

30 DEC 2010  
Eastern University, Sri Lanka

EASTERN UNIVERSITY, SRI LANKA  
FIRST EXAMINATION IN SCIENCE - 2009/2010  
FIRST SEMESTER (PROPER/REPEAT)  
(July/August 2011)  
PH 202 ELECTRONICS I

Time: 01 hour.

Answer ALL Questions

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1. What do you mean by intrinsic semiconductor?

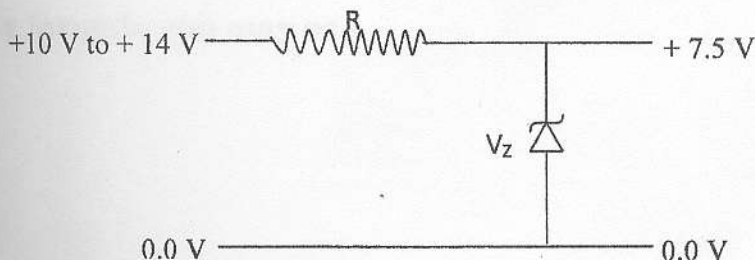
Explain how an intrinsic semiconductor, for example pure silicon, may be converted into

(a) N - type semiconductor

(b) P - type semiconductor

Discuss the terms Junction break down, Zener break down and Avalanche break down.

The figure shows regulated voltage supply circuit. The input voltage varies from 10 V to 14 V. The required output voltage is 7.5 V.



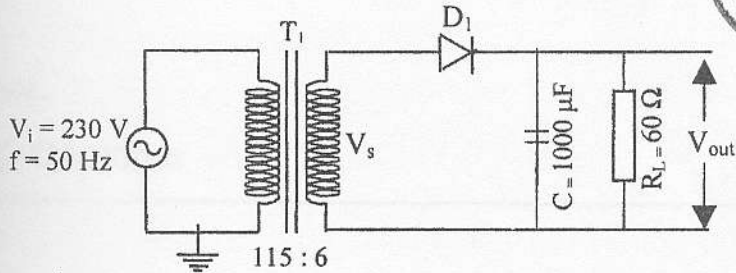
- i. Name the type of diode required in this circuit.
- ii. What voltage rating should be chosen for the diode?
- iii. In which bias direction is the diode connected?

- iv. If the minimum diode current is  $10\text{ mA}$  and the required output current from the circuit is  $100\text{ mA}$ , Calculate;
- The current through the resistance  $R$ , when the output current is  $100\text{ mA}$
  - The voltage across the resistor  $R$ , when the input voltage is at minimum of  $10\text{ V}$ .
- v. The input voltage now rises to its maximum of  $14\text{ V}$ . Calculate;
- the voltage across  $R$ ,
  - the current through  $R$  at this voltage
  - the power dissipated by  $R$  at this voltage
- vi. The power supply input voltage remains at  $14\text{ V}$ , but no current is drawn from the output of the regulator circuit. Find;
- the current through the diode
  - the power dissipated by the diode



2. Explain using circuit diagram function of a half wave rectifier, and indicate the direction of flow of current for any cycle of a.c. voltage. Hence derive an expression for mean output current  $I_{dc}$ .

Consider the half wave rectifier circuit given below.



- (i) Find the secondary voltage  $V_s$
- (ii) The average value of current  $I_{dc}$
- (iii) Average dc voltage across  $R_L$
- (iv) r.m.s value of current  $I_{rms}$
- (v) r.m.s voltage across  $R_L$
- (vi) Ripple factor
- (vii) Peak inverse voltage

Prove any formula you may use.

