Kementerian Pendidikan, Kebudayaan, Riset, dan Teknologi
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FINAL EXAMINATION ODD SEMESTER ACADEMIC YEAR 2024/2025

Course	: General Biology
Lecturer	: General Bio Team
Student Year/Class	: 2024/ABCDE
Day/Date	: Thursday/9 January 2025
Time Period	: 100 minutes

Type A

A. Choose one most correct answer from the options.

Mendelian Genetics

1. In a monohybrid cross experiment, Gregor Mendel found a phenotypic ratio of **3:1** in the F2 generation. What are the possible genotypes of plants that exhibit dominant phenotypes in this ratio?
   A. 1:2
   B. 2:1
   C. 1:1
   D. 2:1:1
   E. 1:2:1

2. Mendel's law of segregation states that alleles for a particular trait will separate during gamete formation. In an organism with the genotype AaBb, what combination of gametes will result?
   A. AB, Ab, aB, ab
   B. AB, aB, aB, Ab
   C. Aa, Bb, AB, ab
   D. AA, BB, Ab, ab
   E. AaBb, AB, Ab, ab

3. A normal woman whose biological father was hemophiliac marries a normal man. The marriage could potentially produce a hemophiliac son of...
   A. 25%
   B. 12.50%
   C. 50%
   D. 75%
   E. 100%

Structure and Function of Animal and Plant Tissues

4. Bayu observed cross-sections of dicotyledonous plant stems using a microscope. In his observations, Bayu found tissue with the following characteristics:
   1) The cells are polyglonal

2) Have lots of space between cells
3) Cell walls are thin
4) Large vacuoles are found in the cells

Based on the characteristics obtained, Bayu can conclude that the tissue observed have function as...

A. Food storage area
B. Photosynthesis site
C. Protection of internal tissues
D. Transport of photosynthesis products
E. Gas exchange site

5. In animal organs, muscle tissue has different functions depending on its type. What is the main difference between smooth muscle and skeletal muscle?
   A. Smooth muscle works voluntarily, while skeletal muscle works involuntarily.
   B. Smooth muscle has many nuclei, while skeletal muscle has one nucleus.
   C. Smooth muscle does not have striations, while skeletal muscle does.
   D. Smooth muscle is found only in the heart, while skeletal muscle is found throughout the body.
   E. Smooth muscle is stronger than skeletal muscle.

6. Which one is the function is of single layer flat epithelium?
   A. Facilitate active movement of molecules, such as absorption, secretion, and ion transport
   B. The process of O2 and CO2 diffusion
   C. Secretion and absorption
   D. Removing dust trapped in mucus and the lungs
   E. Protection

Diversity of Living Things

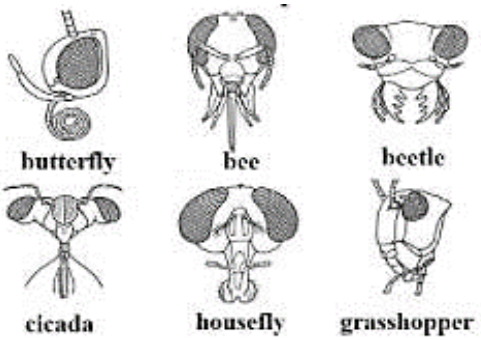
7. Examples of diversity that occurs at the gene level are ...
   A. Honey mango and Manalagi mango
   B. Horse and donkey
   C. Cat and tiger
   D. Peanut and green bean
   E. Coconut and areca nut

8. Pay attention to the following characteristics of organisms.
   1) Multicellular
   2) Have cell walls
   3) Autotrophic
   4) Prokaryotic
   5) Can actively move

   The characteristics of **plants** are found in the numbers.....

A. 1), 2), and 3)
B. 1) 2), and 5)
C. 2), 3), and 4)
D. 2), 4), and 5)
E. 3) 4), and 5)

9. Look at the following picture.



The image shows the mouthparts of various insects. These different morphologies indicate…
A. homology and analogy
B. homoplasy and ontogeny
C. transformation and analogy
D. homology and transformation
E. transformation and homoplasy

Growth and Development of Microorganism

10. One important factor that influences microbial growth is pH. Most human pathogenic microbes grow optimally at what pH?
    A. 2-4
    B. 5-7
    C. 6-8
    D. 9-11
    E. 12-14

11. In the growth phase of microbes in liquid culture media, there are four main phases: lag, log, stationary, and death. In which phase do microbes experience high metabolic activity but no increase in cell number?
    A. Lag
    B. Log
    C. Stationary
    D. Death phase
    E. Exponential

12. What are microbes that can grow well at high temperatures and are often found in extreme environments, such as hot springs, called?
    A. Mesophiles
    B. Thermophiles
    C. Psychrophiles
    D. Halophiles
    E. Capnophiles

Evolution

13. What is the main difference between the theories of biogenesis and abiogenesis?
    A. Biogenesis states that life originates from nonliving matter, while abiogenesis states that life originates from other organisms.
    B. Abiogenesis states that life originates from nonliving matter, while biogenesis states that life originates from preexisting life.
    C. Abiogenesis states that microorganisms originate from the air, while biogenesis states that microorganisms originate from the environment.
    D. Biogenesis proves that living things can form spontaneously, while abiogenesis proves that life requires other living organisms.
    E. Biogenesis and abiogenesis are conceptually similar.
14. One of the experiments that supports the theory of abiogenesis is the Miller-Urey experiment. What was the main objective of this experiment?
    A. Proving that life comes from preexisting life.
    B. Synthesizing amino acids from inorganic materials.
    C. Proving that living things come from nonliving matter.
    D. Showing that fly larvae come from rotting meat.
    E. Confirming that microorganisms come from the air.

Ecology

15. Pay attention to the following biotic components!
    1) Worms
    2) Woodlice
    3) Fungi
    4) Bacteria
    5) Woodlice

    The biotic components that play a role in providing nutrients for producers are indicated by the number.....
    A. 1) and 2)
    B. 1) and 3)
    C. 2) and 4)
    D. 3) and 4)
    E. 4) and 5)

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16. The interaction between various organisms of different species forms ....
    A. Individual
    B. Ecosystem
    C. Population
    D. Biome
    E. Community

17. In an aquatic ecosystem, the number of producers (phytoplankton) decreases significantly. What is the most likely direct impact on the food web of that ecosystem?
    A. Tertiary consumers will switch to other food sources.
    B. Primary consumers will experience a population decline.
    C. Secondary consumers will increase due to reduced competition.
    D. Decomposers will dominate the ecosystem due to increased organic matter.
    E. Nutrient levels in the water will increase drastically.

Biotechnology

18. Biotechnology that is carried out by inserting DNA with certain characteristics into the genes of organisms to obtain offspring that meet the desired requirements is called. . . .
    A. Artificial insemination
    B. Cloning
    C. Tissue culture
    D. Monoclonal antibodies
    E. Recombination

19. In traditional biotechnology, microorganisms are used to produce food products such as cheese and yogurt. Which microorganisms play a major role in the fermentation process that produces yogurt?
    A. *Saccharomyces cerevisiae*
    B. *Lactobacillus bulgaricus* and *Streptococcus thermophilus*
    C. *Aspergillus oryzae*
    D. *Bacillus subtilis*
    E. *Penicillium notatum*

20. Conventional biotechnology is carried out based on experiences passed down from generation to generation have the following feature . . . .
    A. Through scientific research
    B. Without applying scientific principles
    C. Repeated trials
    D. Without utilizing microorganisms
    E. High level of sterility

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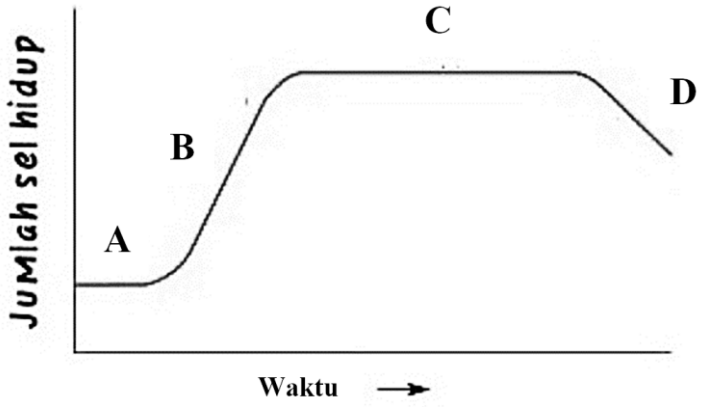
B. Answer the following questions completely and correctly.

1. Can natural disasters be used as one of the causes of the evolutionary mechanism? Explain your reasoning.

2. A farmer cross-breeds two varieties of pea plants. The first variety has round, yellow seeds (BbYy), while the second variety has wrinkled, green seeds (bbyy). After cross-breeding, the farmer finds the following results among the 160 offspring plants:
   • 60 plants had round-yellow seeds,
   • 20 plants had wrinkled-yellow seeds,
   • 60 plants had round-green seeds,
   • 20 plants had wrinkled-green seeds.
   Do these results conform to Mendel's laws? Explain your analysis based on the resulting phenotype ratios.

3. Pay attention to the following bacterial growth curve!



Yanto cultured yeast cells. At 80 hours, the cell count was 95% of the previous number. Then, at 83 hours, the cell count was 80% of the previous number. Based on the microorganism growth graph, which growth phase is the yeast in? Explain your answer.