

Name.....Student I.D.....

**Department of Mining and Materials Engineering**  
**Faculty of Engineering**  
**Prince of Songkla University**

Mid-term Examination for Semester: 1

Academic Year: 2015

Date: October 7, 2015

Time: 09.00 - 12.00

Subject: 237-407 Failure Mechanics and Analysis

Room: S104

**Instructions**

1. There are 3 problems (9 pages including cover page). Please do all of them. Write your answers in the space provided.
2. Dictionary and calculator are allowed.
3. Text books and course notes are not allowed.
4. This mid-term exam is accounted for 25% of the total grade.

Asst. Prof. Dr. Thawatchai Plookphol

Problem no.	Full score	Student's score
1	20	
2	30	
3	30	
Total	80	







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## Given Formula

Theoretical cohesive strength  $\sigma_c = \sqrt{\frac{2E\gamma_s}{b}}$

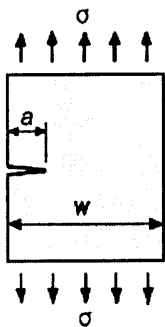
Inglis' formula  $\sigma_f = \sqrt{\frac{E\gamma_s}{4a}}$

Griffith's equation (plane stress):  $\sigma_f = \sqrt{\frac{2E\gamma_s}{\pi a}}$

Griffith's equation (plane strain):  $\sigma_f = \sqrt{\frac{2E\gamma_s}{\pi(1-\nu^2)a}}$

Modified Griffith's equation:  $\sigma_f = \sqrt{\frac{2E(\gamma_s + \gamma_p)}{\pi a}}$

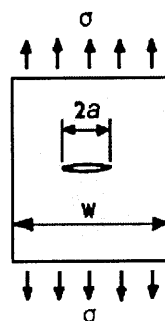
Energy release rate:  $G = \frac{\pi\sigma^2 a}{E}$



Single edge notched plate :

$$K_I = C\sigma\sqrt{\pi a}$$

$$C = 1.122 - 0.231\left(\frac{a}{W}\right) + 10.550\left(\frac{a}{W}\right)^2 - 21.710\left(\frac{a}{W}\right)^3 + 30.382\left(\frac{a}{W}\right)^4$$



Center cracked plate :

$$K_I = C\sigma\sqrt{\pi a}$$

$$C = 1 + 0.256\left(\frac{a}{W}\right) - 1.152\left(\frac{a}{W}\right)^2 + 12.200\left(\frac{a}{W}\right)^3$$