



B.E / B.Tech (Full Time) DEGREE END SEMESTER EXAMINATIONS, APRIL 2011

8

MATERIALS SCIENCE AND ENGINEERING BRANCH

SIXTH SEMESTER - (REGULATION 2004)

ML 382 – CREEP AND FATIGUE BEHAVIOUR OF MATERIALS

Time: 3 hr

Max. Mark: 100

PART- A (10X2 = 20 Mark)

What do you mean by the following:

1. Jog and Kink
2. Super Plasticity
3. Beach Marking.
4. Paris law
5. Transgranular crack

Justify the following statements

6. 99.9% pure copper has critical shear stress of 1 MPa compared to theoretical value of 414 MPa.
7. Large grain microstructure has better high temperature properties than small grain microstructure while material remaining same.
8. There is no true fatigue limit for aluminum alloys.
9. The notch sensitivity factor for gray cast iron is very low.
10. Fracture surface preservation is necessary for failure analysis.

PART- B (5 X16 = 80 Mark)

11. Discuss in detail type of engineering failures, different methods of examination and their preparation.

12. (a) (i) Derive an expression for strength of a perfect crystal. (8)
(ii) Brief on Partial dislocation. (8)

(OR)

- (b) (i) What is the nature of stress field and forces on dislocation. (8)
(ii) Brief on Frank Read source of dislocation multiplication. (8)

13. (a) Brief on mechanism of deformation of creep behaviour.

(OR)

(b) (i) Brief on the extrapolation schemes for creep life. (8)

(ii) What are materials suitable for high temperature applications? (8)

14. (a) (i) Explain how the effect of small notches or cracks can be analyzed in terms of fracture toughness. (8)

(ii) Brief on crack initiation mechanisms. (8)

(OR)

(b) Explain the term fatigue cycle? Explain briefly about high cycle fatigue and low cycle fatigue?

15. (a) Discuss about the J-integral approaches and R-curve analysis in CTOD of elastic and plastic fracture.

(OR)

(b) Explain various experimental methods for measuring K_{IC} .