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M.TECH

Total Number of Pages :1

M.TECH 1ST SEMESTER REGULAR EXAMINATIONS, DECEMBER 2018

FATIGUE, CREEP & STRUCTURE

Branch: MD, Subject Code: MMDPE1031

(Regulations 2018)

Time: 3 Hours

Max Marks : 70

Question Code: RD18002071

PART-A (10 X 2=20 Marks)

1. Answer the following questions.
 - a. Explain how the factor of safety is determined under steady and varying loading.
 - b. What is meant by 'stress concentration'? How do you take it into consideration in case of a component subjected to dynamic loading?
 - c. State the basic characteristics of ductile fracture.
 - d. Define low cycle and high cycle fatigue?
 - e. Explain the miner's concept of cumulative fatigue damage.
 - f. How does surface roughness influence fatigue?
 - g. Explain various modes of fractures with neat sketch?
 - h. What is SN curve?
 - i. Differentiate between creep and fatigue?
 - j. What do you mean by stress concentration and notch sensitivity?

PART-B (5 X 10=50 Marks)

Answer any five questions from the following.

2. a) Write a short note on different modes of crack opening. [5]
b) Compare Von Mises criteria and Tresca criteria. [5]
3. a) Explain the mechanism of creep deformation. [5]
b) Describe the three modes of fracture with appropriate sketches [5]
4. a) describe the methods of reducing stress concentration. [5]
b) A machine component is subjected to a flexural stress which fluctuates between $+300\text{MN/m}^2$ and -150MN/m^2 . Determine the value of minimum ultimate strength according to:
i) Gerber relation ii) Modified Goodman relation iii) Soderberg relation [5]
5. a) Compare Goodman, Soderberg and Gerber fatigue design formula [5]
b) Describe the creep phenomenon for high temperature bolting design in pressure vessels [5]
6. a) Discuss the various mechanical and metallurgical methods for improvement of fatigue strength in metal? [5]
b) What do you mean by linear elastic fracture mechanics? Derive an equation for stress intensity factor. [5]
7. a) State and explain Griffith theory of brittle fracture. [5]
b) Derive an expression for the stresses of crack propagation. [5]
8. Write short notes on
a) Stress rupture test [5]
b) Low cycle fatigue [5]