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Total No. of Printed Pages: [1]

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B. Tech. (Mech. Engg.) (Semester – 4th)

MATERIALS ENGINEERING

Subject Code: BMECS1401

Paper ID: [18112315]

Time: 03 Hours

Maximum Marks: 60

Instruction for candidates:

1. Section A is compulsory. It consists of 10 parts of two marks each
2. Section B consist of 5 questions of 5 marks each. The student has to attempt any 4 questions out of it.
3. Section C consist of 3 questions of 10 marks each. The student has to attempt any 2 questions.

Section – A

(2 marks each)

Q1. Attempt the following:

- a. Explain the activation energy of diffusion.
- b. Draw a BCC unit cell and calculate the number of atoms in this unit cell.
- c. What is meant by allotropy?
- d. Define Polymorphism
- e. What are the carbon percentages in ferrite and cementite?
- f. What is the difference between hardness and harden ability?
- g. What is normalising?
- h. Explain Critical cooling rate.
- i. What do you mean by yielding of ductile materials?
- j. What is Ultra-high strength steel?

Section – B

(5 marks each)

- Q2. What are the basic difference between edge, screw and mixed dislocations?
- Q3. What is alloying? Explain the effect of addition of sulphur and phosphor on stability of iron.
- Q4. How crystal growth can be enhanced? Discuss various methods
- Q5. What are the properties of ferrous materials explain any two of them in detail.
- Q6. What is case hardening process? Explain the flame hardening process in brief.

Section – C

(10 marks each)

- Q7. Draw and neatly label the iron carbon diagram. Explain the various reactions involved while cooling and heating of steel.
- Q8. Describe the carburizing and nitriding process of case hardening with the help of suitable diagrams.
- Q9. On what basis the alloying elements are classified? Discuss the effects of adding Si, Mn and Mo as alloying elements in steels.