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**[5152]-514**

**S.E. (Mechanical/Automobile Engg.) (First Semester)**

**EXAMINATION, 2017**

**MATERIAL SCIENCE**

**(2015 PATTERN)**

**Time : Two Hours**

**Maximum Marks : 50**

**N.B. :—** (i) Neat diagrams must be drawn wherever necessary.

(ii) Figures to the right side indicate full marks.

(iii) Use of Calculator is allowed.

(iv) Assume Suitable data if necessary.

(v) Answer 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.

1. (A) Calculate atomic packing factor for BCC and FCC crystal structure. [6]
- (B) What is strain hardening and how does it affect plastic deformation ? Explain theory of dislocation on the basis of rotation of slip planes during plastic deformation. [6]

*Or*

2. (A) What do you mean by the term "Miller Indices" ? Explain the procedure and determine the Miller indices for plane (111). [4]

P.T.O.

- (B) What makes ceramics different than polymers with respect to properties ? [2]
- (C) What are different classifications of imperfections in crystal structure ? Explain the point imperfection in detail. [6]
3. (A) What is the basic difference between destructive and non-destructive testing ? Explain the purpose of the following testing methods :
- (1) Tensile test
  - (2) Ultrasonic
  - (3) Creep test. [7]
- (B) What do you mean by the term corrosion ? What are the different ways to delay the destruction of metal under corrosion ? [6]
- Or*
4. (A) Identify the type of corrosion for the following cases : [4]
- (i) Formation of cavities of small anodic area around which metal is relatively unattacked as compared large cathodic area.
  - (ii) Simultaneous effect of environment and cyclic fluctuation of stress.
  - (iii) The grain boundary phase or a region adjacent to the grain boundary becomes anodic and get preferably corroded due to precipitation of some phase.

(iv) An accelerated attack at the junction of two metals exposed to a corrosive environment.

(B) What is sacrificial anode ? [3]

(C) What is the basic difference between hardness and toughness of the material ? Explain the method to determine the toughness. [6]

5. (A) What are the properties of coating materials ? Which are affects surface quality ? Explain any *three* surface cleaning methods. [6]

(B) What is shot blasting ? [3]

(C) List out the factors affecting electro-deposition [3]

Or

6. (A) Compare PVD and CVD coating. [4]

(B) Explain the process of Ion vapour deposition (IVD) with principle of working, advantages and disadvantages and applications. [6]

(C) What is powder coating ? [2]

7. (A) Explain the basic steps of powder metallurgy process. [4]

(B) Explain the role and function of lubricants and binders in Powder Metallurgy. [6]

(C) Why is sintering important step in Powder Metallurgy ? [3]

Or

8. (A) Sieve analysis method is used in determination which property of powder metallurgy ? Explain it with neat diagram. [5]
- (B) Write flow chart of production of friction material. [4]
- (C) Explain Carbonil process for powder manufacturing. [4]