

Design for fracture, fatigue and creep

Time : 3 hrs

PG. M.E 2nd semester Examination -2018

full Marks : 100

Answer any five questions

1. a) Why fracture mechanics is significant in design.
 b) Discuss the design principle based on CTOD following PD-6493.
 c) Explain primary secondary and reference stresses.
 d) Explain the parameters influencing fracture toughness.
- 4 + 5 + 6 + 5
2. a) Discuss the principle and method of computing J integral by EPRI method.
 b) How J-R curve is measured experimentally?
 c) How tearing modulus is applied design?
- 8 + 6 + 6
3. a) Explain FAD at different levels and its application in design.
 b) How K_I for part through crack is measured?
 c) How FAD is modified for application for design of welded parts ?
- 10 + 5 + 5
4. a) Compare failure mechanism due to fatigue and fracture .
 b) Discuss S-N curve and application in design considering effect of mean stress on it.
 d) Derive the equation for fatigue crack growth curve considering all the features ?
- 4 + 8 + 8
5. a) Discuss the design principle for variable amplitude fatigue loading.
 b) What is cyclic stress – strain curve .
 c) Discuss the in detail the principles of strain – life equation for LCF, HCF and also for combined?
- 6 + 6 + 8
6. a) Draw and discuss the aspects of a creep curve.
 b) Derive the creep equation for combined dependence of temperature and stress.
 c) How creep fatigue interaction can be modelled by strain partitioning method.
 d) Explain the role C^* Integral for design for creep.
- 4 + 4 + 6 + 6
7. Write short notes on any four : 4 X 5 = 20
 a) R-6 method of design b) Activation energy for creep c) weight function for arbitrary loading
 d) modelling for LCF e) Statistical nature of fracture toughness. f) Safe life estimation based on crack growth.