Total No. of Questions—**8**] [Total No. of Printed Pages—**4**

Seat No.	

[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]

P.T.O.

(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 bauschinger'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]