of Microproc 8051 Microcontrolle 8051 Addressing mo Design and develop come: ember the fundamen erstand addressing m by 8051 Timers, Cou yze interfacing of 80	inderstand: essor and Microcontroller or architecture and Pin description odes and instruction set applications using 8051 Assembly tals of microcontroller and interna odes and basic operations of 8051 inters and Interrupts 051 with peripherals	y language and C program	n. features
MODULE 1Introduction to microcontrollers: Introduction, Microprocessors and Microcontrollers,. RISC & Architectures, Harvard & Von-Neumann CPU architecture. The 8051 Architecture: Introduction, 8051 Microcontroller Hardware, Input/Output Pins Circuits External Memory, Counter and Timers, Serial Data Inpu Interrupts.		,. RISC & CISC CPU ecture. Output Pins, Ports and ial Data Input / Output,	10hrs	
MODULE 2	Addressing modes Introduction, Addu Read Only Data Opcodes, Data excl Byte level logical Swap Operations, Incrementing and I Division, Decimal Jump and Call I calls and Subroutin	s and operations: ressing modes, External data M Moves / Indexed Addressing m hanges, Example Programs. Operations, Bit level Logical C Example Programs. Arithmet Decrementing, Addition, Subtract Arithmetic, Example Programs. Instructions: The JUMP and C. nes, Interrupts and Returns,	oves, Code Memory, ode, PUSH and POP Operations, Rotate and ic Operations: Flags, ion, Multiplication and ALL Program, Jumps,	12hrs
MODULE 3	8051 programmin Data types and tim	g in C : ne delays in 8051C		

	Timer / counter programming in 8051: Programming 8051 Timers, Counter Programming, programming timers 0	
	1 in 8051 assembly level and embedded C.	
	8051 Interrupts, Programming Timer Interrupts	14 hrs
	Programming the Serial Communication Interrupts, Interrupt Priority	
MODULE 4	Memories and Interfacing Memory Concepts – Types of Semiconductor memories ROMs – Mask Rom, Simple ROM, internal ROM structure, application of ROM, PROMs and EPROMs RAM – Static RAM , Dynamic RAM basic Structure of Static RAM and Dynamic RAM Interfacing with 8051- Interfacing 8051 to LCD, Keyboard, ADC, DAC	12 hrs

Text Books:

1. Kenneth J. Ayala ; "The 8051 Microcontroller Architecture, Programming & Applications" 2e, Penram International, 1996 / Thomson Learning 2005.

Reference Books:

- Muhammad Ali Mazidi and Janice Gillespie Mazidi and Rollin D.McKinlay; "The 8051 Microcontroller and Embedded Systems – using assembly and C"- PHI, 2006 / Pearson, 2006
- 2. Ajay V Deshmukh; "Microcontrollers- Theory and Applications", TMH, 2005.

Web Reference http://www.the8051microcontroller.com http://sites.google.com http://web.mit.edu

Max Marks: 40	CREDITS : 2	NO OF HRS: 4hrs/wee	
embly Language Program	nming:		
Program to add and subt	ract two 8-bit numbers.		
Program to find 2's com	plements of an 16-bit number.		
Program to find the sum	of N 8-bit numbers.		
Program to multiply two	8-bit numbers.		
Program to multiply two	16-bit numbers.		
Program to find the squa	Program to solve the linear equation $y = mx + c$.		
Program to find largest of N numbers.			
Program to find smallest of N numbers			
Program to verify the truth tables of logic gates.			
Program to find whether	the given data is palindrome.		
Program to arrange the n	numbers in ascending order.		
hedded C & Interfacing			
Toggling of ports.			
Program to use timer as	Event Counter		
Program to transfer a me	essage Serially		
Program to Recieve a mo	essage Serially		
Experiments related with	n interrupts.		
DAC interfacing			
Dire internaeing.			

TITLE: ARM MICROCONTROLLER

Max marks:	60	CREDITS : 4	TOTAL NO OF H	RS: 48
Course Objectiv	V0.			
This course air interfacing of based embedd	ms to make studen external periphera ed electronic syste	nts to get the skills of program ils to microcontroller and trou ems/products	nming the microcont ableshooting of micro	roller, ocontroller
Course Outcor	ne:			
After studying t	this course, students	s will be able to:		
 Remembrand M3. Understant applicati Apply the and attrivition Analyze 	er the architectura and the knowledge g ons. le basic hardware co butes of an embedo the hardware /softy	l features and instructions of 32 gained for Programming ARM (omponents and their selection m led system. vare co-design and firmware des	bit microcontroller AR Cortex M3 for different ethod based on the cha sign approaches.	M Cortex t tracteristics
UNIT1	ARM Introduction Types of computer A and CISC, RISC De ARM microprocesso and Hardware	Architectures, ISA's and ARM, Di sign philosophy, ARM Design Ph or, ARM processor family, Embed	fference between RISC ilosophy, History of Ided System Software	10hrs
UNIT2	ARM-32 bit Micro Thumb-2 technolc Cortex M3, Variou General Purpose R stack operation, re	ocontroller: ogy and applications of ARM, A s Units in the architecture, Deb egisters, Special Registers, exco eset sequence (Text 1: Ch 1, 2, 3	rchitecture of ARM ugging support, eptions, interrupts,) L1, L2	12hrs
UNIT3	ARM Cortex M3 I Assembly basics, II Memory mapping, language Program 10.5 only) L1, L2, L	nstruction Sets and Program Instruction list and description, I Bit-band operations and CMS Iming (Text 1: Ch-4, Ch-5, Ch-1 3	ming: Useful instructions, IS, Assembly and C 0 (10.1, 10.2, 10.3,	14hrs

UNIT 4	Embedded C Programming for ARM	12 hrs

Text Books:

- 1. Joseph Yiu, —The Definitive Guide to the ARM Cortex-M3l, 2nd Edition, Newnes, (Elsevier), 2010.
- 2. Learning Internet of Things by Peter Waher 2015 Packt Publishing
- 3. Shibu K V, —Introduction to Embedded Systems^{II}, Tata McGraw Hill Education Private Limited, 2nd Edition.

Reference Books

Microcontroller ARM) and Embedded systems2020 edition by Raghunandan. G.h,cengageIndia ARM processor systems, Cortex M architeture programming and Interfacing. Muhammad Tahir and Kashif Javed

Web Reference http://community.arm.com

http://developer .arm.com