

**B.Tech. 5th Semester (AUE) F. Scheme Examination,
December-2017**

MATERIALS SCIENCE AND TECHNOLOGY

Paper-AUE-305-F

Time allowed : 3 hours] [Maximum marks : 100

Note : Students have to attempt five questions in total with at least one question from each section and Question No. 1 is compulsory.

1. (a) What is meant by crystal imperfections ?
- (b) What is Recovery, Recrystallization and Grain growth ?
- (c) What is cohesive strength of metal and how it is related to the strength of metal ?
- (d) What is ductile and brittle fracture what is creep and fracture ?
- (e) What is the effect of stress concentration on fatigue ?
- (f) What is heat treatment ? How it changes the properties of metal ?
- (g) What is austempering and martempering ?
- (h) What is case hardening ?
- (i) What is allotropic and monotectic reaction ?
- (j) What are the factors affecting the Critical cooling Rate ?

20

(2)

24408

(3)

24408

Section-A

2. (a) What are the defects and imperfections in a crystal? Describe them with neat sketches. 10
(b) What is work hardening (strain hardening)? Explain the mechanism of work hardening. 10
3. Draw the Iron-carbon equilibrium diagram and explain each constituent present in the iron-carbon equilibrium diagram. 20

Section-B

4. (a) Explain and derive the Griffith theory of fracture. 10
(b) What is creep? Explain the creep curve and creep equation. 10
5. (a) Explain the Orowan theory of fatigue and compare with fatigue limit theory. 10
(b) Explain the creep test with the neat sketch. 10

Section-C

6. (a) Describe the Ceramics and explain the advantages and disadvantages of ceramics over the metals. 10
(b) Describe the fabrication techniques for the composite materials. 10

7. Write short notes on : 20

- (a) Cryogenic wear
(b) Selection of materials for axle bearing and chassis
(c) Materials for high temperature.

Section-D

8. (a) What is annealing? Explain the mechanism of annealing along with different type of annealing. 10
(b) Explain the normalizing and spheroidizing. How they affect the properties of metal? 10
9. Explain the following :
(a) Flame hardening
(b) Nitriding
(c) Induction hardening. 20