

SUBJECT : NANO PHYSICS

Day : Saturday
Date : 18/05/2019

Time : 11.00 AM TO 02.00 PM
Max. Marks : 60

S-2019-3344

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 **SAME** Answer book.

SECTION – I

Q.1 State the major assumptions in Bohr's model of an atom. Give the modifications done by Sommerfeld (10)

OR

Give a brief account of L-S and J-J coupling.

Q.2 Calculate the following commutators (10)
[Px, Py], [Ly, Lz], [P, xⁿ]

OR

Derive the formula for energy eigen value and eigen vector when a particle is trapped in a potential well of infinite depth.

Q.3 What is Miller's indices? Draw the following planes with the help of Miller's indices: (10)

i) (2,2,2) ii) (1,0,0) iii) (2,4,6)

OR

What is dislocation in crystals? Explain its type.

SECTION – II

Q.4 What is tunneling? Explain working of tunnel diode with IV characteristics curve. (10)

OR

What is filter? Explain the working of first order active low pass filter.

Q.5 With energy band diagram, explain the working of diode laser. Give its advantages. (10)

OR

Explain the following terms:

i) population inversion ii) optical cavity iii) active medium

Q.6 State and explain Coloumb's Law. Find the resultant force on charge q₃ acted by charges q₁ and q₂ when the charges are placed at the corners of a triangle. (10)

OR

Give Maxwell's equation in differential and integral form.

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