

## Unit 14 - Week 12

Course outline
How to access the portal
Pre-Requisite Assignment
Week 1
Week 2
Week 3
Week 4
Week 5
Week 6
Week 7
Week 8
Week 9
Week 10
Week 11
Week 12
• HRR Fields and CTOD
○ FAD and Mixed Mode Fracture
○ Crack Arrest and Repair Methodologies
○ Engineering Fracture Mechanics : Week 12 Feedback form
○ Quiz : Assignment 12
Video Download
Text Transcripts

## Assignment 12

The due date for submitting this assignment has passed.  
As per our records you have not submitted this assignment.

**Due on 2019-10-23, 23:59 IST.**

### Instructions for answering numerical questions

- In all numerical type questions, you are expected to round off the answers to two decimal places accuracy unless otherwise specified.  
Examples: 1. Ans: 9.825, you report as 9.83  
2. Ans: 9.8, you report as 9.80  
3. Ans: 9, you report as 9.00

This style of reporting is essential for computer based automated correction of your answers.

- The answers for various quantities asked are to be reported in the following units unless otherwise specified, Stress- MPa, Stress Intensity Factor- MPa/m, Strain energy- Nmm, Energy release rate-  $J/m^2$ , deflection - mm

- 1) HRR field is another name for: 1 point
- K dominated zone  
 J dominated zone  
 Fracture process zone  
 none of the above

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
J dominated zone

- 2) If  $r$  is the radial distance from crack tip, Hutchinson, Rice and Rosengren showed that in order for  $J$  integral to remain path independent the product of stress and strain near the crack tip must vary as a function of: 1 point

- $r$   
  $\frac{1}{r^2}$   
  $\frac{1}{r}$   
  $\frac{1}{\sqrt{r}}$

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
 $\frac{1}{r}$

- 3) The correct order of occurrence of regions starting from the crack tip is: 1 point

- J dominated zone, K dominated zone, Fracture Process zone  
 K dominated zone, Fracture Process zone, J dominated zone  
 Fracture Process zone, J dominated zone, K dominated zone  
 Fracture Process zone, K dominated zone, J dominated zone

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
Fracture Process zone, J dominated zone, K dominated zone

- 4) Region of plastic collapse in the failure assessment diagram occurs at: 1 point

- High Load ratio and High toughness ratio  
 High Load ratio and Low toughness ratio  
 Low Load ratio and Low toughness ratio  
 Low Load ratio and High toughness ratio

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
High Load ratio and Low toughness ratio

- 5) If A is the SIF of unpatched crack, B is the SIF of one side patched crack, C is the SIF of double side patched crack, then which of the following is true 1 point

- $A < B < C$   
  $A > C > B$   
  $A > B > C$   
  $A < C < B$

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
 $A > B > C$

- 6) An inherent crack arrest mechanism is found in 1 point

- welded joints  
 riveted joints  
 brazed joints  
 none of the above

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
riveted joints

- 7) J integral becomes path dependent when 2 points

- The crack faces are unloaded  
 The crack faces are loaded  
 The crack is straight  
 The crack is curved

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
The crack faces are loaded  
The crack is curved

- 8) In a mixed mode loading, if mode I SIF  $K_I$  is  $40MPa(m)^{1/2}$  and its critical value  $K_{IC}$  is  $70MPa(m)^{1/2}$ , what will be the critical value of mode II SIF  $K_{IIC}$  (in  $MPa(m)^{1/2}$ ) given  $K_{II}$  is  $30MPa(m)^{1/2}$ ? 2 points

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
(Type: Range) 34.00,38.00

A cracked body is subjected to combined Mode-I and Mode-II loading. It fails at a tensile stress of  $140MPa$  and a shear stress of  $80MPa$ . The crack length  $2a$  at the time of failure is  $70mm$

- 9) What is the ratio of mode I SIF to mode II SIF i.e.,  $K_I/K_{II}$  1 point

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
(Type: Range) 1.70,1.80

- 10) Using the maximum principal stress criterion, calculate the physically possible crack growth angle (in degrees) 2 points

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
(Type: Range) -45.00,-41.00

- 11) What value of  $K_{IIC}$  is physically possible (in  $MPa(m)^{1/2}$ )? 2 points

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
(Type: Range) 37.00,42.00