Computer Organization and Design
BEG271CO

Year: II   **Semester: III**

Teaching Schedule Hours/Week			Examination Schedule				Total
Theory	Tutorial	Practical	Internal Assessment		Final		
			Theory	Practical	Theory	Practical	
3	1	2/2	20	25	80	-	125

Course Objective: To introduce students about the organization of computer structure and the implementation of its architecture.

Course Contents:

1. Overview of Computer Architecture and Organization   (3 Hours)
    1.1 Introduction
    1.2 Contrast between computer architecture and organization
    1.3 Fundamentals of computer architecture
    1.4 Organization of Von-Neumann machine

2. Computer Instruction   (4 Hours)
    2.1 Instruction format
    2.2 Instruction cycle
    2.3 Instruction types and addressing modes

3. Computer Arithmetic   (5 Hours)
    3.1 Representation of integers and real numbers
    3.2 Algorithm of Addition, Subtraction, Multiplication and Division

4. Memory system organization and Architecture   (4 Hours)
    4.1 Memory system hierarchy
    4.2 Main memory Organization
    4.3 Cache memory
    4.4 Virtual memory

5. Interfacing and Communication   (4 Hours)
    5.1 I/O fundamentals
    5.2 I/O techniques
    5.3 Interrupt
    5.4 Memory system design and interfacing
    5.5 Buses

6. Device subsystem   (3 Hours)
    6.1 External storage system
    6.2 RAID architecture

7. Control Unit Design   (7 Hours)
    7.1 Instruction sequencing
    7.2 Instruction Interpretation
    7.3 Control memory
    7.4 Hardwired control
    7.5 Micro-programmed control
    7.6 Micro-programmed computers

8. Input-Output Organization   (4 Hours)
   8.1 Bus control
   8.2 Serial I/O: Asynchronous and synchronous modes, USART and VART

9. Parallel Data Transfer   (4 Hours)
   9.1 Asynchronous and Synchronous program controlled
   9.2 Interrupt Driven and DMA modes
   9.3 Interrupt and DMA controller

10. Trends in Computer architecture   (3 Hours)
    10.1 CISC
    10.2 RISC
    10.3 VLIW

11. ILP   (4 Hours)
    11.1 Introduction to ILP
    11.2 Pipeline hazards: Structural hazards, Data and control hazards
    11.3 Reducing the effects of hazards

Practicals: Lab implementation of the following algorithms:
1. Addition
2. Subtraction
3. Unsigned and signed multiplication
4. Cache memory mapping

Reference Books:
1. J. P. Hayes, Computer Architecture and Organization, McGraw Hill, 3rd Ed., 1998
2. M. M. Mano, Computer System Architecture, Pearson, 3rd Ed., 2004
3. V. C. Hamacher, Z. G. Veranesic, & S. G. Zaky, "Computer Organisation", Tata McGraw Hill, 5th Ed., 2002
4. W. Stallings, "Computer Organization and Architecture – Designing for Performance", Prentice Hall of India, 7th Ed., 2007
5. D. A. Pattersen and J. L. Hennesy, "Computer Organization and Design: The Hardware Software Interface", Elsevier, 2nd Ed., 2006