GCSAA Turf Equipment Management Program

Turf Equipment Technician Certificate Study Guide

Spray Systems: Calibration, Operation and Maintenance

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Turf Equipment Technician Exam Background:

To build a competency-based continuing education curriculum for turf equipment technicians, GCSAA enlisted subject matter experts to define the body of knowledge (BOK) a successful turf equipment technician possesses. Following psychometric principles for exam and study guide development, subject matter experts developed eight new exams testing professional competence for turf equipment technicians.

Successful completion of an exam demonstrates professional competence as a turf equipment technician in that domain of expertise. Completion of all eight exams results in achievement of the GCSAA Turf Equipment Technician Certificate, and demonstrates comprehensive professional competence for a turf equipment technician.

The information and resources contained in this study guide are designed to help prospective test takers prepare for the Spray Systems exam. Included in this guide are the categories and associated competencies that will be tested and the specific testing objectives for Spray Systems.

This study resource will enable test takers to evaluate areas of existing proficiency and identify areas where additional study or practical experience might be needed. The guide also provides suggested resources for self-study and sample exam questions.

Study and preparation are essential components for success on any exam. However, real-world, hands-on experience is necessary to demonstrate competence as a turf equipment technician. Studying alone will not adequately prepare an exam taker to pass the examinations.

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Exam Structure and Testing Requirements:

The Turf Equipment Technician Certificate examinations are online, closed book, proctored exams. You will need a computer with internet access and a printer.

The Spray Systems exam consists of 30 multiple choice questions that must be completed within a 60-minute timeframe. You must pass the examination with a minimum of 17 correct answers.

The exam questions may be accompanied by descriptive scenarios, illustrations, charts, graphs and other visual elements.

Once you begin the exam, you must complete the exam in a single session. You cannot leave the testing location and return later.

If you are unsuccessful at your first attempt to pass the exam, your exam fee covers an additional attempt at no additional charge.

Three options are available for proctoring:

- A list of locations where proctoring is available (free of charge) can be found on the Association website.
- A superintendent or equivalent third party (i.e., school personnel, a member of the clergy, librarian, or other such third party) can sign up to be your proctor. To make those arrangements, contact TETCertificates@gcsaa.org.
- Online proctoring is available (for a fee). For this option, your computer must have a webcam and Skype technology. Additional formation can be found on the Association website.

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Self-Evaluation:

In the next section are the Spray Systems categories, competencies and testing objectives. As you read through them, take the opportunity to evaluate your current knowledge levels. As you read, score yourself on what you think your level of mastery is in each area. Label each of the objectives with a number from 1 to 5 using the following scale. 5 – I could do that in my sleep. 4 – I'm comfortable with it, but not an expert. 3 – I know the topic, but I might need help. 2 – I'm aware of the topic, but haven't ever worked with it. 1 – I've never seen it before.

When you've scored yourself, review your scoring and consider the following.

- Did you score more than half the topics as a 3 or lower? If so, additional practical experience and/or mentoring may be needed for you to pass the exam.
- For any category that you scored a 5, you have a strong foundation but a refresher prior to the exam would be helpful.
- Anything you scored a 3 or 4, you will probably need to improve your knowledge base with additional study or hands on experience.

Stay mindful of the following as you prepare for the exam:

The psychometric principals applied to exam development ensure that a test measures an individual's comprehensive understanding of a topic. To fully prepare for the exam, ensure your knowledge base is covered in each category, competency, and objective area.

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Spray Systems: Categories, Competencies and Testing Objectives

Read through the following eleven categories. These will be the concepts and competencies tested on the examination.

1. **Category - Mathematics**
    a. Competency – Make speed calculations
        i. Testing Objective – Identify how to calculate a speed (meters per second and miles per hour)

2. **Category - Calibration**
    a. Competency – Understand spray systems calibrations
        i. Testing Objective – Identify the calibration process of spray systems.
        ii. Testing Objective – Given a scenario about a sprayer, identify proper calibration procedures and tools to calibrate the equipment.

3. **Category - Components**
    a. Competency – Understand spray systems pumps
        i. Testing Objective – Identify the characteristics and advantages of centrifugal pumps.
        ii. Testing Objective – Identify the problems caused by cavitation in a centrifugal pump.
        iii. Testing Objective – Identify the characteristics and advantages of diaphragm pumps.
        iv. Testing Objective – Identify the steps to prepare a pump for short-term storage.
    b. Competency – Rebuild spray systems pumps
        i. Testing Objective – Given a scenario, identify how to properly install centrifugal pump seals.
        ii. Testing Objective – Given a scenario, identify how to properly install diaphragms and values.
    c. Competency – Understand spray systems components

i. Testing Objective – Given a graphic of a spray system, identify the components.
ii. Testing Objective – Identify the functions of a spray monitor.
iii. Testing Objective – Identify the functions of spray controllers.
iv. Testing Objective – Given a scenario, identify how to check that a check value is operating correctly.
v. Testing Objective – Identify the function of flow control valves.
vi. Testing Objective – Identify the function of a flow meter.
vii. Testing Objective – Identify the function of pulsation dampeners.

d. Competency – Understand nozzle spray patterns

i. Testing Objective – Identify the nozzle spray pattern that is operating correctly.

e. Competency – Troubleshoot and repair spray system components

i. Testing Objective – Given a scenario about a faulty control valve, identify how to troubleshoot and repair the problem.

f. Competency – Understand spray system control valves

i. Testing Objective – Identify the individual parts of a control valve.
ii. Testing Objective – Identify the advantages and disadvantages of manual and electric control valves.

g. Competency – Understand foam markers

i. Testing Objective – Identify the function of foam markers.

4. Category - Spreader Calibration

a. Competency – Understand spreader calibration

i. Testing Objective – Identify the calibration process for spreaders.

5. **Category - Maintenance & Troubleshooting**

    a. Competency – Understand sprayer maintenance

        i. Testing Objective – Identify sprayer preventative maintenance checks.
        ii. Testing Objective – Identify the steps needed to winterize a sprayer system.
        iii. Testing Objective – Identify the characteristics of the pressure change of agitation on the spray system.

6. **Category - Forms and Formulas**

    a. Competency – Understand safety considerations about chemicals.

        i. Testing Objective – Given a scenario about spraying, identify courses of action that should followed to prevent runoff and leaching.
        ii. Testing Objective – Identify safety concerns when working with chemicals in a spray system.
        iii. Testing Objective – Given a scenario, identify the personal protective equipment is required.

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Spray Systems: Examination Sample Questions

Below are five sample questions from the Spray Systems exam. These exact questions will not appear on the exam. However, they will provide exam takers an idea on what to expect regarding the format of the questions and the level of difficulty.

The answers to the questions are located at the end of this study guide. Take your time, read the questions, answer them thoughtfully. When you are done, check your responses.

Question 1

Given: Miles per hour (mph) = (Distance in feet X 60) / (Time in Seconds x 88)

It takes an individual 22 seconds to travel 200 feet.

What is the individual's speed in mph?

a. 3.24 mph
b. 6.19 mph
c. 9.09 mph
d. 13.33 mph

Question 2

A spray technician needs to calibrate prior to a chemical application.

What is the proper procedure?

a. Set spray pressure, measure results, set timer, catch spray
b. Set timer, catch spray, set spray pressure, measure results
c. Set spray pressure, set timer, catch spray, measure results
d. Set timer, catch spray, measure results, set spray pressure

Question 3

What is a characteristic of a centrifugal pump compared to a diaphragm pump?

a. It has pulsating input pressure.
b. It has pulsating output pressure.
c. It has a potential for higher flow and lower pressure.
d. It has a potential for lower flow and higher pressure.

Question 4

What is a characteristic of a diaphragm pump compared to a centrifugal pump?

a. It has an impeller.
b. It has internal valves.
c. It has external valves.
d. It has ceramic radial seals.

Question 5

The operator fills a tank with clean water to check the system before spraying. The operator complains that the pressure will increase using the pressure switch but will not decrease. The voltage from the switch was checked with a multimeter and eliminated as a cause.

What should the technician do next to troubleshoot the problem?

a. Disassemble the regulator valve and inspect it for damage
b. Disassemble the boom bypass valves and inspect it for damage
c. Inspect the agitation nozzles in the tank to determine if there is a clog
d. Disassemble the pump valve section and inspect it for debris or a clog

Now that you've answered the questions, grade yourself against the key at the end. If you got four or five correct, you have a strong knowledge base for this exam. If you only answered one or two correctly, more study and practical experience with Spray Systems will be needed to achieve the proficiency required to pass this exam.

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Answers to Sample Questions

1. B
2. C
3. C
4. B
5. A