

## CBCS SCHEME

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15EC63

Sixth Semester B.E. Degree Examination, Dec.2019/Jan.2020

## VLSI Design

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

## Module-1

- 1 a. Explain the step-by-step CMOS P-Well fabrication process. (16 Marks)  
 b. With the mathematical equations, explain velocity saturation and carrier velocity saturation effect due to increase in saturation current. (16 Marks)

OR

- 2 a. With the transfer characteristic of skewed inverter, explain the bell curve effects. (16 Marks)  
 b. Compare CMOS and bipolar technologies. (16 Marks)  
 c. Consider the nMOS transistor in a 180 nm process with a channel threshold of 0.4V and doping level of  $8 \times 10^{22} \text{ cm}^{-3}$ . The body is tied to ground with a silicidate contact. How much does the threshold change at room temperature if the source is at 1.1V instead of '0'? (16 Marks)

## Module-2

- 3 a. Discuss the 4-based design rules (i) Buffering concept (ii) Transistor (nMOS, pMOS and CMOS) (16 Marks)  
 b. Derive the expression of delay between output of CMOS inverter pair. (16 Marks)

- 4 a. Draw the layout for  $Y = A + BC$  using CMOS (16 Marks)  
 b. Find the  $C_{in}$  for the layout shown in Fig. Q4(b). (16 Marks)

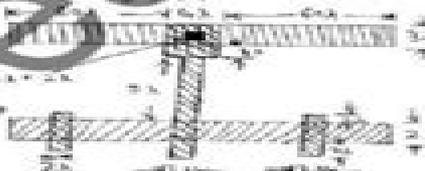


Fig. Q4(b)

## Module-3

- 5 a. Define scaling. Explain the scaling factors for device parameters. (16 Marks)  
 b. What is Manchester Carry Chain? Explain it. (16 Marks)

OR

- 6 a. What are the problems associated with VLSI design and how to reduce by using standard practice? (16 Marks)  
 b. Draw the 4 × 4 cross bar switch using MOS switches and explain it. (16 Marks)  
 c. Calculate the Regularity for 4 × 4 bit and 8 × 8 bit dialler. (16 Marks)

1 of 2

Question No. 1. (i) including your name, register/desig. number, etc. on the remaining blank pages.  
 (ii) Any marking of identification, approval or signature, etc. will be treated as irregularities.

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