III B. Tech – II Semester

(20ME6754) NANO BIOTECHNOLOGY

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	4

Pre-Requisites: Basic nanotechnology, Basic biotechnology

UNIT-I:

Introduction: Background and definition of nanotechnology, chemical bonds in nanotechnology-Scales at the bio-nano interface-Basic capabilities of nanobiotechnology and nanomedicine-Biological tradition and mechanical tradition biotechnology-Applications in biotechnology

UNIT-II:

Structural and Functional Principles of Nano-Biotechnology: Biomolecular structure and stability-Protein folding-Self-assembly-Self-organization-Molecular recognition-Flexibility-Information-Driven nanoassembly-Energetics-Chemical transformation -Regulation-Biomaterials-Biomolecular motors-Traffic across membranes-Biomolecular sensing-Selfreplication-Machine-phase nano-biotechnology

UNIT-III:

Properties and Characterizations: Optical (UV-Vis/Fluorescence) , X-ray diffraction – 3 Lectures Imaging and size (Electron microscopy, light scattering, Zetapotential, Surface and composition (ECSA, EDAX, AFM/STM etc) –Vibrational (FT-IR and RAMAN), SERS - Magnetic, Electrical and Electrochemical

UNIT-IV:

Protein-Based Nanostructures: S-Layers-Engineered nanopores-Microbial nanoparticle production-Magnetosomes-Nanoscale magnetic iron minerals in bacteria-Nanoparticle-Biomaterial hybrid systems.

UNIT-V:

DNA-Based Nanostructures: DNA-Protein nanostructures-Biomimetic fabrication of DNA based metallic nanowires and networks-DNA-Gold nanoparticle conjugates-Nanoparticles as non-viral transfection agents.

Course Outcomes:

A student who successfully fulfills this course requirement will be able to:

S. No	Course Outcome	BTL
1.	Explain the fundamental principles of nanotechnology and Biotechnology and their application to biomedical engineering.	L2
2.	Illustrate structural and functional principles of nano-biotechnology.	L2
3.	Outline properties and characterizations of optical andx-ray diffraction.	L2
4.	Classify protein-based nanostructures.	L2
5.	Summarize dna-based nanostructures.	L2

Correlation of Cos with POs & PSOs:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	1	3	3	1	1	1	1	1	2	2
CO2	3	3	2	2	1	2	1	0	3	2	1	1	3	3
CO3	3	3	2	3	1	1	3	1	2	1	0	1	3	2
CO4	3	3	3	3	1	3	1	1	2	3	2	0	3	2
CO5	3	3	2	2	2	3	2	0	3	1	1	1	3	2

Text Books

1. Nano Materials- A.K.Bandyopadhyay/ New Age Publishers.
2. Nano Essentials- T.Pradeep/TMH
3. Biotechnology: principles & applications -S.C. rasthogi - narosa publishing house pvt ltd
4. Text book of Biotechnology – H.K.Das – Wiley publishers