

12. (a) (i) Derive the expression for noise figure in a two port network and in a two port network device the noise power is 500mW, noise bandwidth is 300Hz in the temperature of about 273K. Find the minimum noise figure of the network device Also calculate the expected noise figure obtained for an equivalent noise resistance of 330 ohms admittance of $34+j22$ and an optimum source admittance of $27+j32$. (8)
- (ii) Derive the expressions for non-linear conductance and multi-dimensional transconductance. (8)

Or

- (b) (i) Draw the two port network and derive the expression for the noise parameters Given $R_{va} = 400$ ohms, $G_{in} = 23$, $B_c = 0.06$, $G_c = 230$, find the values of noise parameters. (8)
- (ii) Draw the small signal model for noise parameters and derive the expression for induced gate noise and its correlation to the drain noise. (8)

13. (a) Describe the BSIM 4 capacitance models in detail.

Or

- (b) Explain the BSIM 4 channel charge model and mobility model with suitable equations.

14. (a) Explain in detail about the modeling of second order effects of the drain current with respect to EKV model.

Or

- (b) (i) Explain in detail MOSA1 model. (8)
- (ii) Derive the noise model of MM9. (8)

15. (a) Write short notes on

- (i) Mismatch model in resistors and capacitors. (8)
- (ii) Mismatching models of MOSFETs. (8)

Or

- (b) Discuss in detail about

- (i) Leakage current (5)
- (ii) Transfer characteristics in weak and moderate inversion region (6)
- (iii) Gate Leakage current. (5)