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[5152]-114**S.E. (Mechanical/Automobile) (First Semester)****EXAMINATION, 2017****MATERIAL SCIENCE****(2012 PATTERN)****Time : Two Hours****Maximum Marks : 50**

N.B. :- (i) Solve Q. No. 1 or Q. No. 2, Q. No. 3 or Q. No. 4,
Q. No. 5 or Q. No. 6, Q. No. 7 or Q. No. 8.

(ii) Figures to the right indicate full marks.

(iii) Draw the neat sketch wherever necessary.

- 1.** (a) What do you mean by the term 'Atomic Packing Factor'?
Calculate atomic packing factor for B.C.C unit cell, assuming
the atoms to be hard spheres ? [4]
- (b) Explain surface imperfections with *one* example. [2]
- (c) What is ceramic material ? Explain its advantages and
disadvantages with its applications. [6]

Or

- 2.** (a) Differentiate between Isostress and Isostrain conditions of
classifying composite materials. [4]
- (b) What do you mean by the term 'Elastomers' ? [2]

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- (c) What is work hardening ? Describe with a neat graph the stages of how it affects in mechanical properties ? [6]
- 3.** (a) What is the significance of impact test ? Explain with any *one* type impact test. [5]
- (b) What do you mean by magnetic particle test ? Differentiate between longitudinal and circular magnetization. [4]
- (c) Explain Radiographic test with its advantages, disadvantages and applications. [4]
- 4.** (a) Identify and explain the methods of NDT in the following applications : [6]
- (i) Rods, bars, forging blanks and rough castings,
- (ii) Surface detection of forgings, castings, weldments,
- (iii) Detection of cracks in welding joints internal or external.
- (b) Which is the material test for scratch hardness ? Explain in detail. [3]
- (c) What is baushinger's effect ? Explain with its root cause with example and neat sketch. [4]
- 5.** (a) Define the term 'powder metallurgy'. What are the classifications of powder manufacturing processes ? [5]

- (b) What do you mean by conditioning of metal powders ? Explain with purpose and different processing stages. [4]
- (c) What is a diamond impregnated tool ? Explain the roll of powder metallurgy for manufacturing of diamond impregnated tool. [4]

Or

6. (a) Explain powder metallurgy with characteristics of metal powders, advantages, in the application of manufacturing the composite materials. [5]
- (b) What do you mean by the term 'sintering' ? Explain the stages of sintering. [4]
- (c) Powder metallurgical manufacturing is only beneficial for manufacturing for certain applications. Explain. [4]
7. (a) Explain the following terms (any *two*) : [4]
- (i) Piezometric materials
 - (ii) Superconductors
 - (iii) Dielectric materials
- (b) What do you mean by the term 'biomaterials' ? Explain with different types. [4]
- (c) Explain 'Biosensors' with principle, advantages and applications. [4]

Or

8. (a) Explain the following terms (any *two*) : [4]
- (i) Cryogenic applications of materials
 - (ii) Modern materials for high temperature applications
 - (iii) Soft and hard ferrites.
- (b) Explain the concept of nanotechnology with *one* example. [4]
- (c) Explain the concept of 'shape memory alloy' with advantages, disadvantages and applications. [4]

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