

Pima JTED Bioscience Practice Test (Sample)

Study Guide



Everything you need from our exam experts!

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Questions

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- 1. What is the function of a western blot?**
 - A. Amplifying DNA sequences**
 - B. Separating small molecules**
 - C. Identifying proteins using antibody binding**
 - D. Visualizing RNA sequences**
- 2. Which method primarily focuses on quantifying proteins in a sample?**
 - A. Gel electrophoresis**
 - B. Protein precipitation**
 - C. Enzyme linked immunosorbent assay**
 - D. DNA sequencing**
- 3. Quality assurance typically involves which of the following?**
 - A. Regular updates of marketing collateral**
 - B. A focus solely on end-user satisfaction**
 - C. Regular examinations of the manufacturing process**
 - D. Encouraging team-building exercises**
- 4. What does the process of propagation involve in microbiology?**
 - A. To create a slant culture**
 - B. To isolate specific colonies**
 - C. To grow multiple samples of an organism**
 - D. To perform inoculation procedures**
- 5. What is the initial step in the process of PCR?**
 - A. Denature stage**
 - B. Annealing stage**
 - C. Extension stage**
 - D. Ligase stage**

- 6. What does SIP stand for in the context of industry practices?**
- A. Standard Instruction Policy**
 - B. Standard Industry Practice**
 - C. Safety Information Protocol**
 - D. Structured Implementation Process**
- 7. How do organizations use trend analysis effectively?**
- A. By implementing short-term solutions**
 - B. By evaluating past data to predict future patterns**
 - C. By solely focusing on customer feedback**
 - D. By enhancing employee performance reviews**
- 8. What occurs during the denaturation of a protein?**
- A. The primary structure is altered**
 - B. The protein's secondary structure is lost**
 - C. The protein is completely degraded**
 - D. The protein is synthesized anew**
- 9. Which component of a solution is known to dissolve the solute?**
- A. Solvent**
 - B. Solute**
 - C. Diluent**
 - D. Concentration**
- 10. What does the term 'variable' mean in the context of an experiment?**
- A. A fixed value that does not change**
 - B. A factor in an experiment that is either purposely changed or altered as a result of another variable**
 - C. A tool used to measure results**
 - D. An untested concept**

Answers

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

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Explanations

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1. What is the function of a western blot?

- A. Amplifying DNA sequences
- B. Separating small molecules
- C. Identifying proteins using antibody binding**
- D. Visualizing RNA sequences

The function of a western blot is to identify specific proteins within a sample using antibody binding. This technique involves several critical steps: first, proteins are separated based on their size through gel electrophoresis. After separation, the proteins are transferred onto a membrane, where they are immobilized. The next step involves incubating the membrane with specific antibodies that bind to the target proteins. By detecting these antibodies, which are usually linked to a reporter enzyme or a fluorescent tag, researchers can visualize and quantify the proteins of interest. This powerful method allows scientists to study protein expression levels and post-translational modifications, making it an essential tool in biochemistry and molecular biology. The other choices describe different laboratory techniques. Amplifying DNA sequences pertains to PCR (Polymerase Chain Reaction), separating small molecules usually refers to chromatography techniques, and visualizing RNA sequences relates to methods like Northern blotting or RNA sequencing. They do not function in the same way as a western blot, which is specifically focused on proteins.

2. Which method primarily focuses on quantifying proteins in a sample?

- A. Gel electrophoresis
- B. Protein precipitation
- C. Enzyme linked immunosorbent assay**
- D. DNA sequencing

The method that primarily focuses on quantifying proteins in a sample is the enzyme-linked immunosorbent assay, commonly known as ELISA. This technique utilizes specific antibodies to detect and measure the concentration of proteins within a sample. ELISA is widely used because of its sensitivity and specificity, allowing for accurate quantification even in samples where the protein of interest is present at low concentrations. During the ELISA process, the target protein is first attached to a solid surface, usually a microplate. Then, a solution containing a specific antibody is added, which binds to the target protein. A secondary enzyme-linked antibody is subsequently introduced, which binds to the first antibody. When a substrate for the enzyme is added, a measurable signal, such as color change or fluorescence, is produced, which correlates with the amount of protein present in the original sample. This quantification can then be compared against a standard curve. In contrast, the other methods listed do not primarily focus on quantifying proteins. Gel electrophoresis generally separates proteins based on their size or charge but does not provide a direct quantification. Protein precipitation is a technique used to isolate proteins from a solution but does not quantify them directly. DNA sequencing is focused on determining the sequence of nucleotide bases in

3. Quality assurance typically involves which of the following?

- A. Regular updates of marketing collateral**
- B. A focus solely on end-user satisfaction**
- C. Regular examinations of the manufacturing process**
- D. Encouraging team-building exercises**

Quality assurance is a systematic process designed to ensure that a product or service meets certain standards and fulfills the requirements specified by customers or regulatory bodies. Regular examinations of the manufacturing process play a crucial role in this overall system. By consistently assessing the various stages of production, organizations can identify and rectify any issues that could lead to defects or substandard products. Implementing consistent checks helps maintain a high level of quality and assures both the producers and customers that the final output meets the expected quality criteria. In contrast, while marketing collateral updates and team-building exercises are valuable in their own right, they do not directly contribute to the quality assurance of a product or service. Additionally, focusing exclusively on end-user satisfaction neglects the internal processes and standards necessary to consistently produce high-quality outputs. Quality assurance requires a more comprehensive approach, integrating regular evaluations and adaptive management of production standards to achieve reliability and efficiency in outputs.

4. What does the process of propagation involve in microbiology?

- A. To create a slant culture**
- B. To isolate specific colonies**
- C. To grow multiple samples of an organism**
- D. To perform inoculation procedures**

Propagation in microbiology refers to the process of growing and multiplying microorganisms, such as bacteria, fungi, or viruses, to obtain large numbers of cells from a small sample. This process is crucial for various applications, including research, biotechnology, and clinical diagnostics, where a sufficient quantity of organisms is needed for study or use. Growing multiple samples of an organism allows scientists and microbiologists to study its characteristics, behavior, and responses under different conditions. It also facilitates the preservation of cultures for further experimentation or application, including the production of vaccines, enzymes, or pharmaceuticals. The other choices involve important aspects of microbiology, but they do not capture the essence of propagation. Creating a slant culture is a specific technique for storing cultures that can aid in the maintenance of the organisms but does not itself describe the growing process. Isolating specific colonies refers to separating distinct organisms from a mixed culture, while performing inoculation procedures involves introducing organisms into a culture medium, but neither directly addresses the growth of multiple samples as in propagation.

5. What is the initial step in the process of PCR?

A. Denature stage

B. Annealing stage

C. Extension stage

D. Ligase stage

The initial step in the process of Polymerase Chain Reaction (PCR) is the denature stage. During this phase, the double-stranded DNA is heated to a high temperature, typically around 94-98 degrees Celsius. This heat causes the hydrogen bonds between the nucleotide bases to break, resulting in the separation of the two strands of DNA. This denaturation step is crucial because it prepares the DNA template for the subsequent annealing stage, where primers will attach to the single-stranded DNA. The effectiveness of the PCR process relies on this initial separation of DNA strands, enabling the entire procedure to amplify the target segment of DNA effectively in the following cycles. Each component of PCR, including the annealing and extension stages, plays a significant role, but it is the denature step that sets the stage for the entire amplification process.

6. What does SIP stand for in the context of industry practices?

A. Standard Instruction Policy

B. Standard Industry Practice

C. Safety Information Protocol

D. Structured Implementation Process

In the context of industry practices, SIP stands for Standard Industry Practice. This term refers to established guidelines and methodologies that professionals in a specific industry adhere to in order to ensure efficiency, safety, and quality. These practices are developed over time and are based on collective expertise, research, and historical success, providing a framework for consistent performance and decision-making. Standard Industry Practices are crucial in various fields because they help standardize processes, reduce the risk of errors, and ensure that all stakeholders maintain a common understanding of expectations. Industries rely on these standards to facilitate training, compliance, and overall effectiveness, making them a foundational element of professional operations.

7. How do organizations use trend analysis effectively?

- A. By implementing short-term solutions
- B. By evaluating past data to predict future patterns**
- C. By solely focusing on customer feedback
- D. By enhancing employee performance reviews

Organizations utilize trend analysis effectively by evaluating past data to predict future patterns. This method involves systematically collecting and analyzing historical data to identify trends and changes within a specific area, such as market behavior, customer preferences, or operational efficiencies. By understanding these historical trends, organizations can make informed decisions that anticipate future shifts and adjust their strategies accordingly. For instance, analyzing sales data over several years can reveal seasonal patterns or shifts in consumer demand that can inform inventory management and marketing strategies. This predictive capability allows organizations to remain agile and responsive to changes in the environment, thereby enhancing their overall performance and competitive advantage. The other options are less effective in the context of trend analysis. Implementing short-term solutions often misses the broader patterns that trend analysis seeks to capture, while relying solely on customer feedback does not provide a comprehensive view of trends across various data points. Additionally, enhancing employee performance reviews is important but does not directly relate to the predictive capabilities of trend analysis.

8. What occurs during the denaturation of a protein?

- A. The primary structure is altered
- B. The protein's secondary structure is lost**
- C. The protein is completely degraded
- D. The protein is synthesized anew

During the denaturation of a protein, the protein's secondary structure is lost. Denaturation involves the disruption of the non-covalent interactions—such as hydrogen bonds, ionic bonds, and hydrophobic interactions—that stabilize the protein's complex structure. As a result, the secondary structures, which typically include alpha helices and beta sheets, unravel and lose their organized shapes. However, the primary structure, made up of the linear sequence of amino acids, remains intact. This change can significantly affect the protein's functionality, as the structure of a protein is closely tied to its biological activity. The denaturation process does not lead to the complete degradation of the protein nor does it involve the synthesis of new proteins; rather, it alters the existing structure which may be a reversible process under certain conditions.

9. Which component of a solution is known to dissolve the solute?

A. Solvent

B. Solute

C. Diluent

D. Concentration

The component of a solution that is known to dissolve the solute is the solvent. In any solution, the solvent is the substance present in the greatest amount, and it serves as the medium in which the solute is dissolved. For example, when salt (the solute) is added to water (the solvent), the water molecules interact with the salt molecules, pulling them apart and effectively dissolving them. This results in a homogeneous mixture where the solute is evenly distributed throughout the solvent. Other terms in the context of solutions include the solute, which is the substance being dissolved, and diluent, which typically refers to a substance that decreases the concentration of a solute in a solution. Concentration refers to the amount of solute in a given volume of solvent, which does not describe the component that dissolves the solute. Understanding the role of the solvent is crucial in various biological and chemical processes, as it affects the behavior and interactions of the solute particles.

10. What does the term 'variable' mean in the context of an experiment?

A. A fixed value that does not change

B. A factor in an experiment that is either purposely changed or altered as a result of another variable

C. A tool used to measure results

D. An untested concept

In the context of an experiment, the term 'variable' refers specifically to a factor that can be manipulated or measured in order to determine its effects within the experiment. This understanding is essential in scientific research, as it allows researchers to control conditions and examine relationships between different factors. When conducting experiments, variables typically fall into categories such as independent variables, which are intentionally changed to observe their impact, and dependent variables, which are the results observed as a consequence of those changes. By focusing on how one variable influences another, researchers can draw conclusions about cause-and-effect relationships. The other options do not accurately define what a variable is within the experimental framework. A fixed value that does not change does not apply to variables as they are defined by their ability to fluctuate and impact outcomes. Tools used to measure results relate to the methodology of the experiment but are not themselves variables. Similarly, an untested concept does not have the empirical basis that characterizes a variable, which is observed through experimentation. Thus, the correct understanding of 'variable' captures its dynamic role in exploring scientific questions.