LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

M.Sc. DEGREE EXAMINATION – **PHYSICS**

THIRD SEMESTER – **APRIL 2023**

PPH 3301 – NANO SCIENCE

Date: 09-05-2023
Time: 09:00 AM - 12:00 NOON

Dept. No.

Max. : 100 Marks

PART A	
Q. No	**Answer all questions** (10 x 2 = 20 Marks)
1	Give examples for active and passive nanostructures.
2	List out the challenges faced by Nanotechnology.
3	Using the energy level diagram explain the formation of excitons.
4	Mention a few applications of magnetic nanoparticles.
5	What are photonic crystals?
6	What are the parameters which influence the strength of intermolecular forces?
7	What is catenation? How is it related with bond energy?
8	What is hydrothermal synthesis?
9	Write the two most often used anode materials and their significance in XPS?
10	What are the applications of carbon nanotubes?

PART – B	
Answer any four questions	**(4 x 7.5 = 30 Marks)**
11	Discuss the bottom up approach synthesis of nanomaterial.
12	Describe the PVD method for synthesizing of nanomaterials.
13	Briefly explain the role of nanotechnology in the field of energy and information & communication.

14	a) How is total interaction potential between two molecules calculated?(5)
	b) What are coupled semiconductor metal oxide nanocomposites? (2.5)
15	How are metal oxide nanoparticles synthesized using sol-gel process?
16	How is X-ray photoelectron spectroscopy performed for chemical analysis?

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PART – C

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Answer any four questions **(4 x 12.5 = 50 Marks)**

17	With suitable diagram discuss the electronic band structure of nanocrystals and solids.
18	Write a note on Scanning Electron Microscopy and explain the difference between SEM and TEM.
19	(a) Discuss the classification of nanomaterials based on the dimensionality. (7.5 marks) (b) Explain the electrical and optical properties of nanoparticles. (5 marks)
20	a) Classify solids based on inter molecular and intramolecular interactions. (6 marks) b) Describe the electronic and mechanical properties of graphene. (6.5 marks)
21	a) Describe CVD method for synthesis of nanomaterials. (7.5 marks) b) How is BET constant 'C' calculated? What is the significance of C? (5 marks)
22	a) Illustrate thin film preparation using Langmuir-Blodgett technique. (7.5 marks) b) Describe the working principle of solar cell. (5 marks)

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