

## 4.2 Fault Tolerance

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Name: \_\_\_\_\_ Class: \_\_\_\_\_ Date: \_\_\_\_\_

**Total: 8 marks**

**KEY WORDS** fault tolerance 容错 • redundancy 冗余 • single point of failure 单点故障 • internet 互联网  
• packets 数据包

### Objective

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Build the skills to answer exam questions on **fault tolerance**.

**You must be able to:**

- explain how **fault tolerance** 容错 lets a system keep working when part fails
- describe how **redundancy** 冗余 supports fault tolerance
- explain why the Internet is fault tolerant
- identify a **single point of failure** 单点故障

### 1 Worked examples

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Study these first. Each one shows the method for a question type used later.

#### ■ Fault tolerance

A **fault-tolerant** system keeps working even when **part of it fails**.

#### ■ Redundancy

**Redundancy** — having more than one path or copy — supports fault tolerance. The Internet is fault tolerant because packets can take **alternate routes** when a path goes down.

#### ■ Single point of failure

A **single point of failure** is one component whose failure brings down the whole system. Redundancy removes it, but at extra **cost**.

## 2 Practice

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**2.1** Define fault tolerance. [1]

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**2.2** State how redundancy supports fault tolerance. [1]

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**2.3** Define a single point of failure. [1]

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## 3 Exam-style questions

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**3.1** Fault tolerance lets a system [1]

- **A** fail completely
  - **B** keep working when part of it fails
  - **C** run faster
  - **D** compress data
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**3.2** The Internet is fault tolerant because packets can [1]

- **A** take alternate routes
  - **B** be deleted
  - **C** be encrypted
  - **D** be sorted
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**3.3** A network has only one cable connecting two cities.

(a) Name this weakness. [1]

(b) State how to make the connection fault tolerant. [1]

(c) State the trade-off of adding redundancy. [1]

## Solutions

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**2.1** the ability of a system to keep working when part of it fails.

**2.2** it provides more than one path or copy, so a backup takes over when one fails.

**2.3** a single component whose failure brings down the whole system.

**3.1 B.**

**3.2 A.**

**3.3** (a) a single point of failure. (b) add a second (redundant) path or cable. (c) the extra cost of the redundancy.