

R413/13

--	--	--	--	--	--	--	--	--	--

B.E (FULL TIME) DEGREE END SEMESTER EXAMINATIONS, APR/MAY 2013
MATERIALS SCIENCE AND ENGINEERING
SIXTH SEMESTER
ML 9352 CREEP AND FATIGUE BEHAVIOUR OF MATERIALS

24

TIME: 3 Hrs.

Max. Marks: 100

Answer all questions

Part-A (10 x 2 = 20 marks)

1. Distinguish between conservative and Non-conservative motion with reference to Edge dislocation.
2. Define "Burger vector".
3. What do you understand by elastic after effect?
4. State any 2 metallurgical techniques that are employed to enhance creep resistance of metal alloys.
5. Write Goodman and Soderberg equations for determining the stress amplitude.
6. What do you understand by stress concentration factor?
7. Sketch the fatigue fractured surface of steel and label it.
8. Distinguish safe-life and fail-safe designs.
9. State any 2 methods for cleaning the specimen for macroscopic examination.
10. Mention the microscopic features revealed on the surface examination of fatigue fracture.

Part – B (5x 16 = 80 marks)

11. (i) Describe the characteristics of Edge and Screw dislocations. (10)
(ii) Explain the effect of Dislocation orientation on Peierl's stress (6)

12. (a) (i) Explain the procedure involved in creep test and various stage of creep. (10)
(ii) Compare stress rupture and creep tests. (6)

(OR)

(b) What do you understand by Deformation mechanism map? Explain the mechanisms of creep deformation.

13. (a). (a) Write a brief note on (I) Variable stress amplitude (10)
(ii) Strain –life approach on fatigue. (6)

(OR)

- (b). Write a brief note on (i) Creep-Fatigue interaction (10)
(ii) Fretting fatigue (6)

14. (a) (i) Discuss briefly the factors influencing the endurance limit. (6)
(ii) Derive an expression for calculating the number of cycles from the smallest crack that can be detectable to grow upto the critical crack length. (10)

(OR)

14. (b) (i) Explain the method of evaluating the fatigue limit and the significance of S-N curve. (10)
(ii) How do we account for retardation of fatigue crack growth owing to overloads in variable amplitude fatigue? (6)

15. (a) (i) Explain the micro-mechanisms in corrosion fatigue. (8)
(ii) Discuss the information that can be revealed by fractography. (8)

(OR)

15. (b) Describe in detail the step by step procedure involved in preparing report on failure analysis of an industrial component.