R09

Code No: C8901

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M.TECH I SEMESTER EXAMINATIONS, APRIL/MAY-2012
MECHANICAL BEHAVIOUR OF ENGINEERING MATERIALS
(ENGINEERING DESIGN)

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

Answer any five questions
All questions carry equal marks

\- - -

1. a) State the Griffith's criterion and derive the expression for stress in plane strain condition.
   b) Briefly explain the ductile fracture and the Mc clintock's analytical treatment of ductile fracture.

2. a) With the help of neat sketches explain the three modes of crack deformation.
   b) Discuss about stress concentration factors.
3. Discuss in detail about **J** integral concept and write expression for **J** integral for the compact-test specimen.

4. a) Explain the construction of S-N curves for ferrous and non-ferrous metals.
   b) A steel bar is subjected to an axial load that varies from 400 KN tension to 200 KN compression. The mechanical properties of steel are σ_u= 1100 N/mm^2, σ_0 = 1000 N/mm^2 and σ_e = 500 N/mm^2. Determine the bar diameter for infinite life based on a safety factor of 2.5. Use Goodman's theory.

5. Explain the following factors affecting the surface of a fatigue specimen.
   a) Surface roughness.
   b) Changes in surface properties.
   c) Surface residual stress.

6. Explain the Micro mechanisms of fatigue damage.

7. Explain the creep curve and Sketch the creep curve with the three steps of creep. What is Andrade's Analysis?

8. What do you mean by Larson – Miller parameter? Determine also the stress required for failure in 10^5 hours at temperatures of 650^0C and 870^0C.

****