

## JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT TEST -1 EXAMINATION- 2016

## B.Tech VI Semester

COURSE CODE: 10B11EC612

MAX. MARKS: 15

COURSE NAME: VLSI TECHNOLOGY AND APPLICATIONS

COURSE CREDITS: 04

MAX. TIME LHR

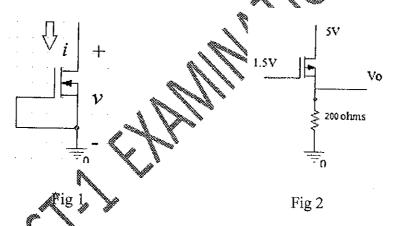
Note: All questions are compulsory.

1. a) For Fig 1, prove the following equation

2.5

$$i = k_n^{\prime} \frac{W}{L} \left[ -V_t v - \frac{1}{2} v^2 \right], \text{ for } v < -V_t; i = \frac{k_n^{\prime}}{2} \frac{W}{L} V_t^2, \text{ for } v < -V_t$$

b) Threshold voltage of a MOSFET is -1.6 V. Which all MOSFET's satisfy this specification? Draw symbol, drain characteristics and transfer characteristics of these MOSFET's. 2.5



- 2. a) Explain the working of a MOS with n-type substrate with the help of energy band diagram.

  2.5
  - b) Show junction depletion region width, junction depth, oxide thickness, and length of channel on MOS device structure. Give the related formulas also.

    2.5
- 3. a) Calculate  $I_D$  and  $V_{DS}$  for  $V_{tp} = -1.0 \text{ V}$ ,  $K_p = 100 \mu \text{A/V}^2$ , and W/L = 4 for the circuit shown in fig 2.
  - b) Calculate the drain current for  $V_{DS} = 3V$ ,  $V_{GS} = 3V$  and  $V_{SB} = 3V$ . Given that  $V_{ton} = 0.55V$ , W/L = 10, gate oxide with a thickness = 120Å, the p type bulk region is doping =  $8 \times 10^{14} \text{cm}^{-3}$  and  $\mu_n = 540 \text{cm}^2/V$ -sec.