

Embedded Processors (304191)

Teaching Scheme:

Lectures: 4 Hrs/ Week

Examination Scheme:

In Semester Assessment:

Phase I : 30

End Semester Examination:

Phase II: 70

Course Objectives:

- To understand need and application of ARM Microprocessors in embedded system.
- To study the architecture of ARM series microprocessor
- To understand architecture and features of typical ARM7& ARM CORTEX-M3 Microcontroller.
- To learn interfacing of real world input and output devices
- To learn embedded communication systems.

Course Outcomes:

After successfully completing the course students will be able to

- Describe the ARM microprocessor architectures and its feature.
- Interface the advanced peripherals to ARM based microcontroller
- Design embedded system with available resources.

Unit I : ARM7, ARM9, ARM11 Processors

7L

Introduction to ARM processors and its versions, ARM7, ARM9 & ARM11 features, advantages & suitability in embedded application, ARM7 data flow model, programmer's model, modes of operations, Instruction set, programming in assembly language.

Unit II: ARM7 Based Microcontroller

7L

ARM7 Based Microcontroller LPC2148: Features, Architecture (Block Diagram and Its Description), System Control Block (PLL and VPB divider) , Memory Map, GPIO, Pin Connect Block, timer, interfacing with LED, LCD, GLCD, KEYPAD.

Unit III: Real World Interfacing with ARM7 Based Microcontroller

7L

Interfacing the peripherals to LPC2148: GSM and GPS using UART, on-chip ADC using interrupt (VIC), EEPROM using I2C, SDCARD using SPI, on-chip DAC for waveform generation.

Unit IV : ARM CORTEX Processors

7L

Introduction to ARM CORTEX series, improvement over classical series and advantages for embedded system design. CORTEX A, CORTEX M, CORTEX R processors series, versions,

features and applications. Need of operating system in developing complex applications in embedded system, desired features of operating system & hardware support from processor, Firmware development using CMSIS standard for ARM Cortex. Survey of CORTEX M3 based controllers, its features and comparison.

Unit V : ARM CORTEX M3 based Microcontroller 7L

ARM-CM3 Based Microcontroller LPC1768: Features, Architecture (Block Diagram & Its Description), System Control, Clock & Power Control, GPIO, Pin Connect Block, interfacing with RGB LED, Seven Segment, TFT Display, MOTOR control using PWM.

Unit VI : Real World Interfacing with ARM-CM3 Based Microcontroller 7L

Concept of USB, CAN, and Ethernet based communication using microcontrollers. CAN, USB, ETHERNET applications in embedded c.

Text Books:

1. Andrew Sloss, Dominic Symes, Chris Wright, “ARM System Developer’s Guide – Designing and Optimizing System Software”, ELSEVIER
2. Joseph Yiu, “The Definitive Guide to the ARM Cortex-M”, Newness, ELSEVIER

Reference Books:

1. LPC 214x User manual (UM10139) :- www.nxp.com
2. LPC 17xx User manual (UM10360) :- www.nxp.com
3. ARM architecture reference manual : - www.arm.com
4. Trevor Martin,”An Engineer’s Introduction to the LPC2100 series”, Hitex (UK) Ltd.