

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 1153

Roll No.

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M. C. A.**(Semester-I) Theory Examination, 2012-13****COMPUTER SYSTEM DESIGN***Time : 3 Hours]**[Total Marks : 100*

Note : Attempt questions from all Sections as per instructions.

Section-AAttempt *all* parts of this question.

2×10=20

1.
 - (a) How does carry differ from overflow ?
 - (b) What is overflow and how can it be detected ?
 - (c) What is the basic element of a sequential circuit ?
 - (d) Construct a truth-table for the following :
$$xyz + x\overline{y}z + \overline{x}yz.$$
 - (e) Define the term 'Optimum-performance'.
 - (f) Define "Arithmetic Mean" and "Geometric Mean".
 - (g) Show three-bit one's complement representation and corresponding signed decimal number that it represents.

- (h) Define static linking and dynamic linking.
- (i) Define total execution time of the program.
- (j) What is assembly language ?

Section-B

Attempt any *three* parts of this question. $10 \times 3 = 30$

2. (a) Write 'Booth multiplication algorithm' and use 'Booth algorithm' to multiply 010011 by 011011.
- (b) Explain with example how an overlapping register window reduces Calls/Returns overhead.
- (c) (i) Draw the timing diagram of a ring counter.
(ii) Design a PIPO, which is 4-bit buffer register with parallel in and parallel out.
- (d) What is Bus arbitration ? Explain all the Bus arbitration schemes with neat sketches.
- (e) (i) Show the Manchester encoding for the bit sequence 110011101.
(ii) A disk that has 16 sectors per track uses an interval factor of 1:4. What is the smallest number of revolutions of the disk required to read all of the sectors of track in sequence ?

Section-C

Attempt *all* questions of this Section. $10 \times 5 = 50$

3. Attempt any two parts : $5 \times 2 = 10$

- (a) Explain the four-stage instruction pipeline with neat block diagram.
- (b) Compare RISC architectures characteristics that distinguish them from CISC architectures.
- (c) List the capabilities of Commercial Assemblers.

4. Attempt any two parts : $5 \times 2 = 10$

- (a) Draw and explain DMA flow-chart for a disk-transfer.
- (b) Explain Instruction Set Design issues with examples. Enumerate classes of instruction sets in a typical processor.
- (c) A bit mapped display is 1024 pixels wide by 1024 pixels high. The refresh rate is 60 Hz, which means that every pixel is rewritten to the screen 60 times a second. But only one pixel is written at anytime. What is the maximum time allowed to write a single pixel ?

5. Attempt any two parts : $5 \times 2 = 10$

- (a) Explain a set-associative mapping scheme for a cache memory.
- (b) Design a four-word by eight-bit RAM using a four-word by four-bit RAM.
- (c) Explain how CAM works and lists its uses.

6. Attempt any one part : 10×1=10
- (a) Design a DATA-PATH for finding sum of 'n' numbers.
 - (b) Explain the differences between :
 - (i) DATABUSES & ADDRESS BUSES
 - (ii) System Clocks & Bus Clocks
 - (iii) Memory mapped I/O and instruction based I/O.
7. Attempt any one part : 10×1=10
- (a) Explain with examples different methods of representing floating point numbers.
 - (b) Give truth table of a 'NAND' logic gate, with two inputs. Show diagrammatically how a 'OR' logic gate can be realized using only 'NAND' gates.