JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -1 EXAMINATION- 2023

B.Tech-III Semester (ECE)

COURSE CODE (CREDITS): 18B11EC313 (4) MAX. MARKS: 15

COURSE NAME: ELECTRONIC DEVICES AND CIRCUITS

COURSE INSTRUCTORS: Dr. Shruti Jain MAX. TIME: 1 Hour

Note: (a)*All questions are compulsory.*

(b)Marks are indicated against each question in square brackets.

(c) The candidate is allowed to make Suitable numeric assumptions wherever required for solving problems

---

Section A (Short Answers : 1 × 5 =5 marks) [CO1]

1.

i. If in a metal, the charge, mobility and concentration of electron are represented by q, μ, and n respectively, the electrical conductivity of the metal is_____

ii. Nisha wants to study about mass action law and Einstein relationship. Help her in explaining the two considering n- type semiconductor.

iii. Total hole current is a sum of_____and_____current.

iv. The p-side of a diode is connected to ground and the n-side is given a potential of 2V. Then the diode will be in_____. The depletion layer of PN junction is increased when the junction is_____bias.

v. The _____ circuit clips off the entire positive half cycle of the input applied voltage. The_____circuit is a circuit in which the output voltage can be shifted at a specific voltage level.

Section B (Long Answers : 2 × 5 =10 marks) [CO1]

2. Find the conductivity of a Germanium semiconductor at 300K if donor impurity is $N_D = 4.5 \times 10^{27}/m^3$. Determine the minority carrier density. Assume $n_i = 2.5 \times 10^{19}/m^3$, $\mu_n = 0.23\ m^2/$ V-s, and $\mu_p = 0.05\ m^2/$ V-s.

3. At room temperature of 300K, the fermi level is 0.25eV below the conduction band in an N-type semiconductor. When the temperature is increased to 400K, calculate the position of the Fermi level.

4. Justify the statement "PN junction diode is nonlinear device".
5. A Zener diode shunt regulated power supply is depicted in Fig 1 . Determine (*a*) Output voltage, (*b*) source current, and (*c*) current through the Zener diode. Assume zener resistance is equal to zero.

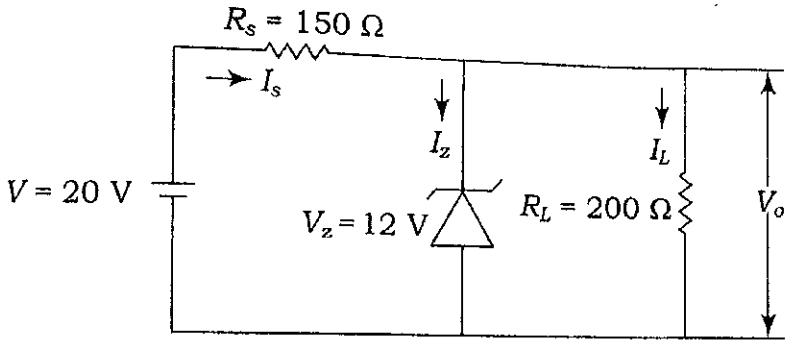

Fig 1

6. Shyam wants to evaluate the efficiency of the single-phase full wave rectifier circuit using centre tapped transistor as shown in Fig 2. Help him in doing so. Assume $R_f = 0$.

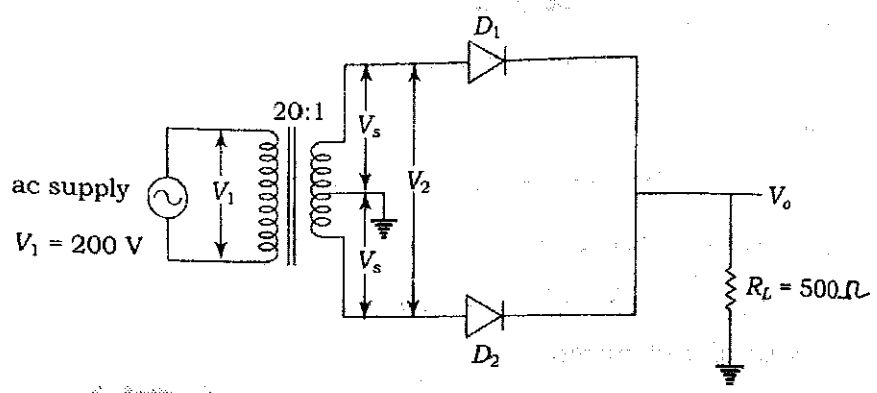

Fig 2