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| Course No: 15HOE767 | Dept.: Electronics and Communication Engineering |
| Course Title : Introduction to ARMs Processor and its Applications | Semester: V |
| Instructor-in-charge : Dr. ROHITH S  [s.rohith@ncetmail.com](mailto:s.rohith@ncetmail.com) | Academic Year: 2020-21 |
| Lab. Instructor : |  |

**Subject Description**

The Arm architecture provides the foundations for the design of a processor or core, things we refer to as a Processing Element (PE). The Arm architecture is used in a range of technologies, integrated into System-on-Chip (SoC) devices such as smart phones, microcomputers, embedded devices, and even servers. The architecture exposes a common instruction set and workflow for software developers, also referred to as the programmer's model. This helps to ensure interoperability across different implementations of the architecture, so that software can run on different Arm devices. This course introduces the Arm architecture and its embedded application

The entire Course is divided into five modules. First module provides overview of Embedded system, interfacing devices and its applications. Module two and three discusses about ARM architecture and its instruction set. In Module four Interrupts & Exception Handling and interfacing to ARM7 is discussed. Module five provides Embedded/Real Time Operating System Concepts.

**Text Books:**

1. Andrew N. Sloss, “ARM system Developers Guide”, Elsevier, 1st Edition, 2008
2. William Hohl, Christopher Hinds“ARM assembly language Fundamentals and Techniques”, 2nd Edition.
3. Shibu K V, “Introduction to Embedded Systems”, Tata McGraw Hill Education Private Limited, 2nd Edition

PREREQUISITES

|  |  |  |
| --- | --- | --- |
| 1 Micro controller and Microprocessor  2 Embedded system | Self study/ Online | Class Notes/ PPT |

LECTURE PLAN

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| --- | --- | --- | --- |
| Topic | Topic Details | Number  of  Lectures | Unit/ Chapter  Reference |
| **Module 1** Introduction to Embedded Systems | Introduction To Embedded system | 1 | T3-1 |
| Embedded system vs General computing system | 1 | T3-4 |
| Characteristics of an embedded system | 1 | T3-73 |
| Quality attributes of embedded system | 1 | T3-75 |
| Core of embedded system, | 1 | T3-18 |
| Memory, sensors and actuators, communication interfaces | 1 | T3-35 |
| Embedded firmware design approaches | 1 | T3-59 |
| Embedded firmware development languages | 1 | T3-59 |
| Revision and Assignment |  |  |  |
| **Module II**  ARM7 Processor Fundamentals | ARM7 Processor Fundamentals. | 1 | T1- 21 |
| ARM Architecture | 1 | T1-21 |
| Registers, current program status register, | 1 | T1- 22 |
| Pipeline, exceptions, interrupts and vector table, core extensions. | 1 | T1- 29-34 |
| Introduction to ARM, | 1 | T1- 47 |
| Instruction Set | 1 | T1- 47 |
| Data Processing Instructions | 1 | T1- 50 |
| Branch Instructions | 1 | T1- 58 |
| Revision and Assignment |  |  |  |
| **Module III**  **Convolution Codes** | Introduction to ARM7 Instruction Set: | 1 | T1- 60 |
| Load Store Instructions | 1 | T1- 60 |
| Load Store Instructions | 1 | T1-60 |
| Software Interrupt Instruction | 1 | T1-73 |
| Program Status Register Instructions | 1 | T1-75 |
| Loading Constants | 1 | T1-78 |
| Conditional Execution. | 1 | T1- 79-84 |
| Conditional Execution. | 1 | T1- 79-84 |
| Revision and Assignment |  |  |  |
| **Module IV**  Interrupts & Exception Handling in ARM7 | Interrupts & Exception Handling in ARM7 | 1 | T1-318 |
| Exception Handling Interrupts | 1 | T1- 324 |
| Interrupt handling schemes | 1 | T1- 328 |
| Interrupt handling schemes | 1 | T1- 328 |
| Design of system using GPIOs | 1 | T1- 333 |
| LCD interface | 1 | T1- 334 |
| 4 x 4 Keypad | 1 | T1- 335 |
| Timers | 1 | T1- 336 |
| Revision |  |  |  |
| **Module V**  Embedded/Real – Time Operating System Concepts | Introduction | 1 | T3-389 |
| Embedded/Real – Time Operating System Concepts | 1 | T3-389 |
| Architecture of the Kernel | 1 | T3-393 |
| Architecture of the Kernel | 1 | T3-393 |
| Tasks | 1 | T3-396 |
| Task Scheduler | 1 | T3- 410 |
| Interrupt service Routine | 2 | T3-125 |
| Revision and Assignment |  |  |  |

Evaluation Scheme:

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| --- | --- | --- | --- |
| Component | Duration | Weightage | Date (Time) |
| CIE 1 | 90 min | 20% | 29.09.2020 |
| CIE 2 | 90 min | 20% | 09.11.2020 |
| AIT 1 | 2 days | 5% | 27.09.2020 |
| AIT 2 | 2 days | 5% | 07.11.2020 |
| Make up CIE | 90 min |  | 27.11.2020 |
| SEE | 180 min | 50% | 11.12.2020 |
| Make up SEE | 180 min |  | 14.01.2020 |
| Total |  |  |  |

**Notices:** All notices will be displayed on NCET and in Department website.

**Chamber Consultation Hour:** Wednesday 2:00Pm to 4:00 Pm

**Makeup Policy:** To be granted only in case of serious illness or emergency.

**Email Policy:** Communication through email. If you want to discuss anything, you are most welcome to meet me during chamber consultation hours or immediately after the class. Academic queries/doubts can be posted in Moodle.

Course-in-charge

Dr. ROHITH S