

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -2 EXAMINATIONS-2022

B.Tech-VII Semester (CS/IT/ECE/Civil/BT)

COURSE CODE (CREDITS): 18B11WPH731(3)

MAX. MARKS: 25

COURSE NAME: Nanotechnology

COURSE INSTRUCTORS: Dr. Ragini Raj Singh

MAX. TIME: 1 Hour and 30 Minutes

Note: All questions are compulsory. Marks are indicated against each question in square brackets.

- Q1. Compared to single-wall carbon nanotubes, what is different in multi-walled carbon nanotube structures? Discuss various models of MWNT and explain the pulsed laser method to prepare carbon nanotubes. [CO: 1, 2, 4; Marks: 4]
- Q.2. What are the main characteristics of magnetic nanoparticles (MNPs)? Discuss the advantages and disadvantages of metallic Nanoparticles. [CO: 1, 2- 5; Marks: 3]
- Q.3. To receive fine quality MNPS, what are the main points that need to be considered, while preparing MNPS. What do you understand by Surface plasmon resonance in MNPs? [CO: 1- 5; Marks: 4]
- Q.4. Derive the formula to calculate the density of states in quantum dots and discuss different quantum structures. [CO: 1, 4, 5; Marks: 3]
- Q.5. Calculate the number of states per unit of energy in a 150 by 150 nm piece of silicon ($m^*=1.08 m_0$) 150 meV above the conduction band edge. Write the result in units of eV^{-1} . What are the main observations from the particle in a finite well problem of quantum mechanics? [CO: 3-5; Marks: 4]
- Q.6. Regarding magnetic materials, discuss magnetic induction, permeability and hysteresis curve along with the types of magnetic materials. [CO: 1, 4, 5; Marks: 3]
- Q.7. Differentiate between ferromagnetic and superparamagnetic materials. What are the unique features and types of magnetic nanoparticles? [CO: 1, 2, 3; Marks: 4]