



K20P 0070



Reg. No. :

Name :

IV Semester M.Sc. Degree (CBSS – Reg./Suppl./Imp.)
Examination, April 2020
(2014 Admission Onwards)
CHEMISTRY
CHE4E.05 : Nanomaterial Chemistry

Time : 3 Hours

Max. Marks : 60

SECTION – A

Answer **all** questions in **one** word or **one** sentence. **Each** question carries **one** mark.

1. Give the size range of nanoparticles.
2. What is meant by nanotechnology ?
3. What is monolayer ?
4. Write two examples of particle-beam lithographic techniques.
5. List any two microscopic techniques used to characterize nanomaterials.
6. What is SNOM ?
7. Give the nanomaterial used in MRI.
8. What are quantum dots ?

(8×1=8)

SECTION – B

Answer **any eight** questions. **Each** question carries **two** marks.

9. Distinguish between one and two dimensional nanomaterials.
10. What are magnetic nanoparticles ?

(4×3=12)

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11. Why materials at nanoscale show different properties compared to its bulk counterpart ?
12. Outline X-ray lithographic technique.
13. What is polymerization ?
14. Distinguish between wet etching and dry etching techniques.
15. Explain the principle of STM.
16. Briefly explain the principle of ESR.
17. Differentiate between TEM and SEM.
18. Write a short note on the applications of nanocomposites.
19. Write down the different types of photonic crystals.
20. What are the applications of nanomaterials in electronics ? **(8×2=16)**

SECTION – C

Answer **any four** questions. **Each** question carries **three** marks.

21. Briefly explain the properties of nanoclusters.
22. Differentiate between top-down and bottom-up approaches for the synthesis of nanomaterials with examples.
23. Explain the determination of particle size from XRD.
24. Explain the principle of UV-Visible absorption spectroscopy.
25. What are photonic band gap materials ? Give details.
26. Briefly explain the properties of carbon nanotubes. **(4×3=12)**



SECTION – D

Essay type questions. Answer **any four** questions. **Each** question carries **six** marks.

27. A) What is quantum effect ? Discuss in detail the influence of quantum effect in the properties of nanomaterials.
OR
B) What are nanomaterials ? Explain the different types of nanomaterials with examples.
28. A) Explain the photolithographic technique, with a neat diagram, used for the synthesis of nanomaterials.
OR
B) What is self-assembly ? Differentiate direct and layer-by-layer self-assembly.
29. A) Describe the working principle and application of AFM.
OR
B) Discuss in detail
i) FTIR and
ii) Raman spectroscopic techniques used for the characterization of nanomaterials.
30. A) Describe the applications of nanomaterials in supercapacitors and gas sensors.
OR
B) What are solar cells ? Discuss the application of nanomaterials in solar cells. **(4×6=24)**