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22MBP318BN

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

MSc DEGREE EXAMINATION DECEMBER 2025
(Third Semester)

Branch – **APPLIED MICROBIOLOGY**

MAJOR ELECTIVE COURSE – I : MICROBIAL NANOTECHNOLOGY

Time: Three Hours Maximum: 75 Marks

SECTION-A (10 Marks)
Answer **ALL** questions
ALL questions carry **EQUAL** marks (10 × 1 = 10)

Module No.	Question No.	Question	K Level	CO
1.	1.	Select which of the following is a potential medical application of nanotechnology? a) Drug delivery b) Imaging c) Diagnostics d) All of the above	K1	CO1
	2.	Infer Computer scientists contribute to nanotechnology by: a) Growing biological cultures b) Simulating nanoscale processes and designing nanorobotics c) Manufacturing vaccines d) Clinical diagnosis	K2	CO1
2.	3.	Match the microorganisms such as *Fusarium oxysporum* and *Pseudomonas stutzeri* are known to synthesize: a) Titanium nanoparticles b) silver and gold nanoparticles c) Carbon nanotubes d) Quantum dots directly	K1	CO2
	4.	Relate the Ball milling is an example of: a) Solid-phase synthesis b) liquid-phase synthesis c) Gas-phase synthesis d) biological synthesis	K2	CO2
3.	5.	Find the Scanning Electron Microscopy (SEM) provides: a) Atomic-level crystallography b) Surface morphology and topography c) Particle size in solution d) Surface charge distribution	K1	CO3
	6.	Show Energy Dispersive X-ray Analysis (EDX) is generally coupled with: a) UV spectrophotometer b) SEM/TEM c) FTIR spectroscopy d) XRD	K2	CO3
4.	7.	Tell MEMS and NEMS devices are primarily used in: a) Agriculture only b) Microelectronics and sensors c) Fuel production d) Water desalination	K1	CO4
	8.	Interpret the Nanotoxicology mainly studies: a) Environmental risks and health effects of nanomaterials b) Production of large-scale nanodevices c) Electrical conductivity of nanoparticles d) DNA fingerprinting	K2	CO4
5.	9.	Define Nanoparticles improve drug solubility mainly by: a) Increasing crystallinity of drugs b) Reducing surface area of drugs c) Decreasing particle size and increasing surface area d) Blocking drug metabolism	K1	CO5
	10.	Explain the biggest ethical concern with nanotechnology is: a) Enhancing fertilizer solubility b) Unknown toxicity and long-term societal effects c)Improved joint replacements d) Increased imaging clarity	K2	CO5

Cont...

SECTION - B (35 Marks)

Answer **ALL** questions

ALL questions carry **EQUAL** Marks (5 × 7 = 35)

Module No.	Question No.	Question	K Level	CO
1	11.a.	Summarize the opportunities and challenges of nanotechnology in medical applications.	K2	CO1
		(OR)		
	11.b.	Explain the major factors affecting the manufacturing of nanomaterials.		
2	12.a.	Construct the applications of quantum dots in biotechnology and medicine.	K3	CO2
		(OR)		
	12.b.	Build the applications of peptide/DNA coupled nanoparticles? Explain with examples.		
3	13.a.	Distinguish between SEM and TEM in nanoparticle characterization.	K4	CO3
		(OR)		
	13.b.	Survey UV–Vis spectroscopy in nanoparticle studies.		
4	14.a.	Criticize the applications of nanomedicine in cancer treatment. Explain with examples.	K5	CO4
		(OR)		
	14.b.	Evaluate the potential applications of DNA computing in cryptography and data storage. Explain with examples.		
5	15.a.	Discuss the advantages and disadvantages of using nanoparticles for drug delivery. Explain with examples.	K6	CO5
		(OR)		
	15.b.	Originate the potential applications of biomotors in robotics and biomedical devices. Explain with examples.		

SECTION -C (30 Marks)

Answer **ANY THREE** questions

ALL questions carry **EQUAL** Marks (3 × 10 = 30)

Module No.	Question No.	Question	K Level	CO
1	16	List the role of self-assembly in nanotechnology. Explain with examples.	K4	CO1
2	17	Explain the microbial synthesis of nanomaterials (Silver, Gold, Platinum, CdS, ZnO, Se, TiO_2) with applications.	K5	CO2
3	18	Design the principle, methodology, and applications of X-ray diffraction (XRD) in nanomaterials.	K6	CO3
4	19	Compare and contrast the different approaches to nanoparticle-based drug delivery. Explain with examples.	K4	CO4
5	20	Defend nanotechnology-based approaches for cancer treatment.	K5	CO5

Z-Z-Z END