

Seat No.: \_\_\_\_\_

Enrolment No. \_\_\_\_\_

## **GUJARAT TECHNOLOGICAL UNIVERSITY**

**B.E. Sem-III Remedial Examination May 2011**

**Subject code: 130704**

**Subject Name: Computer Organization & Architecture**

**Date: 20-05-2011**

**Time: 10.30 am – 01.00 pm**

**Total Marks: 70**

### **Instructions:**

- 1. Attempt all questions.**
- 2. Make suitable assumptions wherever necessary.**
- 3. Figures to the right indicate full marks.**

- Q.1 (a)** Draw a block diagram of a Computer's CPU showing all the basic building blocks such as Program Counter, Accumulator, Address and Data Registers, Instruction Register, Control unit etc. and describe how such an arrangement can work as a computer, if connected properly to Memory, Input / Output etc. **07**
- (b)** In an instruction format, there are 16 bits in an instruction word. Bit 0 to 11 convey the address of the memory location for memory related instructions. For non memory instructions these bits convey various register or I/O operations. Bits 12 to 14 show the various basic memory operations such as ADD, AND, LDA etc. Bit 15 shows if the memory is accessed directly or indirectly. For such an instruction format draw block diagram of the control unit of a computer and briefly explain how an instruction will be decoded and executed, by this Control Unit. **07**
- Q.2 (a)** Explain showing a basic block diagram, how the Control Unit of a CPU can be designed using Hardwired Control. **07**
- (b)** For a computer whose architecture is as per Q: 1 (a) and the instruction format is as per Q: 1 (b), describe how an instruction such as BUN, (i.e. unconditional branch instruction) whose branch address is either given directly or indirectly, will be executed. **07**
- OR**
- (b)** For a computer whose architecture is as per Q: 1 (a) and the instruction format is as per Q: 1 (b), describe how basic Input and Output instructions will be executed. **07**
- Q.3 (a)** What is Assembly Language? Why do we need it? What is the function of Assembler? What is Address symbol table? Describe in brief. **07**
- (b)** Explain showing a basic block diagram, how the Control Unit of a CPU can be designed using Microprogrammed Control. **07**
- OR**
- Q.3 (a)** Why do we need First Pass and Second Pass in the process of Assembly? Describe in brief what is done under each pass. **07**
- (b)** What is a Memory Stack? Explain its role in managing subroutines with the help of neat diagrams. **07**
- Q.4 (a)** Explain Program Interrupts. Explain clearly, discussing the role of stack, PSW and return from interrupt instruction, how interrupts are implemented on computers. **07**

- (b) What do you understand by Reduced Instruction Set Computers? What are Complex Instruction Set Computers? List important characteristics of CISC and RISC computers. Also in a tabular form compare their relative advantages / disadvantages. **07**

**OR**

- Q.4** (a) What are main types of Interrupts? Explain each type clearly. **07**  
(b) Explain the role of Overlapped Register Windows implemented on some RISC Computers. What are their advantages? With proper diagrams explain their operation. **07**

- Q.5** (a) Explain the working of a pipelined processor, which is having four pipeline stages, with proper space time diagrams. Under which conditions this computer's speed up can be 4? Explain mathematically how it is so. **07**  
(b) Explain with proper block diagram the Addition Operation on two floating point numbers. **07**

**OR**

- Q.5** (a) Explain (i) Vector Processing (ii) Vector Operations. Explain how matrix multiplication is carried out on a computer supporting Vector Computations. **07**  
(b) Explain with proper block diagram the Multiplication Operation on two floating point numbers. **07**

\*\*\*\*\*