DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING NATIONAL INSTITUTE OF TECHNOLOGY, KURUKSHETRA

First Test, 21 Sep'2021

Max. Marks: 15

ECPC-30 (Electronic Devices & Circuits)
Time: 50 minutes

1.5×10 Cm -3

Q1. A Si abrupt pn junction has $N_d = 10^{15} cm^{-3}$ on the n side and $N_a = 4 \times 10^{18} cm^{-3}$ on the p side. At 300 K calculate (i) the built-in voltage (ii) the zero bias depletion region width (iii) the maximum electric field in the depletion region at zero bias.

Q2. Explain the phenomenon of zener breakdown and avalanche multiplication. The transition capacitance of an abrupt pn junction is 20 pf at 5V. Find the value of decrease in the capacitance for 1V increased in the bias.

Q3. A crystal diode having internal resistance $R_f = 20\Omega$ is used for half-wave rectification. If the applied voltage $v = 50 \sin \omega t$ and load resistance $R_L = 800\Omega$, find (i) l_m , l_{dc} , l_{rms} (ii) a.c. power input and d.c. power output.

Q4. Sketch the output voltage waveform for the circuit shown in figure 1.

SV-SV-J-3

To the circuit shown in righter.

figure 1