

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -3 EXAMINATION-2024

B.Tech-VII Semester (Open Elective)

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

Q.No	Question	CO	Marks
Q1	(a) CNTs possesses remarkable properties such as mechanical, electrical and thermal, explain them and give reasons also. (b) Which are the four main methods to synthesize CNTs. Discuss the method of laser ablation in detail with suitable diagrams? (c) Discuss any one application of CNTs in detail.	CO2 CO3	3+3+2 =8
Q2	(a) Explain hysteresis in magnetic materials with proper diagram. Also classify different types of magnetic materials on the basis of their susceptibility values. (b) What happens to magnetic particles as its size decreases from bulk to nano. Draw a suitable graph also in support of your explanation. (c) What are the main types of magnetic nanoparticles? Discuss any one application in detail.	CO3 CO4	2+2+2 =6
Q3	(a) What are the main characteristics of metal nanoparticles. List the different types of metal based nanoparticles. (b) One specific phenomenon is related to metal nanoparticles that is SPR, explain (i) Localized SPR; (ii) Propagating SPR. Also discuss any one application of SPR.	CO4	2+3=5

<p>Q4</p>	<p>(a) On the basis of Bohr exciton radius discuss the quantum confinement in quantum dots. What is unique in quantum dots in comparison to other Nanomaterials? Discuss any one application of quantum dots in detail.</p> <p>(b) Derive the equation to calculate density of states in quantum dots.</p>	<p>CO5</p>	<p>3+2=5</p>
<p>Q5</p>	<p>(a) What are the essential parts of AFM and their working? Discuss the advantages and disadvantages of all three modes in AFM.</p> <p>(b) In SEM what types of signals are coming out from the samples on imparting high energy electron beam and where do they come from, make suitable diagram.</p> <p>(c) With respect to TEM discuss main types of electron guns. Also discuss condenser system and image formation in TEM.</p> <p>(d) What determines the intensity of x-ray diffraction peaks? How precisely we can analyze an x-ray diffraction pattern. How one can improve the accuracy of analysis in x-ray diffraction.</p>	<p>CO5</p>	<p>3+2+3 +3=11</p>