M 27921

Reg. No. : .....

Name : .....

Third Semester B.Tech. Degree (Reg./Sup./Imp. – Including Part Time) Examination, November 2015
(2006 and Earlier Admn.)
EC/PTEC 2K 303 : SOLID STATE DEVICES

Time : 3 Hours Max. Marks : 100

Instruction : *1) Answer **all** questions.*
2) Missing data may be assumed suitably.

I. a) Find the resistivity of intrinsic Si at 300°K given $\mu_n = 1350\ cm^2/v - sec$ and $\mu_p = 480\ cm^2/v–sec$. Given $n_i = 1.5 \times 10^{10}\ cm^{-3}$.

b) Explain quasi fermi level.

c) Qualitatively describe the current flow at the pn junction.

d) Explain the operation of a zener diode.

e) Explain the terms emitter injection efficiency and base transport factor for a transistor.

f) Explain avalanche breakdown in transistor.

g) Explain velocity saturation in short channel MOSFET.

h) What is channel length modulation ? Write drain current equation for a short channel device. **(5×8=40)**

II. A) 1) Derive continuity and diffusion equation for electron and holes. **8**

2) Explain indirect recombination process. **7**

OR

B) 1) With necessary diagrams explain direct and indirect bandgap semiconductors. **8**

2) Explain the formation of n-type and p-type semiconductors. **7**

P.T.O.

III. A) 1) With necessary diagrams, derive the expression for junction capacitance. **10**

2) Write a short note on varactor diode. **5**

OR

B) 1) With energy bond diagram explain the operation of a tunnel diode. **10**

2) Write a short note on rectifying contours. **5**

IV. A) Obtain the Eber's-Moll model for a transistor. **15**

OR

B) 1) With necessary diagrams, explain Kirk effect. **7**

2) With neat diagram, explain transistor switching action. **8**

V. A) With neat diagram explain the construction, working and V-I characteristics of JFET. **15**

OR

B) 1) With neat diagrams explain the transfer characteristics of a n-channel MOSFET. **7**

2) Explain the construction and working of a floating gate MOSFET. **8**