Code: 9D15104

M.Tech I Semester Supplementary Examinations August/September 2018

FRACTURE, FATIGUE & CREEP DEFORMATION

(Machine Design)

(For students admitted in 2013, 2014, 2015 & 2016 only)

Time: 3 hours Max. Marks: 60

Answer any FIVE questions

All questions carry equal marks

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1 (a) Define fracture. What are the different modes of fracture failure in materials?
(b) Explain different modes of crack opening.

2 Explain Griffith's theory and also compare this theory to Irwin-Orwin extension.

3 Explain briefly the ductile/brittle fracture transition temperature for notched and unnotched components.

4 With the help of a neat sketch, explain the process of crack initiation and explain the stages of crack initiation.

5 Determine the value of K_1 for the following cases:
(i) Single edge cracked plate under uniform tension a = 15 mm, W = 120 mm subjected to 250 MPa.
(ii) Center-cracked plate under uniform tension; 2a = 30 mm, 2W = 150 mm, subjected to 250 MPa.

6 (a) Discuss in detail the significance and test methods for fracture toughness.
(b) Explain the effect of metallurgical variables on fatigue properties.

7 Explain the term fatigue cycle. Explain the fatigue crack closure mechanism in metals with suitable sketch.

8 (a) Explain the role of diffusion in creep deformation.
(b) Discuss the effect of overload during fatigue crack propagation.

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