Code No: OR210451 **OR**

II B.Tech I Semester Supplementary Examinations, May 2005
ELECTRONIC DEVICES
(Common to Electronics & Communication Engineering,Electronics & Instrumentation Engineering,Bio-Medical Engineering and Electronics & Control Engineering)

Time: 3 hours **Max Marks: 70**

Answer any FIVE Questions
All Questions carry equal marks

⋆ ⋆ ⋆ ⋆ ⋆

1. (a) What do you mean by Hall effect? How can it be used to find the concentration of a semiconductor? Explain Hall coefficient.
   (b) Derive the continuity equation for both holes and electron from first principles. Discuss significance.
2. (a) Show how the reverse saturation current of a PN varies with temperature. Derive the condition.
   (b) The current voltage characteristic of a PN junction diode is given by $I = I_O\left(e\frac{V}{3V_T} - 1\right)$. The diode current is 0.5mA at V = 340mV and 15mA at V=440mV. Find whether the diode is germanium or silicon. Assume V_T=0.026V.
3. (a) Explain the working principle of a photo diode. Discuss in detail any one application.
   (b) A relay is controlled by a photo conductive cell which has resistance of 400kΩ when illuminated and 1 kΩ when in the dark. The relay is supplied with 10mA from a 30-V supply when cell is illuminated and is required to be de-energised when the cell is in the dark. Sketch a suitable circuit and calculate the required series resistance and value of dark current.
4. Draw the Ebers-Moll model for a PNP transistor and derive the equations for emitter current and collector current.
5. Define and explain the parameters transconductance g_m.
   (a) Drain resistance r_d and amplification factor μ of a JFET. Establish the relation between them.
   (b) An n-channel JFET has I_{DSS}=8mA and pinch off voltage - 5V. Determine the minimum drain to source voltage V_{DS} for pinch off region and the drain current I_D for V_{GS}= -2V in the pinch off region.
6. (a) Discuss the motion of an electron between two parallel plates under the influence of applied potential.
   (b) An electron moving with initial velocity of 10^6 m/s enters an uniform magnetic field at an angle of 30^0 with it. Calculate the magnetic flux density required in order that the radius of helical path be 1m. Also calculate the time taken by the electron for one revolution and the pitch of the helix.

7. (a) Derive expressions for dc or average value of voltage and rms value of voltage of a full wave rectifier with resistive load.

   (b) In a half wave rectifier an ac voltage of peak value 24V is connected in series with a silicon diode and load resistance of 480Ω. If the forward resistance of the diode is 20Ω, find the peak current flowing through the diode.

8. Explain:

   (a) Carrier life time for holes and electrons

   (b) Potential variation within a graded semiconductor

   (c) MOSFET as a voltage variable resistor.

⋆ ⋆ ⋆ ⋆ ⋆