

SUBJECT: NANO PHYSICS

Day: Wednesday
Date: 05/12/2018

W-2018-3079

Time: 11.00 AM TO 02.00 PM
Max Marks: 60

N.B.:

- 1) All questions are **COMPULSORY**.
- 2) Figures to the right indicate **FULL** marks.
- 3) Answer to both the sections should be written in **SEPARATE** answer book.

SECTION-I

Q1 Explain LS coupling scheme for two valence electron system using neat vector diagram. (10)

OR

What is Stark effect? Explain it with neat diagram. (10)

Q2 State and explain Heisenberg's uncertainty principle. Also prove that $\Delta E \Delta t = h$. (10)

OR

Starting from the wave function, obtain Schrodinger's time independent wave equation. (10)

Q3 Obtain an expression for the interplaner distance. Hence, show that for simple cubic systems (10)

$$d_{hkl} = \frac{a}{\sqrt{h^2 + k^2 + l^2}}$$

OR

Explain the motion of electron in crystal with the help of free electron theory of solids. (10)

SECTION-II

Q4 Give the principle, construction and working of tunnel diode. (10)

OR

Explain the working of phase shift oscillator. (10)

Q5 Explain the working semiconductor laser. State its advantages and disadvantages. (10)

OR

Explain the following terms, (10)

- a. Metastable state
- b. Active medium
- c. Optical cavity
- d. Pumping

Q6 State and explain, i) Coulomb's law and ii) Biot-Savart's law. (10)

OR

What is Gauss's law? Derive the integral form of Gauss's law. (10)