

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT
TEST -2 EXAMINATIONS-2022

M.Sc-II Semester (BT)

COURSE CODE: 20MSWBT231

MAX. MARKS: 25

COURSE NAME: NanoBiotechnology

COURSE CREDITS: 2

MAX. TIME: 1 Hour 30 Min

Coordinator: Dr. Abhishek

Note: All questions are compulsory. Marks are indicated against each question in square brackets.

- Q. 1 A compound microscope has two lenses. The magnifying power of one is 5x and the combined magnifying power is 100x. Calculate the magnifying power of the other lens. [2]
- Q.2 A student isolate a protein form crude and he found the volume of protein molecule and single amino acid residue 0.01mm³ and 0.001 nm³ respectively. Calculate the total number of amino acid residue present in protein. also suggested the name of some methods through which the size and morphology of protein can be monitored. [3]
- Q.3 A transmission electron microscope uses electrons accelerated by a voltage of 50 kV. Electron released from the electron gun have a wavelength is 0.001A^o. Taking other factors, such as numerical aperture etc. to be same, how does the resolving power of a transmission electron microscope compare with that of a scanning electron microscope which uses electron of 0.1 A^o [2]
- Q. 4 Draw a ray diagram to show the formation of image by a transmission electron microscope when an object is placed in front of the electromagnetic lens between its condenser lens and objective lens. Also explain the working principle of TEM and how it differ from SEM.[5]
- Q.5 Nano-materials can be synthesized by various methods including physical methods, chemical methods and biological methods. All these methods have their own advantages and limitation. In the same line if you would like to synthesize fullerenes, which methods you will select and why?. Give proper justification of your answer [3]
- Q.6 Electrons can either be produced by thermionic emission or in a process called cold field emission using a fine filament of tungsten. The electrons leaving the filament have a low energy and, therefore, need to be accelerated to the desired speed before entering the electron column. For best image formation which filament you will use and why? and also detail out the schottky filament.[4]
- Q.7 The diameter of silver and gold nanoparticles obtained through dynamic light scattering analysis was 4 nm and 16 nm respectively. Compare the surface are to volume ratio (S/V) of silver nanoparticles with gold nanoparticles and list out the advantages of high surface area to volume ratio of nanoparticles [3]

Q. 8 Gold nanoparticles can be easily synthesized by NaBH_4 reduction method in a monophasic system but some time its recommended to synthesize the gold nanoparticles in biphasic system e.g TOAB in Toluene system. Why? [3]

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