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13MCA13

**First Semester MCA Degree Examination, Dec.2016/Jan.2017  
Fundamentals of Computer Organization**

Time: 3 hrs.

Max. Marks:100

**Note: Answer any FIVE full questions.**

- 1**
- a. Carry out the conversion as follows :
- i)  $(69.25)_{10} = (?)_2$                                   ii)  $(11101.111)_2 = (?)_8$
- iii)  $(5A.3C)_{16} = (?)_{10}$                                 iv)  $(135.43)_8 = (?)_{16}$  (08 Marks)
- b. Carry out the following operations:
- i)  $5250 - 321$  using 10's complement            ii)  $20 - 1000$  using 9's complement
- iii)  $11010 - 1101$  using 2's complement        iv)  $11010 - 10000$  using 1's complement (08 Marks)
- c. Represent the decimal number 8620 in BCD and in Excess 3 code. (04 Marks)
- 2**
- a. Implement the following Boolean function using
- i) AND, OR, NOT gates
- ii) only OR & NOT gates
- $$F = xy + \overline{x}\overline{y} + \overline{y}z$$
- (05 Marks)
- b. Simplify the following Boolean functions to a minimum number of literals:
- i)  $xyz + \overline{x}y + xy\overline{z}$
- ii)  $(A+B)(A+\overline{B})$
- iii)  $y(\overline{wz} + wz) + xy$  (06 Marks)
- c. Obtain the simplified expression in sum of products for the following Boolean function (using k-map) :
- $$F(k, l, m, n) = \overline{k}l\overline{m} + k\overline{m}n + kl\overline{m}n + lm\overline{n}$$
- (09 Marks)
- 3**
- a. Explain working of a full adder using two half adders with truth table as well as sum of products and product of sums expressions. (08 Marks)
- b. With a logic diagram, explain working of a BCD to decimal decoder. (06 Marks)
- c. With a neat block diagram, explain concept of programmable logic array (PLA). (06 Marks)
- 4**
- a. Explain working of a J-K flip flop with truth table and logic diagram. (07 Marks)
- b. List and explain the steps involved in design of a sequential circuit. (06 Marks)
- c. Explain with logic diagram, working of a 3-bit synchronous binary counter. (07 Marks)
- 5**
- a. With a neat diagram explain how memory is connected to processor, specifically explaining function of MAR, MDR, PC and IR. (10 Marks)
- b. Explain single bus structure with diagram and its advantages and disadvantages. (06 Marks)
- c. Write basic performance equation and the terms involved in it. (04 Marks)
- 6**
- a. Explain with example, big-endian and little endian assignments. (08 Marks)
- b. Explain any four addressing modes with examples. (08 Marks)
- c. What are condition codes? Explain any four commonly used condition code flags. (04 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

- 7 a. Explain with example, interrupt driven data transfer. (05 Marks)  
b. List and explain various registers involved in keyboard and display interfaces. (08 Marks)  
c. Explain working of synchronous bus with timing diagram for an input transfer operation. (07 Marks)
- 8 a. Explain concept of cache memory and explain direct mapping used to map cache to main memory. (10 Marks)  
b. What do you mean by virtual memory? Explain how translation of virtual address to physical address is being done. (10 Marks)

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