

2016

OPTION—D

Paper : 60440

(MATERIAL SCIENCE AND NANOMATERIALS)

1. What is the basis of classification of materials for material science and engineering? Discuss with examples. 6

Or

Compare between the applications of organic and inorganic materials for engineering purposes. 6

2. What are semiconductors? Mention their typical resistivity range. Discuss few important applications of semiconductors. 1+1+4=6

3. What are engineering materials? Discuss how materials are selected for engineering purposes. 2+2=4

4. What is the basis of spintronics? How is the impact of spintronics on technology? 1+3=4

Or

What are biomaterials? How are they different from organic and inorganic materials? Give an example of a potential biomaterial. 1+2+1=4

5. Define composite material with an example. What are their technological advantages? Discuss their applications. $2+2+2=6$

6. What are nanostructured materials (NSMs)? Why and how are they different from bulk counterparts? $1+4=5$

Or

Define quantum dots, wires and wells. Discuss the applications of quantum dots. $3+2=5$

7. Describe how energy of electrons is quantized in quantum dots, wires and wells structures. 5

8. What are top-down and bottom-up approaches of preparation of nanostructured materials? What are different physical methods for preparation of nanostructured materials? $3+3=6$

9. What is sol-gel technique? Why is it so called? Mention the important advantages and disadvantages of sol-gel method. $1+1+4=6$

Or

Compare between chemical vapour deposition and chemical bath deposition techniques for nanostructured material fabrication. 6

10. What are the parameters measured in an X-ray diffraction technique? How is the technique used for characterization of nanostructured materials? 2+3=5

Or

What is the use of transmission electron microscopy technique? Describe its working principle. 1+4=5

11. Why there are so many applications of nanostructured materials in modern technology? Explain why nanostructured materials are better catalysts in comparison to bulk materials. 2+2=4

12. What are nanomachines? Discuss with examples. 1+2=3

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