Registration No:

Total Number of Pages : 01   **M.TECH**
M.TECH 1ST SEMESTER REGULAR EXAMINATIONS, DECEMBER 2017
FATIGUE CREEP & FRACTURE
Branch: MD, Subject Code:MMDPE1041
Time: 3 Hours
Max Marks : 70
The figures in the right hand margin indicate marks.
PART-A   (2X10=20 MARKS)
1. Answer the following questions .
a) Illustrate how the stress concentration in a component can be reduced.
b) What information do you obtain from Soderberg diagram?
c) In σ – N Curve show endurance strength for finite life and write down the expression
        to find out it.
d) Write down the assumptions while considering creep in bending.
e) How does a continuous system differ from a discrete system in the nature of its equation of
    motion?
f) Why is it important to find the natural frequency of a vibrating system?
g) What do you mean by surface finish factors ?
h) Difference between brittle and ductile fracture. Explain with example.
i) How does fracture stress and mode of fracture vary with specimen thickness?
j) Explain the phenomenon of creep in metals.
PART-B   (5 X 10=50 MARKS)
Answer any five questions from the following.
2. Derive the expression showing the ratio of creep bending stress and elastic bending stress   **5**
    (creep stress ratio) considering creep in bending.   **5**
3. A bar of circular cross-section is subjected to alternating tensile forces varying from a   **5**
    minimum of 200 kN to a maximum of 500 kN. It is to be manufactured of a material with an   **5**
    ultimate tensile strength of 900 MPa and an endurance limit of 700 MPa. Determine the
    diameter of bar using safety factors of 3.5 related to ultimate tensile strength and 4 related to
    endurance limit and a stress concentration factor of 1.65 for fatigue load. Use Goodman
    straight line as basis for design.
4.a) Compare Goodman, Soderberg and Gerber fatigue design formulae. Show them on graph.   **5**
  b) Discuss regarding the modes of Fracture.   **5**
5.a) What is cumulative damage in fatigue? Derive Miner's equation for it.   **5**
  b) What are the different factors to be considered while designing machine parts to avoid   **5**
     fatigue failure?
6.a) Derive the relationship between stain energy release rate and stress intensity factor.   **5**
  b) explain briefly the Griffith theory of Brittle Fracture. And derive the Griffith equation for **5**
     fracture stress in plane stress and plane strain conditions.
7.a) Draw a typical creep curve and explain the various stages.   **5**
  b) Explain the mechanisms of creep deformation.   **5**
8.Write short notes on   **5**
   a)   Stress rupture test
   b)   High temperature alloys   **5**

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