REACTOR OPERATOR PRACTICE EXAM (SAMPLE)

STUDY GUIDE

SAMPLE STUDY GUIDE WITH LIMITED QUESTIONS

Table of Contents

Introduction

Preparing for a certification exam can feel overwhelming, but with the right tools, it becomes an opportunity to build confidence, sharpen your skills, and move one step closer to your goals. At Examzify, we believe that effective exam preparation isn't just about memorization, it's about understanding the material, identifying knowledge gaps, and building the test-taking strategies that lead to success.

This guide was designed to help you do exactly that.

Whether you're preparing for a licensing exam, professional certification, or entry-level qualification, this book offers structured practice to reinforce key concepts. You'll find a wide range of multiple-choice questions, each followed by clear explanations to help you understand not just the right answer, but why it's correct.

The content in this guide is based on real-world exam objectives and aligned with the types of questions and topics commonly found on official tests. It's ideal for learners who want to:

• Practice answering questions under realistic conditions,

• Improve accuracy and speed,

• Review explanations to strengthen weak areas, and

• Approach the exam with greater confidence.

We recommend using this book not as a stand-alone study tool, but alongside other resources like flashcards, textbooks, or hands-on training. For best results, we recommend working through each question, reflecting on the explanation provided, and revisiting the topics that challenge you most.

Remember: successful test preparation isn't about getting every question right the first time, it's about learning from your mistakes and improving over time. Stay focused, trust the process, and know that every page you turn brings you closer to success.

Let's begin.

How to Use This Guide

This guide is designed to help you study more effectively and approach your exam with confidence. Whether you're reviewing for the first time or doing a final refresh, here's how to get the most out of your Examzify study guide:

1. Start with a Diagnostic Review

Skim through the questions to get a sense of what you know and what you need to focus on. Your goal is to identify knowledge gaps early.

2. Study in Short, Focused Sessions

Break your study time into manageable blocks (e.g. 30 – 45 minutes). Review a handful of questions, reflect on the explanations.

3. Learn from the Explanations

After answering a question, always read the explanation, even if you got it right. It reinforces key points, corrects misunderstandings, and teaches subtle distinctions between similar answers.

4. Track Your Progress

Use bookmarks or notes (if reading digitally) to mark difficult questions. Revisit these regularly and track improvements over time.

5. Simulate the Real Exam

Once you're comfortable, try taking a full set of questions without pausing. Set a timer and simulate test-day conditions to build confidence and time management skills.

6. Repeat and Review

Don't just study once, repetition builds retention. Re-attempt questions after a few days and revisit explanations to reinforce learning. Pair this guide with other Examzify tools like flashcards, and digital practice tests to strengthen your preparation across formats.

There's no single right way to study, but consistent, thoughtful effort always wins. Use this guide flexibly, adapt the tips above to fit your pace and learning style. You've got this!

Questions

1. Radiosensitivity tends to be higher in which type of cells?

A. Actively dividing and less differentiated

B. Highly differentiated and non-dividing

C. Mature neural cells

D. Inert tissue cells

2. Which of the following is NOT part of the minimum staffing requirements for Modes 1-3?

A. An operator in the control room

B. A separate security guard in the control room

C. A designated second person who is physically on UF campus or able to reach the control room within 10 minutes

D. A designated senior operator readily available on call within 30 minutes

3. Describe the number of blades in the UFTR control system?

A. Four blades

B. Three blades

C. Five blades

D. Six blades

4. A prompt neutron is born from which process?

A. Fusion

B. Beta decay

C. Fission

D. Radioactive decay of a heavy nucleus

5. The dose equivalence is equal to _____.

A. The absorbed dose in grays multiplied by the quality factor

B. The product of the absorbed dose in rads and the quality factor

C. The energy deposited per unit mass in joules per kilogram

D. The dose rate multiplied by exposure time

6. Which statement best describes detector lifespans?

A. Ionization detectors generally have long lifespans; the life of a neutron detector is limited by consumption of sensitive materials

B. Ionization detectors have short lifespans; neutron detectors are long

C. Ionization detectors generally have long lifespans; neutron detectors' life is not affected by materials

D. Ionization detectors have long lifespans; neutron detectors' life is unaffected by materials

7. Define keff qualitatively.

A. keff indicates the maximum reactor power of the system

B. keff is a measure of thermal efficiency

C. keff indicates whether the reactor is subcritical, critical, or supercritical

D. keff equals the ratio of neutron production to losses per generation

8. How is Xenon-135 produced in a reactor?

A. Radioactive decay from I-135 and radiative capture

B. Direct fission of Xenon-135

C. Activation by fast neutrons in the moderator

D. Spontaneous fission of Xenon isotopes

9. In the safety limit violation report, which element describes causes and contributing factors?

A. Past production metrics

B. Equipment maintenance history

C. The cause and contributing factors

D. Plant licensing history

10. When operating the reactor for a great length of time WITHOUT refueling, there is a loss in reactivity. Why is that?

A. Increased fuel temperature

B. Neutron leakage increases

C. Burnup

D. Moderation decreases

Answers

1. A
2. B
3. A
4. C
5. B
6. A
7. C
8. A
9. C
10. C

Explanations

1. Radiosensitivity tends to be higher in which type of cells?

A. Actively dividing and less differentiated

B. Highly differentiated and non-dividing

C. Mature neural cells

D. Inert tissue cells

Radiosensitivity is higher in cells that are actively dividing and less differentiated. Radiation primarily damages DNA, and cells in the middle of the cell cycle, especially during DNA replication and mitosis, are more likely to incur lethal damage because they have less time to repair and a higher chance that DNA errors become catastrophic. In contrast, mature, highly differentiated cells that rarely divide—like mature neural cells—or inert, non-dividing tissues tend to repair DNA more effectively and are more radioresistant. So the description of actively dividing and less differentiated cells is the one that best explains why some cells are more radiosensitive.

2. Which of the following is NOT part of the minimum staffing requirements for Modes 1-3?

A. An operator in the control room

B. A separate security guard in the control room

C. A designated second person who is physically on UF campus or able to reach the control room within 10 minutes

D. A designated senior operator readily available on call within 30 minutes

Minimum staffing for Modes 1-3 focuses on ensuring the people who operate and monitor the plant can do so reliably and with timely support. An operator in the control room is essential for real-time observation and control. A designated second person who is physically on campus or able to reach the control room within ten minutes provides crucial redundancy so operations can continue smoothly if the primary operator is unavailable. A designated senior operator readily available on call within thirty minutes ensures expert oversight and rapid escalation if more complex decisions are needed. A separate security guard in the control room doesn't contribute to the ability to monitor, control, or rapidly respond to plant conditions, and security staffing is not counted toward the operational minimum staffing. Hence, that option is not part of the minimum staffing requirements for Modes 1-3.

3. Describe the number of blades in the UFTR control system?

A. Four blades

B. Three blades

C. Five blades

D. Six blades

Control of reactor power in the UFTR relies on inserting and withdrawing absorber elements to tune reactivity. In this design, four control blades are used, arranged symmetrically around the core. That symmetry lets the operator change the neutron absorption evenly, providing smooth, controllable adjustments to power and a reliable shutdown path. With four blades, you get a practical balance of control range, uniform flux shaping, and mechanical simplicity suited to this small training reactor. Having the blades in a four-element setup avoids the asymmetry or limited control range you'd face with fewer blades, and keeps the system from becoming needlessly complex if there were more blades. So four blades is the design choice that matches the UFTR's size and control needs.

4. A prompt neutron is born from which process?

A. Fusion

B. Beta decay

C. Fission

D. Radioactive decay of a heavy nucleus

Prompt neutrons come from the fission event itself. When a heavy nucleus such as uranium-235 splits after absorbing a neutron, it breaks into two lighter fragments and emits neutrons in the same instant. These are called prompt neutrons because their emission happens within about 10^-14 seconds of fission and they drive the immediate chain reaction in a reactor. Neutrons produced by fusion occur in a different reaction, and neutrons from beta decay or other radioactive decay happen after a delay, not at the moment of fission. So the process that births a prompt neutron is fission.

5. The dose equivalence is equal to _____.

A. The absorbed dose in grays multiplied by the quality factor

B. The product of the absorbed dose in rads and the quality factor

C. The energy deposited per unit mass in joules per kilogram

D. The dose rate multiplied by exposure time

Dose equivalence accounts for how biologically harmful different types of radiation are by weighting the energy deposited in tissue with a quality factor. The absorbed dose measures energy per unit mass, but radiations differ in their biological impact, so you multiply that dose by a radiation quality factor to get the dose equivalent. In traditional units, the absorbed dose is in rads, and multiplying by the quality factor gives the dose equivalent in rem. In SI units you'd use grays times the radiation weighting factor to get sieverts. The idea throughout is the same: dose equivalence = absorbed dose × quality factor. The other options don't reflect this adjustment for radiation type. Energy deposited per unit mass is the absorbed dose itself, not the adjusted dose for biological effect. Dose rate times exposure time yields a total dose but not the biologically weighted dose.

6. Which statement best describes detector lifespans?

A. Ionization detectors generally have long lifespans; the life of a neutron detector is limited by consumption of sensitive materials

B. Ionization detectors have short lifespans; neutron detectors are long

C. Ionization detectors generally have long lifespans; neutron detectors' life is not affected by materials

D. Ionization detectors have long lifespans; neutron detectors' life is unaffected by materials

Detector lifespans hinge on whether the active medium is consumed during operation. Ionization detectors use a gas-filled chamber where the ionization process creates charge but does not chemically consume the gas; with proper sealing and maintenance, they can last for many years. Neutron detectors rely on isotopes like helium-3 or boron-10 to capture neutrons, and those isotopes are consumed in the detection reactions, gradually depleting the sensitive material and reducing efficiency. Because of this, their usable life is limited by the depletion of the active material rather than by normal operation. Hence, ionization detectors generally have long lifespans, while neutron detectors' life is limited by consumption of sensitive materials.

7. Define keff qualitatively.

A. keff indicates the maximum reactor power of the system

B. keff is a measure of thermal efficiency

C. keff indicates whether the reactor is subcritical, critical, or supercritical

D. keff equals the ratio of neutron production to losses per generation

The main idea here is that keff tells you where the reactor stands in terms of the neutron population from one generation to the next. Qualitatively, keff is the balance between neutrons produced by fission and neutrons lost to absorption and leakage. If keff is equal to one, the neutron population remains steady from generation to generation, so the reactor is critical. If keff is less than one, the population declines and the reaction dies away, which is subcritical. If keff is greater than one, the neutron population grows and the reaction becomes self-sustaining at a higher level, which is supercritical. This classification—subcritical, critical, or supercritical—is what the question is aiming to capture. The other options refer to power, thermal efficiency, or a specific production-to-loss ratio, which do not describe the qualitative state as directly as the criticality picture.

8. How is Xenon-135 produced in a reactor?

A. Radioactive decay from I-135 and radiative capture

B. Direct fission of Xenon-135

C. Activation by fast neutrons in the moderator

D. Spontaneous fission of Xenon isotopes

Xenon-135 is produced in a reactor mainly through two paths in the ongoing neutron-rich environment. First, fission of fuel creates iodine-135 as a fission product; iodine-135 is unstable and beta decays with a half-life of about 6.6 hours to xenon-135. So a significant amount of Xe-135 appears as iodine-135 decays. Second, xenon-134 present in the reactor can capture a neutron (neutron capture with gamma emission) to become xenon-135 directly. Both pathways—decay of iodine-135 and neutron capture on xenon-134—build up xenon-135 in the core. The other options don't describe how Xe-135 is formed: xenon isn't produced by direct fission of xenon, activation of xenon by fast neutrons isn't the primary production route for Xe-135, and spontaneous fission of xenon isotopes is negligible.

9. In the safety limit violation report, which element describes causes and contributing factors?

A. Past production metrics

B. Equipment maintenance history

C. The cause and contributing factors

D. Plant licensing history

Understanding why a safety limit violation occurred hinges on capturing the reasons behind it, including direct causes and any contributing factors. The element that records this information is the section specifically documenting the cause and contributing factors. It goes beyond describing what happened to explain why it happened, covering aspects like human factors, equipment condition, procedural gaps, and other contributors. This insight is what drives effective corrective actions to prevent recurrence. Other elements, such as past production metrics, describe performance data; maintenance history covers upkeep actions and conditions but doesn't lay out the root causes; licensing history relates to regulatory status and isn't about incident causes.

10. When operating the reactor for a great length of time WITHOUT refueling, there is a loss in reactivity. Why is that?

A. Increased fuel temperature

B. Neutron leakage increases

C. Burnup

D. Moderation decreases

Reactivity decreases during long operation without refueling because of burnup. As the reactor runs, fissile atoms like U-235 are consumed to fuel fission, and some fertile material is converted to other isotopes, so the total amount of material capable of sustaining the chain reaction declines. At the same time, fission products accumulate in the fuel, and many of them are neutron absorbers (poisons) that capture neutrons without causing fission. This buildup further reduces the number of neutrons available to sustain the reaction, lowering reactivity. Temperature effects (like Doppler feedback) also trend negative but are secondary over extended operation; the dominant cause of the long-term reactivity loss is burnup.

Next Steps

Congratulations on reaching the final section of this guide. You've taken a meaningful step toward passing your certification exam and advancing your career.

As you continue preparing, remember that consistent practice, review, and self-reflection are key to success. Make time to revisit difficult topics, simulate exam conditions, and track your progress along the way.

If you need help, have suggestions, or want to share feedback, we'd love to hear from you. Reach out to our team at hello@examzify.com.

Or visit your dedicated course page for more study tools and resources:

https://reactoroperator.examzify.com

We wish you the very best on your exam journey. You've got this!