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

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**End Semester Examination – Nov/Dec – 2017**

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| **Code :** | **17EC3035** | **Duration :** | **3hrs** |
| **Sub. Name :** | **SOLID STATE DEVICE MODELING AND SIMULATION** | **Max. marks :** | **100** |

**ANSWER ALL QUESTIONS (5 x 20 = 100 Marks)**

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| **Q. No.** | **Sub Div.** | **Questions** | **Course**  **Outcome** | **Marks** |
| 1. | a. | Elaborate on the modes of MOSFET operation in terms of field characteristics. | CO1 | 10 |
| b. | Using energy band structure, narrate the effect of flat band voltage in the C-V characteristics of n+ poly-silicon gate P - type Si MOS capacitor. | CO1 | 10 |
| (OR) | | | | |
| 2. | a. | Derive ideal C-V characteristic equations of MOS capacitor and plot its LF and HF behavior. | CO1 | 10 |
| b. | Obtain the Poisson-Boltzmann equations and boundary conditions for MOS capacitor. | CO1 | 10 |
|  |  |  |  |  |
| 3. | a. | With neat expressions, establish the Pao-Sah current – voltage model of MOST. | CO1 | 15 |
|  | b. | Summarize function of high frequency MOSFET model using a neat sketch. | CO1 | 5 |
| (OR) | | | | |
| 4. | a. | Sketch the energy band structure of MOST and derive the surface potential master equation. | CO2 | 10 |
|  | b. | Comment on the modeling of MOSFET interface-trap capacitance. | CO2 | 5 |
|  | c. | Enumerate the benefits of MOSFET modeling strategies. | CO2 | 5 |
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| 5. | a. | Model the drain current of long-channel MOS transistor with respect to IF and IR. | CO2 | 10 |
|  | b. | Explain the second order effects of MOSFET. | CO2 | 10 |
| (OR) | | | | |
| 6. | a. | Illustrate with equations on the impact of velocity saturation in MOSFET drain current. | CO2 | 10 |
|  | b. | Construct the LF small-signal transconductance structure of a long-channel MOSFET. | CO2 | 10 |
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| 7. | a. | Obtain the mean squared noise current of MOSFET under shot noise. | CO2 | 10 |
|  | b. | What is white noise? Explain the thermal noise model of MOSFET. | CO2 | 10 |
| (OR) | | | | |
| 8. | a. | Define flicker noise. How will you model flicker noise in MOSFET? | CO3 | 10 |
|  | b. | Explain the need for noise modeling of MOSFET. | CO3 | 10 |
|  | |  |  |  |
|  | | **Compulsory:** |  |  |
| 9. | a. | Can a capacitor be modeled from a two terminal MOST? Prove it. | CO3 | 5 |
|  | b. | Explain the EKV and ACM models of MOSFET. | CO3 | 15 |

ALL THE BEST