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

(An Autonomous Institution affiliated to VTU, Belagavi)

Sixth Semester, B.E. - Electronics and Communication Engineering

Semester End Examination; May/June - 2018

Analog CMOS VLSI Design

Time: 3 hrs

Max. Marks: 100

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

UNIT - I

- 1 a. Derive an expression for I_D , R_{01V} of a MOS transistor in a triode region. 8
- b. Discuss the second order effects : 8
 - i) Body effect ii) Sub threshold conduction
- c. Explain the MOS device capacitance. 4
- 2 a. Along with schematic and input/output characteristics, explain the operation of source follower. 6
- b. Derive an expression for voltage gain A_v by considering common source stage with resistance load. 6
- c. Explain the working of cascade stage along with schematic and input/output characteristics. 8

UNIT - II

- 3 a. Explain the operation of basic differential pair with a relevant diagram and input/output characteristics. 8
- b. Derive the expression for CMRR of a differential amplifier. 6
- c. Write a short note on Gilbert's cell. 6
- 4 a. For a differential amplifier with current mirror as the load, obtain the expression for A_v . 10
- b. Discuss the operation of cascade current mirror. 10

UNIT - III

- 5 a. Derive an expression for positive temperature coefficient voltage along with circuit. 8
- b. Explain the constant G_m biasing. 6
- c. Discuss in brief the speed and noise issues in Band gap references. 6
- 6 a. Analyse the performance of unit gain sampler in sampling mode and in amplification mode. 10
- b. Analyse the performance of discrete-time integrator and obtain the response for the constant input voltage. 10

UNIT - IV

- 7 a. For a three stage ring oscillator, obtain the expression for frequency of oscillations and minimum gain for sustained oscillations. Plot the poles for $0 < A_0 < 2$, $A_0 = 2$ and $A_0 > 2$. 10
- b. For a Colpitts oscillator obtain an expression for oscillations and minimum gain for sustained oscillations. 10

- 8 a. Discuss two methods to generate negative resistance that can be used in oscillator circuit. 10
- b. What is VCO? Briefly explain the important performance parameters of VCO. 10

UNIT - V

- 9 a. With the help of a block diagram, explain the working of a simple PLL. Draw and explain the waveform in PLL under locked conditions. 10
- b. Explain the working of a phase/frequency detector with relevant diagrams. 10
- 10 a. Explain the process of frequency multiplication and frequency synthesis. 10
- b. Discuss the skew and jitter reduction of PLL system. 10

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