

<b>R-4585</b>
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<b>Sub. Code</b>
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<b>533201</b>
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**M.Sc. DEGREE EXAMINATION, APRIL 2021**

**Second Semester**

**Nanoscience and Technology**

**SYNTHESIS OF NANOMATERIALS**

**(CBCS – 2019 onwards)**

Time : 3 Hours

Maximum : 75 Marks

**Part A**

(10 × 2 = 20)

Answer **all** questions.

1. What is laser ablation?
2. What is the significance of RF in RF-plasma system?
3. List some of the advantages of chemical synthesis methods.
4. Give the principle of photochemical synthesis.
5. What type of materials is suitable for hydrothermal method of synthesis?
6. What is single walled carbon nanotubes?
7. What are quantum dots?
8. List some of the limitations of mechanical method.
9. Discuss the advantages of biological synthesis over other methods.
10. Give the principle of mycosynthesis.

**Part B****(5 × 5 = 25)**

Answer **all** questions, choosing either (a) or (b).

11. (a) Explain the operating principle of a method used to prepare ultrathin metallic nanoparticles via evaporation from a metallic source in an inert gas environment.

Or

- (b) Write a short note on DC magnetron sputtering method.

12. (a) Discuss the steps involved in the preparation of nanoparticles by electrochemical synthesis method.

Or

- (b) With proper diagram explain the procedure involved in the synthesis of nanoparticles by co-precipitation hydrolysis method.

13. (a) Explain the process involved in the preparation of nanotubes and nanoflowers of inorganic materials via hydrothermal method.

Or

- (b) Discuss in detail some of the chemical routes to synthesis 1D nanotube and nanorods.

14. (a) Describe in detail the high energy ball milling process used in the synthesis of nanoparticles. What is the importance of high energy in this process?

Or

- (b) Give a brief account on melt quenching and annealing processes.

15. (a) Explain with suitable examples the protein based methods for the formation nanostructures.

Or

- (b) Describe the DNA template based method for the preparation of nanostructures.

**Part C** $(3 \times 10 = 30)$ Answer any **three** questions.

16. Describe with suitable diagram, the following methods of synthesis of nanoparticles
  - (a) Plasma arc technique and
  - (b) microwave plasma evaporation
17. Describe the principles and processes of
  - (a) Sol-gel and
  - (b) sonochemical methods for the preparation of nanosized materials.
18.
  - (a) How will you synthesis carbon nanotubes using hydrothermal route?
  - (b) Describe Schelnk synthesis method for the formation of quantum dots.
19.
  - (a) Discuss some of the limitations of ball-milling process.
  - (b) Describe the principles and processes of severe plastic deformation method for synthesis of nanosized materials.
20. Describe the following techniques, with suitable examples, for synthesis of nanosized materials
  - (a) Phyto-synthesis and
  - (b) bio-product mediated synthesis

<b>R-4586</b>
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<b>533202</b>
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**M.Sc. DEGREE EXAMINATION, APRIL 2021**

**Second Semester**

**Nanoscience and Technology**

**CHARACTERIZATIONS OF NANOMATERIALS**

**(CBCS – 2019 onwards)**

Time : 3 Hours

Maximum : 75 Marks

**Part A**

(10 × 2 = 20)

Answer **all** questions.

1. Define fatigue.
2. What do you mean by plastic deformation?
3. What is activation energy?
4. Define mobility of a charge carrier.
5. Write the principle of photoluminescence spectroscopy.
6. How different AFM from optical microscopy?
7. List the applications of NMR spectroscopy.
8. Explain the principle of Mossbauer spectroscopy.
9. How do you explain Brownian motion?
10. Give the principle of Chronopotentiometry.

**Part B****(5 × 5 = 25)**

Answer **all** the questions, choosing either (a) or (b).

11. (a) Give a brief account on fracture toughness of nanomaterials.

Or

- (b) Discuss in detail superplasticity behaviour of nanomaterials.

12. (a) What is Hall effect? Describe the experimental determination of Hall coefficient of semiconducting material.

Or

- (b) Write a short essay on dc electrical conductivity properties of nanomaterials.

13. (a) Describe the principle, instrumentation and working of FTIR spectrometer with suitable diagrams.

Or

- (b) With neat illustration, explain how a scanning electron microscope functions.

14. (a) What are the different types of magnetism? Explain with illustrations.

Or

- (b) Draw a block diagram of electron spin resonance (ESR) and explain its working principle.

15. (a) Explain in detail the principle, ion/ion interaction and kinetics of electrode reactions of electrochemical cell.

Or

- (b) Explain electrochemical impedance spectroscopy with suitable diagrams.

**Part C** $(3 \times 10 = 30)$ 

Answer any **three** questions.

16. With a suitable schematic, explain the principle and working of nanoindentation technique. Discuss about the determination of some of the mechanical properties by nanoindentation method.
  17. Write an essay on impedance spectroscopy for the study of electrical properties of nanomaterials.
  18. Explain with the help of a suitable and well labeled diagram the principle and working of TEM.
  19. Describe the principle, instrumentation and applications of vibrating sample magnetometer.
  20. Describe the Galvanostatic charge – discharge method and chronoamperometry with suitable diagrams.
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**R-4587**

**Sub. Code**

**533203**

**M.Sc. DEGREE EXAMINATION, APRIL 2021**

**Second Semester**

**Nanoscience and Technology**

**APPLICATIONS OF NANOMATERIALS**

**(CBCS – 2019 onwards)**

Time : 3 Hours

Maximum : 75 Marks

**Part A**

(10 × 2 = 20)

Answer **all** the questions.

1. Give the principle of LED device.
2. Draw and label the structure of electrochromic display device.
3. What is hyperthermia?
4. List out the characteristics of hard magnets.
5. How do ceramic valve work?
6. Discuss the membrane operation in blood purification process.
7. List some of the water resistant composites.
8. Give the principle of varistor.

9. Enumerate the applications of self assembly molecules.
10. Write a short note on nanopharma.

**Part B** (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Give a brief account on microelectronics.  
Or  
(b) Describe the principle, structure and working of CNT based MOSFET device.
12. (a) Discuss the applications of hard magnets in high density storage memories.  
Or  
(b) With suitable example, explain the targeted drug delivery applications of nanomaterials.
13. (a) How nanomaterials used in water purification process? Explain with suitable example.  
Or  
(b) Explain in detail the role of hydroxyapatite in dental applications.
14. (a) Discuss in detail the applications of nanomaterials in organic dye degradation process.  
Or  
(b) Write a short essay on Detoxification of organic and inorganic pollutants.
15. (a) Give a brief account on biofunctionalized CNTs for biological application.  
Or  
(b) Discuss in detail about the cancer detection and diagnosis via nanomaterials based technology.



**Part C**

(3 × 10 = 30)

Answer any **three** questions.

16. Write an essay on nanomaterials based dye sensitized solar cell device.
17. (a) How soft magnets serve in high speed memories? Explain.  
(b) Discuss the applications of magnetic nanoparticles in high energy density batteries.
18. Discuss the applications of nanomaterials in aerospace.
19. Describe in detail the working principle and applications of gas, pressure and temperature sensors.
20. (a) What is tissue culture? Discuss the main steps involved in the tissue culture process.  
(b) Discuss about longer-lasting medical implants.

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**R5469**

**Sub. Code**

**533508**

**M.Sc. DEGREE EXAMINATION, APRIL -2021**

**Fourth Semester**

**Nanoscience and technology**

**NANOTOXICOLOGY**

**(CBCS – 2019 Onwards)**

Time : 3 Hours

Maximum : 75 Marks

**Part A**

(10 × 2 = 20)

Answer **all the** questions.

1. Define the Nano pollution
2. What mean by natural source?
3. Define the Nanotoxicology?
4. What is inflammation in body?
5. What are the routes of exposure?
6. What can pass through a biological membrane?
7. Why ecotoxicology study is important?
8. What are in vivo tests?
9. What are the social impacts of technology?
10. What is mean by ethical?

**Part B**

(5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Explain about the anthropogenic source?

Or

- (b) Describe the nanotechnology important to our society?

12. (a) Explain about the cellular interactions?

Or

- (b) Details about of four routes of entry for toxic substances?

13. (a) Explain the toxicity of Nanoparticle of in the eye?

Or

- (b) Explain about the toxicity Nanoparticle in the spleen?

14. (a) Difference between in vitro and in vivo toxicity testing?

Or

- (b) Explain about the Ecotoxicology studies?

15. (a) What is target tissue and uses?

Or

- (b) Explain about the social implications?

**Part C**

(3 × 10 = 30)

Answer any **three** questions.

16. Describe in detail about the test protocols for Nanomaterials?

17. Explain detail about the immunotoxicity?

18. Write the note on translocation of UFPs from respiratory tract?
  19. Describe in detail about the in vitro toxicity testing?
  20. Write the notes on regulation of engineered Nanomaterials in Europe and USA?
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