Reg.No. \_\_\_\_\_\_\_\_\_\_\_\_



**End Semester Examination – Nov/Dec – 2018**

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| **Code :** | **18EC3051** | **Duration :** | **3hrs** |
| **Sub. Name :** | **NANOSCALE DEVICES AND CIRCUIT DESIGN** | **Max. marks :** | **100** |

**ANSWER ANY FIVE QUESTIONS (5 x 16 = 80 Marks)**

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| **Q. No.** | **Sub Div.** | **Questions** | **Course**  **Outcome** | **Marks** |
| 1. | a. | Summarize various leakage current mechanisms in nano scale MOSFETs. | CO1 | 6 |
| b. | Elaborate the emerging CMOS technologies to meet the challenges below 32nm scale. | CO2 | 10 |
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| 2. |  | Show a Si-Ge MOSFET device and discuss its Ids-Vgs and output characteristics with neat diagrams. | CO5 | 16 |
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| 3 |  | Analyze the effects of channel transmission coefficients under low drain bias due to scattering in MOSFETS. | CO3 | 16 |
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| 4. | a. | Analyze the energy band transitions in quantum well structures. | CO5 | 6 |
| b. | Discuss the working of a single electron transistor with energy band diagram and charge stability diagram. | CO5 | 10 |
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| 5. |  | Discuss circuit level power optimization techniques in detail. | CO4 | 16 |
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| 6. |  | Discuss how process variations affect the timing characteristics of the circuit. | CO1 | 16 |
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| 7. | a. | Illustrate modified Booth algorithm to improve the performance of the multiplier. | CO4 | 10 |
| b. | Discuss gate voltage dependence of electron tunnel current for different values of the semiconductor film thickness in multigate MOSFETs. | CO3 | 6 |
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| **COMPULSORY QUESTION (1 x 20 = 20 Marks)** | | | | |
| 8. | a. | What is the radius of a (19, 0) carbon nanotube? Consider an (n, 0) zigzag carbon nanotube that has radius 0.3523 nm. What is the value of the index n? | CO6 | 5 |
| b. | Discuss the timing requirements for edge-triggered sequential circuits. | CO6 | 10 |
| c. | Show the design flow of reactive design for manufacturing VLSI circuits. | CO6 | 5 |