

12 Pages

1. Please give the information requested in the boxes below.
2. Enter your name in the space provided to the right, fold over and seal down (using the label provided) to hide your name
3. The answers must be legibly written. The Examiners can either accept illegible script or have it typed and the expense of typing charged to the candidate.
4. Write your answers in ink.
5. Begin each answer on a fresh page. Do all rough work in the answer book and cross it through.
6. No part of this book is to be torn out; it must be handed in complete.
7. If more books than one are used, fasten them together using the tags available from the invigilator(s).
8. **Every book must be handed in. In no circumstances may answer books, used or unused, be taken out of the examination venue.**

SURNAME:

WILKS

FORENAME(S):

WILLIAM PETER

1	Student Number	P151304
2	Title of Examination Paper	CAE STRESS ANALYSIS
3	Module Code	MSX02064
4	Date and Time of Examination	9.5.19 12.00
5	Examination Venue	Q1310
6	Seat Number	9015
7	Number of Answer Books handed in	

[illegible]

(Gweler yr ochr arall am y fersiwn Cymraeg)

15%

Question No.

Q.
a.

$$\sigma_H = \frac{Pd}{2t}$$

$$F \uparrow = P \times A \\ = P \times dL$$

$$F \downarrow = 2\sigma_H \times tL$$

$$P \times dL = 2\sigma_H \times tL \quad \text{Rearrange}$$

$$\sigma_H = \frac{Pd}{2t}$$

/ (4)

b.
i.

$$\sigma_H = \frac{Pd}{2t}$$

$$P = \rho gh$$

$$\text{@ sea level } P = 101 \times 10^3 \text{ Pa}$$

$$d = 3.5 \text{ m}$$

$$t = 0.5 \times 10^{-4} \text{ m}$$

||||

$$\sigma_H = 200 \times 10^6 \text{ Pa}$$

$$\frac{\sigma_H 2t}{d} = P$$

$$\frac{200 \times 10^6 \times 2 \times 0.5 \times 10^{-4}}{3.5} = 5714.29 \text{ Pa}$$

(1)

$$5714.29 = \rho gh$$

$$\text{Maximum Altitude} = 15000 \text{ ft}$$

+

$$\text{ii. } 75.3 \text{ kPa}$$

(0)

Question No.

Examiner

Arholwr yn unig

y Cwestiwn

$$\sigma_{\theta} = \frac{1}{2}(\sigma_x + \sigma_y) + \frac{1}{2}(\sigma_x - \sigma_y) \cos 2\theta$$

$$\tau_{\theta} = \frac{1}{2}(\sigma_x - \sigma_y) \sin 2\theta$$

Q2.
a.

Principle Stress

X

Principle Plane are the stresses which act parallel and perpendicular to the plane X O

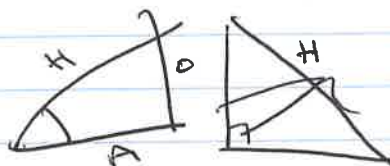
b. $\sigma_{\theta} = \frac{1}{2}(\sigma_x + \sigma_y) + \frac{1}{2}(\sigma_x - \sigma_y) \cos 2\theta + \tau_{xy} \sin 2\theta$

$$\frac{d\sigma_{\theta}}{d\theta} = -(\sigma_x - \sigma_y) \sin 2\theta + 2\tau_{xy} \cos 2\theta$$

$$(\sigma_x - \sigma_y) \sin 2\theta = 2\tau_{xy} \cos 2\theta$$

$$\frac{\sin 2\theta}{\cos 2\theta} = \frac{2\tau_{xy}}{(\sigma_x - \sigma_y)}$$

$$\tan 2\theta = \frac{2\tau_{xy}}{(\sigma_x - \sigma_y)}$$



σ_H σ_A τ_H

X O

Q3. Design problem, its ~~purpose~~ interpreting the correct specification e.i material.
Problems creating part e.i tooling

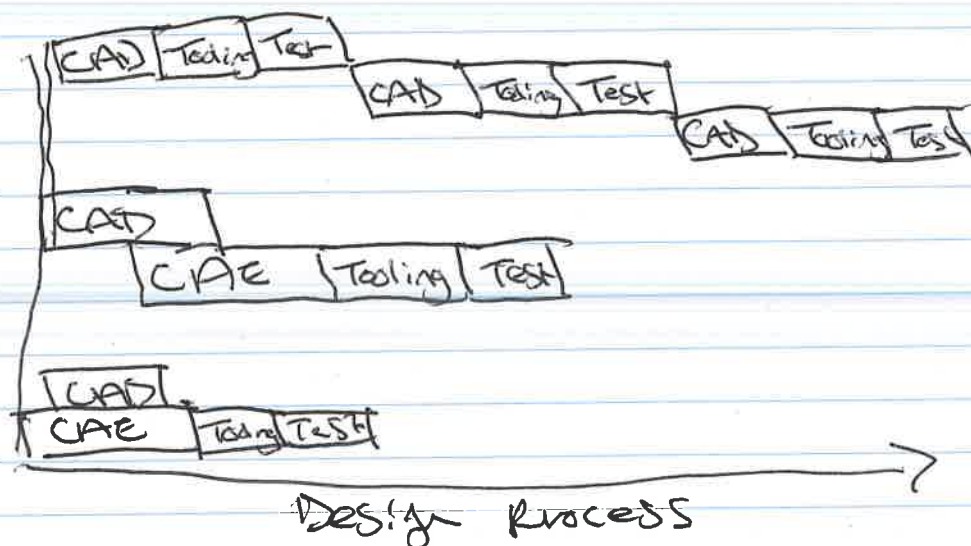
Analysis problems

Problems interpreting the Data and Putting it all together.

b. The Design process is normally not iterative Problem due to the designer's knowledge, understanding, and ability to interpret the design

Analysis problem happens when the results cannot be seen to be put together or too many approximations have been used so the results seem incorrect.

C.



implicating CAE Shorten the design process
 Giving little answer limiting the amount
 of CAD required, time and money.

3

SIMPLE method

Split Split Geometry into finite Elements/nodes
 1D, 2D, 3D

Interpret to received fair results in a fair time
 Approximation must be used.

Material Then material information must
 be added to the model.

Physical properties for 1D, 2D element physical properties
 must be known, 2D is a plate thickness, 3D is a volume.

Loading Solver $\rightarrow$ matrix which $\rightarrow$ Simultaneous
 equation $\rightarrow$ loading and boundary conditions must
 be known to solve simultaneously.

Evaluate The analysis must evaluate results.

Five Steps.

X

Question No.

Examiner's
Oraminer's

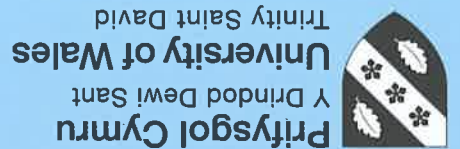
Question No.

Examiner Only

Question No.

Examiner O





Llyfr Atebion Arholiadau

12 Tudalen

Cyfarwyddiadau i Ymgeiswyr

1. Rhwch yr holl wybodaeth y gofynnir amdani yn y blychau isod.
2. Rhwch eich enw yn lle a ddarparwyd ar y dde, plygwch ef a'i sellio i lawr (gan ddefnyddio'r label a ddarparwyd) i guddio'ch enw.

3. Rhaid i'r atebion fod mewn llawysgriften ddarlennadwy. Gall yr Arholwyr naill ai anwybyddu sgrïpt annarllennadwy, neu drefnu iddi gael ei threipio a chael yr ymgaisydd i dalu.
4. Ysgrifennwch eich atebion mewn inc.
5. Dechreuwch bob ateb ar dudalen newydd. Gwnewch unrhyw fras nodiadau yn y llyfr atebion a thynnu llinell drwyddynt.
6. Ni ddylid rhwngo unrhyw ran o'r llyfr hwn; rhaid ei gyflwyno yn gyfan.
7. Os defnyddir mwy nag un llyfr, rhwymwch hwy gyda'i gilydd gan ddefnyddio'r tagiau sydd ar gael oddi wrth y gwyllwyr/gwylwyr.
8. Rhaid dychwelyd pob llyfr. Ni chaniateir mynd â llyfrau atebion, wedi eu defnyddio neu heb eu defnyddio, allan o'r lleoliad arholi o dan unrhyw amgylchladau.

7	Nifer y Llyfrau Atebion a gyflwynwyd	
6	Rhif Sedd	
5	Lleoliad yr Arholiad	
4	Dyddiad ac Amser yr Arholiad	
3	Cod y Modwl	
2	Teitl y Papur Arholiad	
1	Rhif Myfyrwr	

Rhestwch ffâu'r cwestiyonau a ymgeistwyd genych	
	Cyfanswm
At Dibenion y Swyddfa	

(See the other side for English version)

Llenwch, plygwch a seliwch
(gweler nodyn 2 isod)

CYFENW:

ENW(AU) CYNTAF: