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B.E (FULL TIME) DEGREE END SEMESTER EXAMINATIONS, APR/MAY 2012
MATERIALS SCIENCE AND ENGINEERING
SIXTH SEMESTER
ML 9352 CREEP AND FATIGUE BEHAVIOUR OF MATERIALS

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. What do you understand by cross slip?
3. Why Dislocation loops tend to be circular?
4. Distinguish Trans-granular and Inter-granular fracture.
5. Mention any two materials suitable for high temperature application subjected to constant stress.
6. What do you understand by stress concentration factor?
7. Mention the metallurgical techniques employed in enhancing the creep resistance of the materials
8. What do you understand by the term (i) Thermal fatigue and (ii) corrosion fatigue?
9. Distinguish High cycle and low cycle fatigue.
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) Write a brief note on partial dislocation and its movements.

(OR)

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

13. (a). Discuss the method of evaluating the creep strength and explain the behavior of metals at constant loads and the data extrapolation method.

(OR)

(b). Write a brief note on (i) Creep-Fatigue interaction (10) and (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 major factors influencing Environment- assisted fatigue fracture. (8)

(OR)

15. (b) Describe in detail the step by step procedure involved in component failure analysis.