R09

Code No: C1503
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M.Tech I Semester Examinations, March-2011
FATIGUE, CREEP AND FRACTURE MECHANICS
(MACHINE DESIGN)

Time: 3hours   **Max. Marks: 60**

Answer any five questions
All questions carry equal marks
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1. a) Explain plane stress and plane strain conditions.
    b)Why actual strength of the material is different from ideal strength? Explain.   [12]

2. a) What is DBTT? How it is determined for notched components?
    b) Discuss the ductile rupture as a failure mechanism fracture at elevated
       temperatures.   [12]

3. Explain stresses and displacement in Cartesian and polar coordinates.   [12]

4. What is Strip-Yield model? Derive an expression for Keff under this approach.   [12]

5. a) Explain the reasons for R curve and shape.
    b) Determine the energy release rate for a double cantilever beam.   [12]

6. Estimate the relative size of the singularity dominated zone ahead of a through crack in an
   infinite plate subject to remote uniaxial tension.   [12]

7. Discuss the empirical laws of fatigue failure.   [12]

8. Discuss on factors affecting the fatigue failure of welded joints.   [12]

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M. Tech I- Semester (Machine Design) Regular April 2011 Set-2
Fracture, Creep and Fracture Mechanics

Time: 3.0 hrs   **Maximum marks: 60**

Answer any FIVE questions.
All questions carry equal marks.

1. a. Explain the failure mechanism in materials at elevated temperatures.

    b. Define and explain stress intensity factor and strain energy release rate.

2. Explain Irwin approach for crack tip plasticity.

3. a. Draw and explain typical stress-strain curves for aluminum, white cast iron,

    nodular cast iron and brass.

    b. Explain the concept of representing the principal stresses and strains in

    Mohr's circle.

4. a. Explain the stress analysis of cracks.

    b. What is KIC? How it is determined?

5. Explain different modes of crack opening.

6. What is J-integral? Explain J-integral approach.

7. a. What is Paris-Ergodan law? Explain its significance.

    b. Explain microstructural models of crack initiation under fatigue conditions.

8. Discuss on creep-fatigue interactions.

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