



LOYOLA COLLEGE (AUTONOMOUS) CHENNAI – 600 034

B.Sc. DEGREE EXAMINATION

PLANT BIOLOGY AND PLANT BIOTECHNOLOGY

FIFTH SEMESTER – APRIL 2025

UPB 5602 – NANOTECHNOLOGY



Date: 08-05-2025

Dept. No.

Max. : 100 Marks

Time: 01:00 PM - 04:00 PM

SECTION A - K1 (CO1)

Answer ALL the Questions

(10 x 1 = 10)

1. Fill in the blanks

- a) The first talk about nano-technology was given by _____.
- b) STM stands for _____.
- c) VLS method for synthesis of nanowires stands for _____.
- d) Polymeric nanotubes are _____ materials with a tubular nanostructure.
- e) Nanoscale devices that measure physical quantities and convert these to signals that can be detected and analysed are called _____.

2. State whether the following statements are TRUE or FALSE

- a) Norio Taniguchi coined the term 'Nanotechnology'.
- b) STMs can operate in liquids, air, or other gases at near room temperature.
- c) Carbon nanotubes were discovered in 2004 by Andre Geim and Konstantin Novoselov
- d) Synthetically produced highly branched, spherical nanostructures that can be used as carrier molecules for imaging are dendrimers.
- e) Kevlar is a synthetic fiber with a unique combination of properties.

SECTION A - K2 (CO1)

Answer ALL the Questions

(10 x 1 = 10)

3. Choose the correct answer

- a) A cube has a side length of about 20nm. Calculate its surface to volume ratio.
i) 3 ii) 0.3 iii) 0.6 iv) 1.3
- b) A cantilever is an important part of _____
i) AFM ii) SEM iii) STM iv) TEM
- c) Which of the following is a character of nanotubes and nanowires?
i) High aspect ratio ii) Low aspect ratio
iii) Both high and low aspect ratio iv) Neither high nor low aspect ratio
- d) The commonly used nanomaterial for fluorescence is _____
i) CNTs ii) Nanowires iii) Quantum dots iv) Fullerenes

e)	The commonly used nanoparticle sunscreen agent is i) Zinc oxide ii) Silicon oxide iii) Magnesium oxide iv) Copper oxide
4.	Answer the following, each in about 50 words
a)	Explain the surface-to-volume ratio aspect of nanoparticles.
b)	Mention the catalytic properties of nanoparticles
c)	Compare nanowires and nanorods.
d)	List the role of nutraceuticals.
e)	Enlist the role of nanotechnology in the textile industry.
SECTION B - K3 (CO2)	
	Answer any TWO of the following in 500 words (2 x 10 = 20) Draw diagrams / flowcharts wherever necessary
5.	Identify the principle, methods and advantages of the green synthesis of nanoparticles.
6.	Construct an account on the history, structure, properties and applications of carbon nanotubes.
7.	List out the applications of solid lipid nanoparticles (SLN).
8.	Organize the various aspects in the construction and use of DNA origami.
SECTION C – K4 (CO3)	
	Answer any TWO of the following in 500 words (2 x 10 = 20) Draw diagrams / flowcharts wherever necessary
9.	Analyze the various aspects and implications of Quantum confinement in nanoparticles.
10.	Examine the working principle and the construction of a single beam spectrophotometer.
11.	Explain the features and applications of nanosensors.
12.	Present an account on nanobots in medicine and add notes on their advantages.
SECTION D – K5 (CO4)	
	Answer any ONE of the following in 1000 words (1 x 20 = 20) Draw diagrams / flowcharts wherever necessary
13.	Explain in detail on the discovery, types, properties and applications of fullerenes.
14.	Assess the characteristics of Magnetic Nanoparticles (MNPs), in terms of their design, synthesis and applications.
SECTION E – K6 (CO5)	
	Answer any ONE of the following in 1000 words (1 x 20 = 20) Draw diagrams / flowcharts wherever necessary
15.	Discuss the working principle, construction, limitations and applications of Atomic Force Microscope.
16.	Elaborate on the salient aspects and impact of nanoremediation.

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