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# Question 1

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**Question Type:** MultipleChoice

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Starting from which Rating does the requirement of Concurrently Maintainability becomes relevant?

## Options:

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A- Rated-4

B- Rated-3

C- Rated-2

D- Rated-1

## Answer:

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B

## Explanation:

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The requirement of Concurrently Maintainability becomes relevant starting from Rated-3, according to the Uptime Institute Tier Classification System<sup>1</sup>. Concurrently Maintainability means that any component or system in the data centre can be maintained or

replaced without affecting the availability of the IT equipment. This requires having redundant capacity components and multiple independent distribution paths serving the IT equipment. Rated-3 data centres are designed to achieve Concurrently Maintainability and have a minimum uptime of 99.982%. Rated-4 data centres also have Concurrently Maintainability, but they also have Fault Tolerance, which means that they can withstand any single unplanned event without affecting the availability of the IT equipment. Rated-4 data centres have a minimum uptime of 99.995%. Rated-1 and Rated-2 data centres do not have Concurrently Maintainability, as they have only one distribution path serving the IT equipment and no redundant capacity components. Rated-1 data centres have a minimum uptime of 99.671% and Rated-2 data centres have a minimum uptime of 99.741%.

1: Uptime Institute Tier Classification System<sup>2</sup>, page 1, section 1 2: Data Center Tiers Classification Explained: (Tier 1, 2, 3, 4)<sup>3</sup>, page 1, section 1 3: Data Center Tier Standards<sup>4</sup>, page 1, section 1

## Question 2

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**Question Type:** MultipleChoice

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Sprinkler heads used in computer rooms activate at what temperature?

**Options:**

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**A-** 57 C (135 F)

**B-** 27 C (81 F)

**C-** 70 C (158 F)

**D-** Only on direct contact with a flame

**Answer:**

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A

**Explanation:**

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Sprinkler heads used in computer rooms activate at 57 C (135 F), which is the standard temperature rating for ordinary sprinklers. This is the temperature at which the heat-sensitive element of the sprinkler head, such as a glass bulb or a fusible link, breaks or melts, allowing water to flow from the sprinkler. Sprinkler heads are designed to activate only when exposed to a fire, not to ambient temperature fluctuations. Therefore, sprinkler heads should be installed at a sufficient distance from the heat sources, such as servers, racks, or ducts, to avoid accidental activation. Sprinkler heads should also be selected and installed in accordance with the relevant standards and codes, such as NFPA 13 and NFPA 75.

1: CDCP Preparation Guide, page 24, section 2.4.3 2: Sprinkler Systems in Data Centers3, page 1, section 1 4: Data Center Fire Protection5, page 1, section 2 6: Data Center Sprinkler System Design7, page 1, section 1

## Question 3

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**Question Type: MultipleChoice**

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By what are magnetic fields of the type 'H' or 'B' created?

**Options:**

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- A-** Magnetic fields are created when an electric current flows; the greater the current, the stronger the magnetic field.
- B-** Magnetic fields are created by the magnetic flux of the earth which varies per month.
- C-** Magnetic fields are created by voltage; the greater the voltage, the stronger the magnetic field.
- D-** Magnetic fields are created when there is a high level of common mode noise (CMN); the greater the common mode noise (CMN), the stronger the magnetic field.

**Answer:**

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A

**Explanation:**

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According to the CDCP Preparation Guide<sup>1</sup>, magnetic fields of the type 'H' or 'B' are created when an electric current flows through a conductor, such as a wire or a coil. The magnetic field strength 'H' is proportional to the current 'I' and the number of turns 'N' of the coil, and inversely proportional to the length 'l' of the coil. The magnetic flux density 'B' is proportional to the magnetic field strength 'H' and the permeability  $\mu$  of the medium in which the magnetic field exists. The greater the current, the stronger the magnetic field and the

magnetic flux density. The relationship between 'H', 'B', 'I', 'N', 'l', and " can be expressed by the following equations:

$$H = NI / l$$

$$B = \mu H$$

1: CDCP Preparation Guide, page 23, section 2.4.2.1 2: Difference between B and H in magnetic fields?3, page 1, section 1 4: Magnetic field | Definition & Facts5, page 1, section 1

## Question 4

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**Question Type: MultipleChoice**

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What factor should be considered when placing fluorescent lighting in the data centre?

### Options:

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- A-** Fluorescent lights should not be connected to the back-up generator.
- B-** Fluorescent lights should only be installed in equipment supporting areas and not in the Computer/Server room.
- C-** Fluorescent lights should not be connected to the mains power supply.

**D-** Fluorescent lights should not be connected to the same UPS that supports the ICT equipment.

**Answer:**

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D

**Explanation:**

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The UPS (uninterruptible power supply) is a device that provides backup power to the ICT equipment in case of a power outage or a power quality issue. The UPS should be dedicated to the ICT equipment only, and not to other loads, such as lighting, cooling, or security systems. This is because connecting fluorescent lights to the same UPS as the ICT equipment can cause several problems, such as:

- \* Reducing the battery runtime of the UPS, which may not be enough to support the ICT equipment until the backup generator kicks in or the utility power is restored.
- \* Increasing the harmonic distortion of the UPS output, which can affect the performance and reliability of the ICT equipment and the UPS itself.
- \* Creating electromagnetic interference (EMI) or radio frequency interference (RFI), which can disrupt the communication and data transmission of the ICT equipment.
- \* Triggering false alarms or tripping the circuit breakers of the UPS, which can cause downtime or data loss.

Therefore, fluorescent lights should not be connected to the same UPS that supports the ICT equipment. Instead, they should be connected to a separate power source, such as the utility power, the backup generator, or a different UPS.

1: CDCP Preparation Guide, page 17, section 2.3.1 2: Data Center Lighting Design Considerations3, page 1, section 3 4: Data Center Lighting Solutions5, page 1, section 1 6: Going beyond energy savings in data centers with LEDs7, page 1, section 2

## Question 5

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**Question Type:** MultipleChoice

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What is the current recommended temperature for ICT equipment as described in the ASHREA TC 9.9 guideline?

### Options:

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- A- 8-18 C (46.4 -64.4 F)
- B- 20-40 C (68 - 104 F)
- C- 18-27 C (64.4 - 80.6F)
- D- 25-45 C (77 - 113 F)

### Answer:

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C



## **Explanation:**

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The current recommended temperature for ICT equipment as described in the ASHRAE TC 9.9 guideline is 18-27 C (64.4 - 80.6F). This is the recommended range for the dry-bulb temperature at the inlet of the servers, which is the most critical parameter for ensuring the optimal performance and reliability of the ICT equipment. The recommended range is based on the thermal specifications of the majority of the ICT equipment in the market, as well as the energy efficiency and environmental considerations of the data centre cooling systems. The recommended range is suitable for Classes A1 to A4 of the ASHRAE thermal guideline classes, which cover different types and generations of ICT equipment.

1: 2021 Equipment Thermal Guidelines for Data Processing Environments - ASHRAE2, page 1, Table 2.1 3: ASHRAE TC9.9 Data Center Power Equipment Thermal Guidelines and Best Practices4, page 10, section 2.1 5: Does your Data Center Follow ASHRAE TC 9.9 Thermal Guidelines for Data Processing Environments?6, page 1, section 1

## **Question 6**

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**Question Type:** MultipleChoice

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What is the main risk for a data centre when the water supply fails?

**Options:**

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- A-** Failure to the water supply could result in IT failure and/or denial of access to operate.
- B-** Failure to the water supply could result in DX cooling systems to fail.
- C-** Failure to the water supply could cause issues for the cooling of back-up generators.
- D-** Failure to the water supply could result in sudden changes of the relative humidity in the Computer room.

**Answer:**

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C

**Explanation:**

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Back-up generators are essential for providing power to the data centre in case of a utility outage. However, back-up generators also generate a lot of heat, which needs to be dissipated by a cooling system. The cooling system may rely on water supply, either from the municipal network or from a dedicated tank. If the water supply fails, the cooling system may not function properly, leading to overheating and potential damage to the generators. This could compromise the reliability and availability of the data centre power supply and cause downtime or data loss.

1: CDCP Preparation Guide, page 18, section 2.3.2 2: Data Center Generator Cooling Systems3, page 1, section 1 4: Data Center Cooling Systems5, page 1, section 1

## Question 7

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**Question Type: MultipleChoice**

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Do I need to check the local standards if I already comply to international standards?

**Options:**

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- A-** Local standards do not to be checked as some countries have too many local standards, which will slow down the data centre construction.
- B-** You need to check the local standards to ensure compliance to these standards.
- C-** Compliance to only international standards is good enough as most local standards are derived from international standards.
- D-** Data centres only need to comply to international standards since they are connected to a worldwide international network infrastructure.

**Answer:**

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B

**Explanation:**

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Data centre design and infrastructure standards can vary from country to country, depending on the local regulations, codes, and practices. Therefore, it is important to check the local standards before designing, building, or operating a data centre in a specific location. Compliance to only international standards may not be sufficient or adequate to meet the local requirements, which could result

in legal, financial, or operational risks. For example, some countries may have stricter fire safety, environmental, or energy efficiency standards than the international ones. Some countries may also have different electrical standards, such as voltage, frequency, or plug types. By checking the local standards, you can ensure that your data centre is compliant, safe, and efficient in the local context.

1: Data Center Design: Which Standards to Follow?2, page 1, section 1 3: The Most Important Data Center Design and Infrastructure Codes and Standards4, page 1, section 1 5: Explaining the new family of ISO Data Centre Standards6, page 1, section 1 7: Standards for data centre certification. Is a changing coming?8, page 1, section 1

## Question 8

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**Question Type:** MultipleChoice

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Which one of the following is a Natural Disaster?

### Options:

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- A- Grid Failure
- B- Blackouts
- C- Hurricanes

**D-** Human Error

**Answer:**

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C

**Explanation:**

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According to the CDCP Preparation Guide, a natural disaster is a catastrophic event that is caused by natural forces and has a significant impact on human lives, property, and environment. Hurricanes are examples of natural disasters, as they are powerful storms that form over warm ocean waters and produce strong winds, heavy rain, storm surges, and flooding. Grid failure, blackouts, and human error are not natural disasters, but rather man-made or technological disasters that result from failures or errors in human systems or activities.

## Question 9

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**Question Type:** MultipleChoice

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Cost of Downtime can be classified as .

### Options:

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- A- Direct and Indirect
- B- Up and Down
- C- Mean and Median
- D- Classified and Declassified

### Answer:

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A

### Explanation:

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Cost of downtime is the total amount of money lost due to a data centre outage or disruption. It can be classified into two categories: direct and indirect. Direct costs are the immediate and measurable expenses incurred during or after an outage, such as lost revenue, lost productivity, recovery costs, compensation costs, penalties, etc. Indirect costs are the long-term and intangible impacts of an outage, such as reputation damage, customer dissatisfaction, loss of market share, legal liabilities, etc. Both direct and indirect costs can vary depending on the type, duration, and severity of the outage, as well as the industry, size, and location of the data centre.

\* EPI Data Centre Training Framework1

\* EPI Data Centre Competence Framework2

\* Understanding the Cost of Data Center Downtime3

\* Uptime Institute's 2022 Outage Analysis Finds Downtime Costs and Consequences Worsening

\* [INFOGRAPHIC] The Cost of Downtime: 21 Stats You Need to Know

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