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## P.E.S. College of Engineering, Mandya - 571 401

(An Autonomous Institution affiliated to VTU, Belgaum)

First Semester, M. Tech. – Electronics and Communication Engineering (MECE)

(VLSI Design and Embedded Systems)

Semester End Examination; Jan/Feb. - 2016

**SOC Design**

Time: 3 hrs

Max. Marks: 100

*Note: Answer FIVE full questions, selecting ONE full question from each unit.*

### UNIT - I

- |      |   |   |
|------|---|---|
| 1 a. | What are the typical goals used in SOC design? Explain them.  | 6 |
|      | b. Why scaling of MOSFET necessary? Explain constant field scaling and their effect on drain current and power dissipation. | 8 |
|      | c. Explain the various factors that are driving the industry to develop SOC.  | 6 |
| 2 a. | Briefly explain the principle of system on chip with respect to power and performance.                                      | 6 |
|      | b. Define system on board and system on chip and differentiate them.  | 8 |
|      | c. What is a design productivity gap? Suggest some ways to bridge the productivity gap.                                     | 6 |

### UNIT - II

- |      |  |    |
|------|--|----|
| 3 a. | Illustrate the differences between Von-Neumann and Harvard architecture. | 8  |
|      | b. Differentiate between microprocessor and microcontrollers.            | 6  |
|      | c. Write short notes on interrupt architectures.                         | 6  |
| 4 a. | Briefly explain and mention its advantages :                             |    |
|      | i) Cache memory  | 12 |
|      | ii) Scratch pad memory   |    |
|      | iii) Flash memory.   |    |
|      | b. Explain the concept of directory based coherence.                     | 4  |
|      | c. Explain MESI protocol for cache - coherency.                          | 4  |

### UNIT - III

- |      |   |    |
|------|---|----|
| 5 a. | What are the types of data transfer modes? Mention its advantages and disadvantages.  | 10 |
|      | b. What is the need for hardware accelerators in SOC? What are the trade offs in implementing these functionalities in SOC? | 10 |
| 6 a. | Explain in detail direct and hybrid network topologies. Compare them.   | 8  |
|      | b. Write short notes on packet switching and worm hole routing.   | 8  |
|      | c. Write short note on mesh based NOC.  | 4  |

### UNIT - IV

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|------|--|---|
| 7 a. | Explain the block diagram of Hartley image rejection receiver. And how the image band is rejected, explain it. | 8 |
|------|--|---|

Contd.....2

- b. What are the different data converters used in SOC? Explain any one ADC used in SOC. 8
- c. Write short notes on Amplifiers need in SOC design. 4
- 8 a. What is the need for power management in SOC? What are the different sources of power dissipation? 10
- b. Explain the necessary operation of RF Transmitter and receiver circuits in detail. 10

**UNIT - V**

- 9 a. Describe the fundamental issues involved in Hardware - Software co design. 10
- b. With a neat flow chart explain the high level verification for an SOC design. 10
- 10. Write short notes on the following :
  - a) DRAM
  - b) ESL design flow 20
  - c) VSB controller
  - d) RISC and CISC comparison.

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