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M.TECH

Total Number of Pages : 1

M.TECH 1<sup>ST</sup> SEMESTER SUPPLE EXAMINATIONS, DECEMBER 2018

FATIGUE CREEP & FRACTURE

Branch: MD, Subject Code:MMDPE1041

(Regulations 2017)

Time: 3 Hours

Max Marks : 70

Question Code: SD18002073

PART-A (10 X 2=20 Marks)

1. Answer the following questions.

- Distinguish between “stress concentration factor” and “stress intensity factor”?
- What is strain hardening of creep?
- Distinguish between toughness and fracture toughness?
- Mention two important causes for increasing tendency of brittle fracture of metals.
- Explain the phenomenon of creep in metals.
- What is strain hardening effect of creep ?
- Name different modes of fractures with neat sketch?
- What is SN curve?
- Differentiate between creep and fatigue?
- What do you mean by stress concentration and notch sensitivity?

PART-B (5 X 10=50 Marks)

Answer any five questions from the following.

- Write a short note on different modes of crack opening. [ 5 ]
  - Compare Von Mises criteria and Tresca criteria. [ 5 ]
- Explain the mechanism of creep deformation. [ 5 ]
  - Describe the three modes of fracture with appropriate sketches [ 5 ]
- describe the methods of reducing stress concentration. [ 4 ]
  - A machine component is subjected to a flexural stress which fluctuates between  $+300\text{MN/m}^2$  and  $-150\text{MN/m}^2$ . Determine the value of minimum ultimate strength according to:  
    - Gerber relation
    - Modified Goodman relation
    - Soderberg relation[ 6 ]
- Compare Goodman, soderberg and Gerber fatigue design formula [ 5 ]
  - Describe the creep phenomenon for high temperature bolting design in pressure vessels [ 5 ]
- Explain the testing procedure and method to determine  $K_{Ic}$ , the plain strain fracture toughness. [5+5]
- write short notes on
  - Corrosion fatigue mechanism
  - Ductile brittle transition temperature.
- Write short notes on
  - High and Low cycle fatigue. [ 5 ]
  - Fatigue crack closure theories. [ 5 ]