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Exam.Code:1031
Sub. Code: 7862 ✓

1128
M. Tech. (Material Science and Technology)
Third Semester
MST-302: Nano-Materials

Time allowed: 3 Hours

Max. Marks: 50

NOTE: Attempt five questions in all, including Question No. 1 which is compulsory and selecting two questions from each Unit.

x-x-x

- I. Attempt any five of the following:-
- How does thermal evaporation differ from laser ablation.
 - List two factors which govern the process of nucleation resulting in formation of clusters.
 - Name three allotropes of carbon.
 - What is the need of functionalizing nanoparticles?
 - What is the basic principle of hydrothermal method?
 - What is the cause of Ostwald ripening?
 - Why is silicon carbide a potential material for fabricating artificial heart valves?
(5x2)

UNIT - I

- II. a) What are the various processes which influence the electrical conductivity of a nanostructured material?
b) Discuss spray pyrolysis method for synthesis of nanomaterials. (5,5)
- III. a) Discuss step wise process to fabricate thin film using molecular beam epitaxy technique. List merits and demerits of this technique.
b) Why do you need to stabilize the colloidal solution of fine particles against agglomeration. How do you stabilize colloidal solution using electrostatic method? (5,5)
- IV. a) Discuss the classical nucleation theory.
b) Give distinguishing features of Bottom-up and Top-down approaches of synthesizing nanomaterials. (6,4)

P.T.O.

(2)

UNIT - II

- V. What are nanocomposites. Give two techniques to synthesis nano-composite. Discuss how nanocomposites can be used as gas sensors. (10)
- VI. Discuss the structure of C60 molecule and carbon nanotube. What are nanostructured carbon coatings? What are various applications of such coatings? (10)
- VII. Write a note on any two of the following:
- a) Nanofluidics
 - b) Nanomechanics
 - c) Biomedical imaging
- (2x5)

x-x-x