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Reg. No. | | | | | | | | | | | | |

Question Paper Code : 83074

M.E. DEGREE EXAMINATION, MAY/JUNE 2016

Second Semester

Applied Electronics

AP 7201 – ANALYSIS AND DESIGN OF ANALOG INTEGRATED CIRCUITS

(Common to M.E. VLSI Design)

(Regulations 2013)

Time : Three Hours **Maximum : 100 Marks**

Answer ALL questions.

PART – A (10 × 2 = 20 Marks)

1. Draw the circuit diagram of a source follower with a resistive load using N-channel MOSFETS.
2. Draw the small-signal equivalent circuit of the common gate stage.
3. State Miller effect.
4. Define Noise Bandwidth.
5. Draw a single stage amplifier with voltage shunt feedback.
6. Define slew rate.
7. Mention the different methods of Op-amp compensation techniques.
8. Define Gain margin (G_m) and Phase margin (P_m)
9. Derive for PTAT voltage with circuit diagram.
10. Draw a simple current mirror and write the expression for output current.

PART – B (5 × 16 = 80 Marks)

11. (a) Draw a MOS Differential amplifier with active load and derive for A_d and A_c. **(16)**

OR

(b) (i) Explain the common-source amplifier with source degeneration and derive its transconductance (G_m) and output resistance (R_o) **(10)**

(ii) Draw a cascade current source and derive its output impedance with equivalent circuit. **(6)**

12. (a) (i) Explain the statistical characteristic of Noise in single stage amplifier. **(8)**

(ii) Calculate the transfer function for a source follower with C_{gs} = 7.33 pF, C_{gd} = 0.1 pF, C_{gb} = 0.05 pF, C_{sb} = 0.5 pF, k'W/L = 100 mA/V^2, R_L = 2 kΩ, R_S = 190 kΩ and I_D = 4 mA. Ignore the body effect, Assume G_m = 28.2 mA/V, C'_{gd} = 0.15pF. **(8)**

OR

(b) Derive for pole-zero frequencies of common gate stage with ideal current source as active load. **(16)**

13. (a) (i) Draw the basic amplifier without feedback and derive for its transfer gain using feedback concept and also write the expression for A_{Vf}. **(8)**

(ii) Explain the concept of gain boosting with an example. **(8)**

OR

(b) (i) Explain the methods of improving slew rate of op-amp. **(8)**

(ii) Draw a one stage op-amp and give the circuit description. Also write the expression for open loop gain. **(8)**

14. (a) Draw two stage op-amp with miller's compensating capacitor with the equivalent circuit. Derive for its pole and zero frequencies. **(16)**

OR

(b) Discuss about multi-pole systems for stability in Phase margin. **(16)**

15. (a) (i) Explain constant G_M biasing circuit. **(8)**

(ii) Draw a temperature independent biasing circuits using zener diode and derive its temperature co-efficient. **(8)**

OR

(b) (i) Draw and explain cascade current mirror and derive for output current and output resistance. **(10)**

(ii) Describe the logical steps to build a Band gap reference voltage source. **(6)**
