Total No. of Questions : 4]

SEAT No. :

P1406

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# M.Sc. - II
# INORGANIC CHEMISTRY
## CHI - 432 : Material Science - II (Nanomaterials)
## (2014 Pattern) (Semester - IV) (4 Credits)

*Time : 3 Hours]* *[Max. Marks : 50*

***Instructions to the candidates:***

1) ***All questions are compulsory.***
2) ***All questions carry equal marks.***
3) ***Use of calculators is allowed.***

***Q1)*** Answer the following: **[20]**

a) What do you mean by quantum wire, quantum sheet & quantum dot?

b) Why cavitation occurs in the synthesis of nanoparticles?

c) What is a carbon nanotube? How the carbon nanotubes are differentiated as zigzag, armchair and chiral nanotube.

d) Explain the formation of mesoporous nanomaterials.

e) Define piezoelectricity and pyroelectricity.

f) Why nanoparticles shows high electrical conductivity?

g) Explain the targeted drug delivery mechanism using suitable example.

h) How silver nanoparticles are prepared? Give the chemical reaction involved in it.

i) Write about sonochemical method for preparation of nanoparticles.

j) What are rectifiers?

***Q2)*** Answer the following (any Two): **[10]**

a) What is nanotechnology? Name the various methods for synthesis of nanoparticles. How these methods are important?

b) How semiconductors are prepared using nanomaterials?

c) Discuss the chemical reduction method for the synthesis of Fe-Cu bimetallic nanoparticle.

d) How Raman spectroscopy is useful in characteristic nanoparticles?

***P.T.O.***

***Q3)*** Answer the following (any two): **[10]**

a) Explain the principle, construction and working of transmission electron microscope.

b) Explain how thermocouple operates on the basis of principle of Peilter and seeback effect.

c) Explain how spectroscopy is useful in characterization of nanoparticles.

d) What are nanosensors? Explain their different types.

***Q4)*** Answer the following (any two): **[10]**

a) What is diode? Explain the working of p-n-junction diode with the help of bond energy diagram.

b) What is nano-composite material? Explain any Four size dependent properties of nanomaterials.

c) What are nanoporous materials? Explain the synthesis methods for nanoporous materials.

d) Explain the preparation of pbse nanowire by solvothermal method.

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