| Reg. No | | | | | | | | | | | | | | | |
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# B.Tech DEGREE EXAMINATION, DECEMBER 2023

Fourth & Fifth Semester

## 18NTO304T - ENVIRONMENTAL NANOTECHNOLOGY

*(For the candidates admitted during the academic year (2020-2021 & 2021-20222))*

**Note:**

i. **Part - A** should be answered in OMR sheet within first 40 minutes and OMR sheet should be handed over to hall invigilator at the end of 40th minute.

ii. **Part - B** and **Part - C** should be answered in answer booklet.

**Time: 3 Hours** **Max. Marks: 100**

**PART - A (20 × 1 = 20 Marks)**

Answer **all** Questions

| | | Marks | BL | CO |
|---|---|---|---|---|
| 1. | Nanomaterial exhibit unique properties due to their increased _____ ratio.<br>(A) Surface area/volume (B) Weight/volume<br>(C) Volume/weight (D) Pressure/volume | 1 | 2 | 1 |
| 2. | _____is a process by which the genetic information of an organism is changed, resulting in a mutation<br>(A) Mutagenesis (B) apoptosis<br>(C) mitosis (D) ROS | 1 | 1 | 1 |
| 3. | _____is the way of cleaning out damaged cells by the body , in order to regenerate newer, healthier cells.<br>(A) Necrosis (B) Apoptosis<br>(C) Pyroptosis (D) Autophagy | 1 | 1 | 1 |
| 4. | *In -vivo* experiments were_____<br>(A) Performed in isolated cellular components. (B) less expensive<br>(C) Less time consuming (D) Performed on whole living organism | 1 | 2 | 1 |
| 5. | The _____ method consists of transporting ions into the microbial cell to form nanoparticles in the presence of enzymes.<br>(A) Extracellular synthesis (B) Intracellular synthesis<br>(C) Intercellular synthesis (D) Intermediate synthesis | 1 | 1 | 2 |
| 6. | A _____ is a device which detects the presence or concentration of gases in the atmosphere.<br>(A) Sensor (B) Elcometer<br>(C) Sonicator (D) pH meter | 1 | 2 | 2 |
| 7. | _____ exhibits 3 crystalline structures<br>(A) Ag (B) SiO2<br>(C) Au (D) TiO2 | 1 | 1 | 2 |
| 8. | $NAD^+$ is an _____ agent<br>(A) Reducing (B) Oxidizing<br>(C) Decomposing (D) Precipitating | 1 | 2 | 2 |
| 9. | The waste from the coking industry falls under the ____ list<br>(A) K (B) P<br>(C) U (D) F | 1 | 1 | 3 |

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|---|---|---|---|---|
| 10. | _____ membranes can operate at lower pressures and offer selective solute rejection based on both size and charge<br>(A) Reverse osmosis (B) Ultrafiltration<br>(C) Nanofiltration (D) Microfiltration | 1 | 3 | 3 |
| 11. | A _____is a combination of two different metals that exhibit several new and improved properties<br>(A) Alloy (B) bimetallic nanopar<br>(C) semiconductor (D) ceramic | 1 | 1 | 3 |
| 12. | _____ nanocatalyst is considered as environmentally friendly catalysis due to its high recoverability<br>(A) heterogeneous (B) Homogeneous<br>(C) Super (D) Porous | 1 | 2 | 3 |
| 13. | _____ incineration may be prohibited in some countries due to toxic emission.<br>(A) Solidification (B) Flocculation<br>(C) Plastic vial (D) ion exchangers | 1 | 4 | 4 |
| 14. | _____ is the concept of increasing the nutritional quality of edible grains and vegetables.<br>(A) Biofortification (B) Biosparging<br>(C) Bioventing (D) Biopile | 1 | 4 | 4 |
| 15. | Nanoparticles of sizes ____ migrate to olfactory nerves<br>(A) 10-20nm (B) 20-30nm<br>(C) 30-40nm (D) 30-50nm | 1 | 1 | 4 |
| 16. | _____ includes the flushing action of groundwater in pump-and-treat systems, as well as the use of surfactants to enhance the removal effectiveness of water passing through contaminated soil.<br>(A) Air sparging (B) Soil flushing<br>(C) electroosmosis (D) electrophoresis | 1 | 1 | 4 |
| 17. | Engineered nanoparticles used in personal care products leads to ____<br>(A) Occupational exposure (B) Environmental exposure<br>(C) Consumer exposure (D) Water exposure | 1 | 3 | 5 |
| 18. | ____ effect is involved in manufacturing of façade paints as self-cleaning coatings<br>(A) Green (B) Micelle<br>(C) Lotus (D) Solar effect | 1 | 2 | 5 |
| 19. | The development of the _____concept for nanomaterials is currently under investigation by scientists<br>(A) 'life time' (B) 'environmental risk'<br>(C) 'specific design' (D) 'Safe-by-design' | 1 | 3 | 5 |
| 20. | _____ has higher aspect ration among the following<br>(A) **Nanopillars** (B) Nanospheres<br>(C) Nanopyramids (D) Nanoflakes | 1 | 4 | 5 |

**PART - B (5 × 4 = 20 Marks)**

Answer **any 5** Questions

| | | Marks | BL | CO |
|---|---|---|---|---|
| 21. | Predict the ways to minimize worker exposure to hazards in the workplace | 4 | 1 | 1 |
| 22. | Write short notes on nanocomposites | 4 | 1 | 1 |
| 23. | Mention the important functions of nanocatalyst | 4 | 1 | 2 |
| 24. | Categorize the sensors based on the materials used (bulk and nano) and comment on its efficiency | 4 | 1 | 2 |
| 25. | Predict the four distinct generations of advancement in Nanotechnology. | 4 | 1 | 3 |

| | | | | |
|---|---|---|---|---|
| 26. | Discuss the chemical,physical& biological transformation of carbon nanoparticles (CNPs) | 4 | 1 | 4 |
| 27. | Tabulate the different between the fungi and actinomycetes. | 4 | 1 | 5 |

**PART - C (5 × 12 = 60 Marks)**

Answer **all** Questions

| | | Marks | BL | CO |
|---|---|---|---|---|
| 28. | (a) (i) Various routes of particle entry and stress generation diagram.<br>(ii)Common mechanisms of nanoparticle toxicity.<br>**(OR)**<br>(b) Discuss in detail about the occupational health and challenges. | 12 | 2 | 1 |
| 29. | (a) What is meant by green chemistry? Explain the principles of green chemistry.<br>**(OR)**<br>(b) What are the different methods available for synthesizing nanoparticles? Give a detailed note on the methods used. | 12 | 1 | 2 |
| 30. | (a) Elucidate on different biopolymers giving appropriate examples for each.<br>**(OR)**<br>(b) Explain the different types and sources of soil contaminants in detail. | 12 | 3 | 3 |
| 31. | (a) Describe the physical and chemical based remediation techniques involved in environmental cleaning.<br>**(OR)**<br>(b) With a neat sketch explain the process of removing heavy metals from the soil. | 12 | 1 | 4 |
| 32. | (a) Demonstrate how "cradle-to-grave" approach is a key process in driving forward the environmental improvements .<br>**(OR)**<br>(b) What is life cycle analysis (LCA)? What are the key stages in life cycle analysis? Explain in detail. | 12 | 3 | 5 |

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