B.Sc. IT, First Year DEGREE EXAMINATION, DECEMBER 2006

Paper I - COMPUTER ORGANIZATION

Time : Three hours   Maximum : 100 marks

Answer any FIVE questions.

All questions carry equal marks.

1. (a) Simplify the following Boolean function in product-of-sum from by means of five variable map. Draw the logic diagram with

      (i) OR - AND gates   (ii) NOR gates   (iii) NAND gates

$$F(A,B,C,D,E) = \sum(0,4,10,11,14,15,16,20,26,27,30,31) + \sum_{\phi}(1,5,8,12,17,21,24,28)$$

  (b) What is Multiplexer and explain how it works.

2. (a) Discuss error detection codes, explain with circuit diagram.

  (b) Convert the hexadecimal number FACE to

      (i) decimal number   (ii) binary number

      (iii) octal number   (iv) BCD number

3. (a) The 8-bit registers AR, BR, CR and DR initially have the following values.

      AR = 11111111 BR = 11101010

      CR = 10111001 DR = 11110010

    Determine the 8-bit values in each register after the execution of following sequence of micro operations:

      (i) $AR \leftarrow AR + BR$

      (ii) $DR \leftarrow CR \wedge DR, BR \leftarrow BR + 1$

      (iii) $AR \leftarrow AR - DR$.

  (b) Design an 8-bit adder-subtractor.

4. (a) Justify the statement "the change in the value of program counter as a result of the execution of a program control instruction causes a break in the sequence of interrupt execution".

  (b) Discuss different addressing modes with examples.

5. (a) Explain Booth's algorithm for multiplication of signed 2's-complement number.

  (b) Describe how BCD addition and subtraction are performed.

6. (a) Discuss the different methods of Asynchronous data Transfer.

  (b) Illustrate how a priority interrupt establishes a priority over various sources to determine which condition is to be served first when two or more requests arrive simultaneously.

7. (a) A magnetic disk has following prameters:

      T_s = average tune to position the magnetic head over a track.

      R = Rotation speed of a disk in revolutions per second.

N_t = number of bits per track

N_s = number of bits per sector.

Calculate the average time T_a that it will take a read one sector.

(b) A virtual memory system has an address space of 8K words, a memory space of 4K words, and page and block sizes of 1K words. The following page reference changes occur during a given time interval:

4 2 0 1 2 6 14 0 1 0 2 3 5 7

Determine four pages that are resident in main memory after each page reference change if replacement algorithm used is

(i) FIFO   (ii) LRU

8. (a) Explain the concept of Boolean algebra and its importance. How it is related to logic gate simplification-using its identities?

(b) Explain the two constructions of SR Flip flops with logic diagrams.

9. (a) Draw the block diagram of a dual 4-to-1 line multiplexers and explain its operation by means of a function table.

(b) Illustrate the working of Shift Registers.

10. (a) What are Binary counters? How binary counters differ with binary counter with parallel load?

(b) Discuss the various Architectures of Input-Output Interface.