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**Total No. of Pages: 02**  
**Total No. of Questions: 09**

**B.Tech. (ECE/ETE) (Sem.-6<sup>th</sup>)**

**VLSI Design**

**Subject Code: BTEC-604**

**Paper ID: [A2318]**

**Time: 3 Hrs.**

**Max. Marks: 60**

**Instructions to candidates:**

- 1) **Section-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
- 2) **Section-B contains FIVE questions carrying FIVE marks each. And student has to attempt any FOUR questions.**
- 3) **SECTION-C contains THREE questions carrying TEN marks each. And student has to attempt any TWO questions.**

**SECTION-A**

- Q1. a) Name different types of primary constructs or design units in VHDL.
- b) Name different types of operators in VHDL.
- c) Write down various functions of signal drivers in VHDL?
- d) Write syntax of process statement used in VHDL and in which type of modeling style it is used?
- e) What parameters affect Threshold Voltage?
- f) What are various sources of power dissipation in CMOS circuits?
- g) What parameters of MOS transistor are scaled in constant field scaling?
- h) How increase in temperature affects the performance of CMOS circuits?
- i) Differentiate between a variable and signal in VHDL.
- j) List various short channel effects present in MOS devices.

**SECTION-B**

- Q2) Design a  $2 \times 4$  decoder and write structural VHDL code.
- Q3) Design a decade counter and write VHDL code.
- Q4) Design XOR gate using NAND gates and write VHDL code.
- Q5) Explain working of NMOS enhancement transistor and plot its output and transfer characteristics.
- Q6) Explain various sources of power dissipation in CMOS circuits.

### **SECTION-C**

- Q7) Explain CMOS inverter's DC transfer characteristics and various regions of its operation. How  $\beta_n / \beta_p$  ratio influences the DC transfer characteristics?
- Q8) Derive I-V equation for an enhancement type NMOS transistor and plot its output characteristics. What factors influence the current flowing between source and drain terminals?
- Q9) Construct a 1-bit full adder from half-adders and logic gates. Write VHDL code.

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