

Dr. K. S Ghosh =

11/5/2023

Roll No. 72

**National Institute of Technology Hamirpur (NIT Hamirpur)**

Name of the Examination: B.Tech. End Semester, May 2023

Branch: B.Tech. Open Elective

Course Name: Bionanotechnology

Time: 3 Hours

Semester: 6<sup>th</sup>

Code: CY-306

Maximum Marks: 50

233

Note: All Questions are compulsory. Answer briefly and to the point.

1. Answer the following:

3 x 10

- (i) Explain the principle and working of scanning tunneling microscopy.
- (ii) Explain fabrication of nanotube membrane and its application for the separation of ions.
- (iii) Discuss the application of bionanotechnology in stem cell research.
- (iv) Explain chemical vapor deposition (CVD) method and its application in nanofabrication with example.
- (v) Discuss fabrication of silver nanowire using a suitable bio-template. Mention one application of it.
- (vi) Explain the working principle of ultrasound contrast agents.
- (vii) Discuss how cancer cells can be killed within body by magnetically filled carbon nanotubes.
- (viii) Explain the construction and application of electronic nose for checking food quality.
- (ix) Discuss fabrication and application of nanobiochip used in the diagnosis of acute myocardial infarction (heart attack).
- (x) Explain the fabrication and working of alcohol sensor made of bionanomaterials.

2. i) What are quantum dots? Why the term "quantum" is given to them? Discuss 4 x 5 applications of bioconjugated quantum dots.

- ii) Discuss the basic principle of MRI and explain the role of contrast agents in MRI.
- iii) What properties of mesoporous silica make it a good candidate for drug delivery? Describe an application of a pH-responsive mesoporous silica nanomaterial in drug delivery.
- iv) How one can attach a protein molecule to carbon nanotube? Based on that, explain the working principle of a glucose sensor.
- v) Make a suitable schematic representation of conventional drug delivery system and explain "first pass effect". How does conventional drug delivery differ from targeted drug delivery?

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