Dr. R.S Ghosh 28/11/2023 (149)

Roll No. 23

National Institute of Technology Hamirpur (HP)

Name of the Examination: B.Tech. End Semester, Nov-Dec 2023

Branch: B.Tech. Open Elective **Semester: 5th**

Course Name: Bionanotechnology **Code: CY-306**

Time: 3 Hours **Maximum Marks: 50**

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

1. Answer the following: **3 x 10**

(i) Explain physical vapor deposition (PVD) method and how is it applied in fabrication of nanomaterials.

(ii) Explain the fabrication and working of alcohol sensor made of bionanomaterials.

(iii) Explain the principle and working of scanning electron microscopy.

(iv) Discuss fabrication and application of nanobiochip used in the diagnosis of acute myocardial infarction (heart attack).

(v) Differentiate between Ostwald ripening and aggregation of nanoparticles in a colloidal solution and explain with the help of growth curve.

(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) Explain the principle and working of scanning near field optical microscope.

(x) Explain fabrication of nanotube membrane and its application for the separation of ions

2. i) What are quantum dots and why the term "quantum" is given to them? What are their advantages over traditional organic fluorophores? Write about the application of quantum dots in microscopy. **4 x 5**

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 thermo-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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