



PRIFYSGOL CYMRU

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Trinity Saint David

Examination Answer Book

24 Pages

Instructions to candidates

1. Please give the information requested in the boxes below.
2. Enter your name in the space provided to the right and seal 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).
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1	Student Number	P144283
2	Title of Examination Paper	SYSTEM ENGINEERING
3	Module Code	MGX00947
4	Date and Time of Examination	30/6/17 1000
5	Examination Venue	MT102
6	Seat Number	

7	Number of Answer Books handed in	
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List the numbers of the questions you have attempted	Office Use
2(a)	18/40
2(b)	21/30
2(c)	24/30
3(a)	9/30
3(b)	28/70
	100/200
	50/100
Total	50%

Please complete this section and SEAL before the examination starts.

Surname HOLLOWAY Forename(s) CHRIS EDWARD (Block Capitals)

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Q2a) The lean systems approach is used to improve quality and minimise waste in a system or process.

The 5 principles of lean implementation are:

- Define the value.
 - Examine what is important to your customer (QFD)
- Map the value stream.
 - Analyse your process or system to see where the value is added and where it isn't
- Make the process flow
 - Ensure your system runs smoothly, correcting any stockpiling or waiting or other processes.
- Pull from the customer
 - Production is driven by customer demand. Nothing is done by upstream processes until demanded by downstream ones.
- Work towards perfection.
 - Implement continuous improvement schemes. Always look for ways to do things better and more efficiently

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2b) ~~Def~~ Value added is something the customer is willing to pay for, it changes the product in a way by way of its form, fit or function and it must be done at the right time.

Identifying where the value is in your product and where it is added within the system can help with ensuring the customer requirements are met.

Non Value added activities should be minimised as they ~~are~~ are not visible to the customer and they ~~will~~ will not want to be charged for them. ~~Non~~ Value adding ~~activities~~ activities ~~also~~ can be things like quality control inspections, ~~unnecessary~~ unneeded storage or transport. Some are necessary non value added costs and can't be avoided e.g. certification.

Both non value and value activities need to be identified through the systems engineering process to ensure the delivery of quality to the customer and to improve efficiency of the system. Tools such as QFD help to focus design on the value perceived by the customer.

2c) The 8 common types of waste in a system are:

• Defects

- Time and money are wasted correcting mistakes and doing Re work.

3

• Over production

- This incurs extra storage ~~costs~~, transportation and manpower costs and can often be used to hide yield losses in a system.

3

• Over processing

- This can be a waste if the product is being manufactured to a higher specification than the customer requires.

3

• Motion

- Unnecessary movement of personnel i.e. having to walk between production line steps.

3

• Transport -

- Moving product from one place to another costs time and resources. Often suppliers will set up next to prime demanders to minimise transport costs. This can lead to a 'Just In Time' ^(JIT) approach where storage and transportation costs are minimised.

3

• Waiting

- Time and productivity can be lost when one process cannot function because it is waiting on the output from another.

3

• Inventory

- Stockpiling of materials incurs ~~storage~~ unneeded storage costs and ties up capital. Implementing the JIT principle can help minimise this.

3

Talent. -

- Waste is incurred here when staff are under utilised and skills possessed are not put to effective use.

3

24

3a) FMEA processes help to identify possible failures in a system early on and allow the designer to mitigate against those risks. They can be carried out at any point in a process to ensure the system risks are minimized. They help to look at the possible failures and the impact of those failures. They can then be assessed and help the designer to prioritise their efforts. It can also help to identify alternatives early on and to deliver a quality product.

b) The steps for a FMEA are as follows

- Identify possible failures in the system
 - eg. a PC PSU failure.
- Assess what that failure would effect
 - eg. a PSU failure would effect the ~~rest~~ whole PC system.
- Assess the impact of that failure
 - eg. the whole PC would be unusable
- Assess the severity of it
 - eg. PC unusable = Severe (depending on its requirement)
- Identify possible mitigations
 - eg. Dual power supplies in the PC.
- Re-assess the impact and severity
 - ^{have} ~~Are~~ the mitigations proposed now lowered the ratings to an acceptable level?

If the mitigations are sufficient then they can be implemented earlier ~~on~~ to reduce possible costs. If they are not sufficient then alternatives will need to be investigated. It is recommended that processes such as FMEA are carried out at various stages and early on, as seeking alternatives or redesigning a system later in the process is going to cost more the further through the system lifecycle it is.

It is essentially a risk assessment for systems ~~etc~~.