

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 ignore 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: wilkinson

FORENAME(S): Steven.

1	Student Number	P149872
2	Title of Examination Paper	CAE + Stress Analysis
3	Module Code	MSX 0 2064
4	Date and Time of Examination	12pm 9/5/18
5	Examination Venue	10 310
6	Seat Number	6057
7	Number of Answer Books handed in	1

[illegible]

(Gweler yr ochr arall am y fersiwn Cymraeg)

48.3%

Q1 a.) $\sigma_H = \frac{Pd}{2t} \rightarrow Pd = 2\sigma_H t$
 $\frac{Pd}{2t} = \sigma_H$

★ ①

b.) $\frac{2 \times 200 \times 10^6 \times 0.5 \times 10^{-3}}{3.5}$

i) $= 57 \text{ kPa.}$

Sea level = 101 kPa

$101 - 57 = 44$

$= 20,000 \text{ ft} \uparrow$

✓ ④

ii) $8000 \text{ ft} = 75.3 \text{ kPa}$

$75.3 - 57 = 18.3 \text{ kPa}$

$= 40,000 \text{ ft} \uparrow$

③

c.) Allow for higher flying where the air is less dense this increases fuel economy and range of the aircrafts travel.

✓ ②

d.) $\sigma_H = \frac{Pd}{4t} = \frac{P + d^2}{4} = \sigma_H \text{ (right)}$
 $= \frac{Pd}{4t} = \sigma_H$

①

e.) Low pressure substances use a long tall cylinder
~~low~~ reduces Footprint needed and more can be built in an area.

High pressure uses spheres which have a larger footprint taking up more space.

✓ ⑤

(Q3)

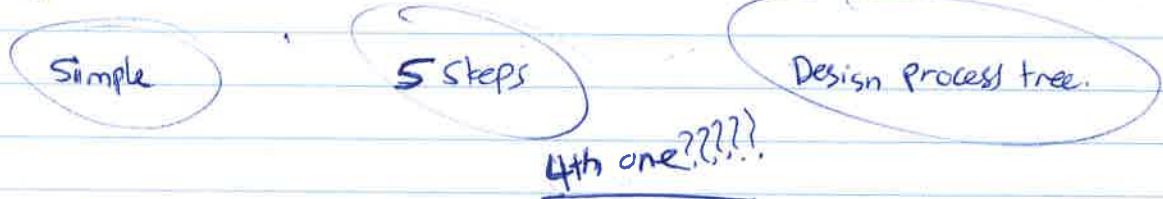
- a.) Design Problems has more than one answer compared to an analysis problem.

Design problems can be drawn from multiple areas e.g. CAD, CAE, or other Design applications. While Analysis problem one normally step followed process which normally have one problem to work to solve.

- b.) Design Problem is a constant evolutionary process where the same design could be re-drawn, evaluated or scrutinised multiple times before being signed off.

Analysis Problem would be data driven Looking at Simulations of CAE test to impact the design this will optimise the maximum performance of the part. Once one part is done, move onto the next part.

- c.) ~~Test~~ design



Simple.

Split, Interpret, materials, Physical property, loading, Evaluate.

Advantages.

- + Step by Step Process to achieve an outcome.
- + Each Step allows you to be able to go back and change the previous step e.g. If the physical property does not match the specification the going back to materials may solve this.
- +
- only works for an analytical problem.
- only one evaluation step, should evaluate your progress all the time. constantly criticising the work.

5 Steps

Define the Problem

Gather information

generate ideas

multiple Solutions

implement Solutions.

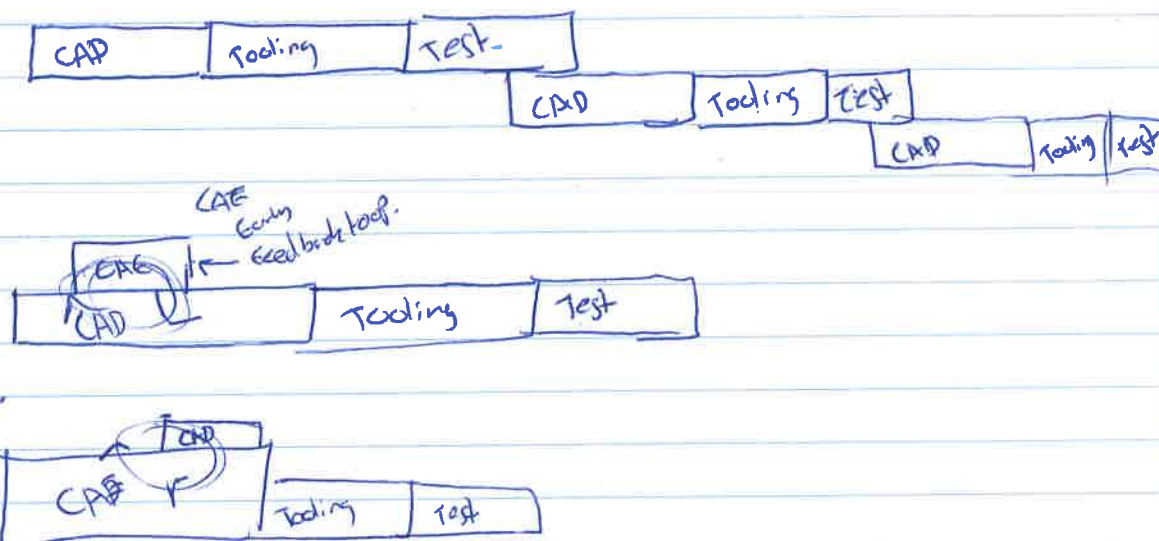
Advantages

+ Step by Step Process

+ Allows multiple People to tackle the task. → Free to take risks and draws people from all areas to allow for fresh new ideas,

— No evaluation stage to criticise the solution. Should be before implementing a solution this reduces error and a waste of time.

(3)

Design Process tree:Advantages

Feedback loop creates a relationship of progression before costs of tooling.

+ Having CAE early means its all Simulation and Virtual testing before any real prototypes have been made massively reducing cost and time of process = less man hours or less workers on project.

— High initial cost, CAE/CAD Packages are expensive and Skilled users.

(3)

Q4

c) optimisation

Time — By reducing the complexity of the part you speed up the time the software will take calculating the results. This limits accuracy but as a first test or "ball park figure" it is worth while.

Accuracy — High detail results normally used for a final CAE test before being signed off. This has a high cost and large amounts of time is needed to be invested into it.

A) Gradient based optimisation

???????

only allows you to see one thing true that ~~been~~ optimised, if you are looking for a specific fault or area other errors or faults not optimised may not be seen and could cause issues further down the project.

Further along the gradient you get, you ~~will~~ limit what you are able to find out from the ^{use of} CAE ~~with~~



More time and effort you put into optimising a specific part the more you will find out.

- b.) Having multiple CAE optimisations of different areas of the part.
they will allow you to find out more, accurate information faster.

However this will increase cost of the project

(1)

Question No.

Examiner On

Arholwr yn unig

ff y Cwestiwn

Question No.

Examiner Only

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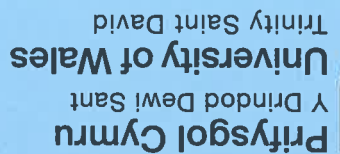
Arholwr yn uni

Rhif y Cwestiwn

Question No.

Examiner On





12 Tudalen

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 selio i lawr (gan ddefnyddio'r label a ddarparwyd i guddio'ch enw.

3. Rhaid i'r atebion fod mewn llwysgrifedd ddarlennadwy. Gall yr Arholwyr naill ai anwybyddu sgrifft annarllenadwy, neu drefnu iddi gael ei theipio a chael yr ymgeisydd 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 rhwgo 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 gwylwlr/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 amgylchiadau.

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

[illegible]

(See the other side for English version)

Llenwch, plygwrch a seliwrch
(gweler nodyn 2 isod)

CYFENN:

ENW(AU) CYNTAF:

ENW(AU) CYNTAF: