

Roll Number:

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -3 EXAMINATION- 2023

B.Tech-VII Semester (CSE/IT/ECE/CE/BT/BI)

COURSE CODE (CREDITS): 18B1WPH731(03)

MAX. MARKS: 35

COURSE NAME: Nanotechnology

COURSE INSTRUCTORS: Dr.Ragini Raj Singh

MAX. TIME: 2 Hours

Note: (a) All questions are compulsory.

(b) Marks are indicated against each question in square brackets.

(c) The candidate is allowed to make Suitable numeric assumptions wherever required for solving problems

- Q.1.(a)** What are ferromagnetic and super-paramagnetic nanoparticle (NP)? Draw the graph between NP diameters versus coercivity and explain. [CO:1, Marks:2.5]
- Q.2.(a)** What are the main points to be considered while preparing metal NPs. [CO:2, Marks:3]
- (b)** What is surface Plasmon resonance (SPR), in which kind of NPs it's occurring? Also discuss localized SPR and propagation SPR. [CO:2, Marks:3]
- Q.3.(a)** Derive the relation for finding density of states in quantum dots. [CO:3, Marks:3]
- (b)** Discuss particle in a finite well with proper diagrams and necessary equations. [CO:3, Marks:3]
- Q.4.** Discuss the working of TEM with proper diagrams and function of each component? Also Discuss Selected area diffraction and Energy dispersive analysis in TEM. [CO:4, Marks:3]
- Q.5.** How many types of signals are there when electron beam interacts with the sample in SEM. Also discuss the interaction on the basis of accelerating voltage and atomic number. [CO:4, Marks:3]
- Q.6.(a)** What are the main components of AFM, describe the function of each component and overall functioning of the instrument. [CO:5, Marks:3]
- (b)** What are the different modes in AFM to analyze the samples? Discuss all three constant force modes with their advantages and disadvantages. [CO:5, Marks:4.5]
- Q.7.(a)** What is the relationship between d-spacing and lattice constants of cubic and hexagonal crystal structures? [CO:5, Marks:2]
- (b)** What types of materials can be analyzed using XRD ? why and why not? [CO:5, Marks:2]
- (c)** Draw the schematic graph between 2θ and intensity in order to explain the anatomy of XRD pattern and to explain what can be determined from XRD data. [CO:5, Marks:3]