B.I.T Sindri
P.O. Sindri Institute
Dhanbad-Jharkhand
Second mid Semester Examination-2018.

First semester 2018, Subject-Physics, (Semiconductor physics.)
Branch- E.C.E. + C.S.E. + I.T.
Full marks- 20. Time - $1\frac{1}{2}$ hours.

Answer **five** questions. **Question no.1** is **compulsory**.
All questions carry equal marks.

1. Answer any **four** of the following multiple choice questions.

I. The density of states in two dimensional space is
(a) $\frac{\pi\hbar^2}{m^*}$ (b) $\frac{m^*}{\pi\hbar^2}$ (c) $\frac{m^*}{4\pi\hbar^2}$ (d) $\frac{\hbar^2}{\pi m^*}$
Where terms have usual meanings.

II. The photon absorption coefficient is the relative number of photons absorbed (a) per unit volume (b) per unit area (c) per unit distance (d) none of the above.

III. Quantum dot is effectively a (a) three dimensional system (b) two dimensional system (c) one dimensional system (d) zero dimensional system.

IV. At any point on the volt- ampere characteristics of the diode, the static resistance R is equal to (a) the reciprocal of the slope of a line joining the operating point to the origin b) the slope of a line joining the operating point to the origin (c) the reciprocal of the slope of the volt ampere characteristics at the operating point. (d) None of the above.

V. In one dimension system such as for quantum wire, the density of states is defined as the no. of available states (a) per unit volume per unit energy around an energy E (b) per unit area per unit energy around an energy E (c) per unit length per unit energy around an energy E (d) None of the above.

VI. In the four point probe method when **d » s** the correction factor is (a) $\frac{ln_2}{\pi}$ (b) $\frac{\pi}{ln_2}$
(c) $\frac{log_{e^2}}{\pi}$ (d) $\frac{\pi}{log_{e^2}}$, Where terms have usual meanings.

2. Derive an expression for maximum power output in photovoltaic effect.
3. Discuss in detail the Vander pauw method, you have studied.
4. Describe quantum well and quantum wire.
5. Derive an expression for the density of states in one dimensional system.
6. Discuss qualitatively the I-V Characteristics of a p-n junction diode.
7. Discuss Four point probe method to measure sheet resistance.