

3E1118

Roll No.

Total No of Pages: **3****3E1118****B. Tech. III - Sem. (Main) Exam., Dec. - 2018****PCC Automobile Engineering****3AE4 – 06 Materials Science and Engineering****AE, ME****Time: 3 Hours****Maximum Marks: 120***Instructions to Candidates:*

Attempt all ten questions from Part A, selecting five questions from Part B and four questions from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used /calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL2. NIL**PART – A****(Answer should be given up to 25 words only)****[10×2=20]****All questions are compulsory**

- Q.1 Define space lattice. What are its important characteristics?
- Q.2 Define a crystalline substance. How does it differ from an amorphous material?
- Q.3 Define Allotropy, give some examples.
- Q.4 What are slip system and easy slip directions?
- Q.5 What do you understand by phase diagram?
- Q.6 What an alloy steel is? What are the alloying elements for steel?

- Q.7 What is elastomer? How do they differ from plastics?
- Q.8 How would you achieve a good combination of strength and ductility in medium carbon steel?
- Q.9 Why is the family of ceramic materials exceptionally large?
- Q.10 Discuss the general effects of tempering the steel.

PART – B

(Analytical/Problem solving questions)

[5×8=40]

Attempt any five questions

- Q.1 Assuming that the length of the side of a cube in the FCC lattice equals one, what is the distance between closest atoms? <http://rtuonline.com>
- Q.2 What are the changes that take place in iron and steels at the following critical points?
 A_0 , A_2 , A_4 , and A_{cm} ?
- Q.3 What information is made available by the Isothermal transformation diagram (TTT-Curve) that was lacking in iron carbon equilibrium diagram?
- Q.4 Certain defects can be expected following heat treatment processes. What are three defects? Explain the reasons of their developments.
- Q.5 What is contribution of light metal and their alloys for solving the problems related to corrosion? Give a few examples?
- Q.6 Describe the nature of bonding of atoms in ceramics materials and discuss the main features of the ceramic crystal structures.
- Q.7 Give names only of the various crystal imperfections and also differentiate between strain hardening and recrystallization.

PART – C

(Descriptive/Analytical/Problem Solving/Design Questions) [4×15=60]

Attempt any four questions

Q.1 Describe Gibb's Phase Rule. How this rule is applied to pure metals and binary alloys?

Explain with the help of examples. <http://rtuonline.com>

Q.2 Mark the silent points on iron carbide diagram and explain the various reactions that occur during cooling from high temperature.

Q.3 What do you understand by tempering of steel? What properties can be acquired by steel after tempering process? Classify various tempering processes.

Q.4 Explain the mechanism of polymerization of the polymers. Describe the properties and applications of PE, PVC, PP and PMMA.

Q.5 Distinguish between fibre & particulate reinforced composite. Discuss the properties and applications of Al_2O_3 , Si_3N_4 and SiC .

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