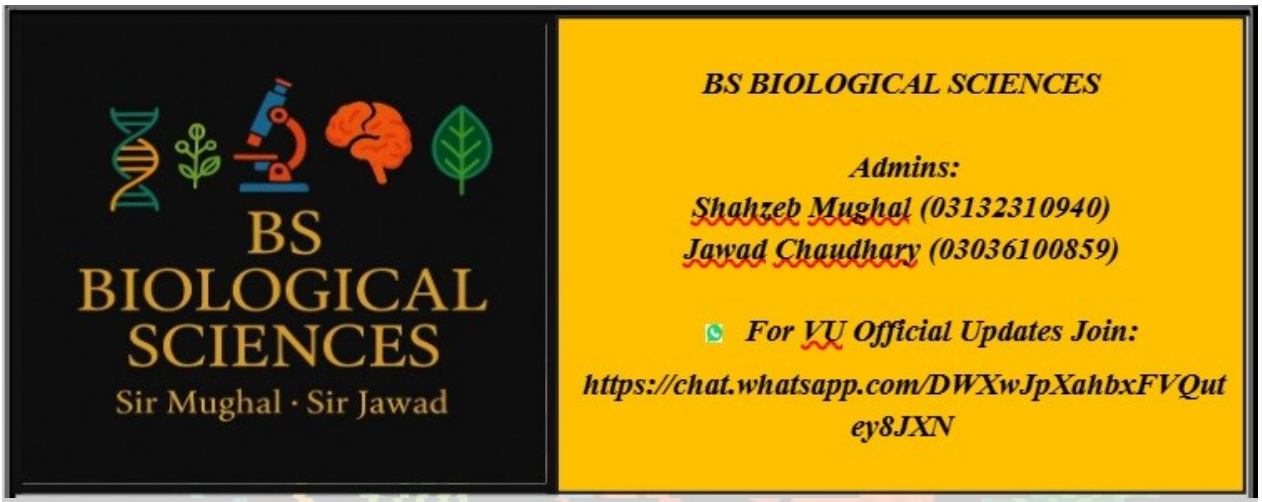

BIF602-

Bioinformatics Computing II

MCQS FOR MIDTERM

By

(COLLABORATION)

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MCQS FOR MIDTERM:

Lesson 1:

1. ***During early human history, natural resources were mainly used to:***
   A) Build computers
   B) Provide food and shelter
   C) Perform natural computing
   D) Create artificial intelligence

2. ***Understanding the physical laws of motion and gravity helped humans to:***
   A) Study neural networks
   B) Design aircrafts
   C) Create cellular automata
   D) Develop swarm intelligence

3. ***Natural computing is an interdisciplinary field that connects:***
   A) Physics and chemistry
   B) Computer science and natural sciences
   C) Literature and computer science
   D) Biology and history

4. ***The main idea of natural computing is that:***
   A) Computers can replace humans in all tasks
   B) Information processing is a natural process
   C) Nature has no connection to computing
   D) Computing is only artificial

5. ***Which of the following is NOT one of the three approaches of natural computing?***
   A) Computing inspired by nature
   B) Simulation and emulation of natural phenomenon in computers
   C) Computing with natural materials
   D) Computing without algorithms

6. ***In "computing inspired by nature," which of the following is considered an example of nature as inspiration?***
   A) Quantum computing
   B) Classical mechanics
   C) Neural computation
   D) Cloud computing

7. ***Which of the following is NOT an example of nature -inspired computing techniques?***
   A) Evolutionary computation
   B) Swarm intelligence
   C) Immuno-computing
   D) Object-oriented programming

8. ***"Simulation and emulation of natural phenomenon in computers" falls under which type of natural computing approach?***

A) Computing inspired by nature
B) Computing with natural materials
C) Simulation approach
D) Artificial intelligence

9. ***Membrane computing is an example of:***
A) Nature as inspiration
B) Classical computation
C) Quantum computing
D) Cloud-based computation

Lesson 2:

1. ***One of the main motivations for studying natural computing is:***
A) To replace computers entirely with nature
B) To understand natural processes and develop novel systems
C) To ignore life processes
D) To increase the use of fossil fuels

2. ***Natural computing products are already available in:***
A) Only scientific laboratories
B) Computers, washing machines, toys, trains, air conditioning, and other devices
C) Only space research
D) Ancient books

3. ***Observing natural phenomena has historically helped humans to:***
A) Create laws of finance
B) Devise theories about how nature works
C) Reduce the use of natural resources
D) Stop the development of artifacts

4. ***Artifacts such as airplanes, submarines, and chemicals used in pharmaceuticals were developed by:***
A) Pure guesswork
B) Taking inspiration from natural phenomena and organisms
C) Random experimentation
D) Studying only computer algorithms

5. ***Natural computing is useful for understanding life processes because it allows:***
A) Creation of virtual reality games only
B) Development of highly abstract models of natu re
C) Avoidance of studying biology
D) Reduction in computer use

6. ***Sometimes natural computing techniques aim to be:***
A) Purely industrial tools
B) Theoretical models of nature providing insights into how nature works

C) Entertainment gadgets
D) Military weapons only

7. ***Which of the following is an example of natural inspiration for artifact design?***
   A) Bats inspiring sonar systems
   B) Coins inspiring aircraft
   C) Rivers inspiring washing machine
   D) Mountains inspiring toys

8. ***Supporting research in natural computing is important because:***
   A) NC products are already obsolete
   B) It contributes to better understanding of nature and development of innovative technologies
   C) Nature has no relation with computing
   D) It reduces computer efficiency

Lesson 3:

1. ***The Natural Computing age is characterized by:***
   A) A focus on classical physics only
   B) Increasing interaction and similarity between computing and nature
   C) Rejection of computers in scientific studies
   D) Avoiding the study of natural processes

2. ***Which of the following is an example of natural clustering phenomena?***
   B) Clustering of dead bodies in ant colonies
   C) Computers recalculating spreadsheets
   D) Cars driving autonomously

3. *Observing birds flocking in the sky often leads to the assumption that:*
   A) Birds follow a random pattern
   B) Birds never interact
   C) Birds fly only at night
   D)Birds follow a leader in front of the flock

4. ***The basic rules to model ant clustering behavior are** :*
   A) Leader-following and scattering rules
   B) Pick up rule and dropping rule
   C) Movement rule and rest rule
   D) Attraction rule and repulsion rule

Lesson 4:

1. ***Natural computing approaches often use:***
   A) Exact, highly detailed natural mechanisms
   B)Random guesses
   C) Highly simplified versions of natural mechanisms
   D) Only digital simulations

2. ***Simplifications in natural computing are necessary to:***
   A) Avoid studying natural phenomena
   B) Make computation with a large number of entities feasible
   C) Eliminate the need for rules
   D) Focus solely on entertainmen

3. ***Creating suitable abstractions in NC helps to:***
   A)Simplify a system while keeping essential features
   B)Remove all important features
   C) Make natural systems more complex
   D) Avoid solving any problem

4. ***Simple behavioral rules of insects can be sufficient for:***
   A) Creating video games
   B) Development of computational tools for solving combinatorial problems
   C) Understanding classical mechanics only
   D) Avoiding computation

Lesson 5:

1. ***The three main branches of natural computing are:***
   A) Neural networks, quantum computing, AI
   B) Classical mechanics, chemistry, biology
   C) Object-oriented programming, AI, robotics
   D) Computing inspired by nature, simulation/emulation of nature, computing with natural Materials

2. ***Computing inspired by nature is successful in solving:***
   A) Only trivial problems
   B) Complex problems, motivated by the urge for survival in living organisms
   C) Problems unrelated to nature
   D) Only financial problems

3. ***Simulation and emulation of nature in computers aim to:***
   A) Provide tools for synthesizing and studying natural phenomena, testing theories not easily testable otherwise
   B) Replace real experiments entirely
   C) Only create artificial life games
   D) Avoid studying biological processes

4. ***Two main approaches for simulation and emulation of nature are:***
   A) DNA computing and RNA computing
   B) Artificial life and fractal geometry of nature
   C) Neural networks and evolutionary computation
   D) Quantum physics and classical mechanics

5. ***Computing with natural materials aims to:***
   A) Replace silicon-based computers with alternative natural materials
   B) Avoid using computers entirely
   C) Simplify computer programming only
   D) Study birds and ants

6. ***Examples of alternative computing materials include:***
   A) Wood and metals
   B) Only silicon
   C) Membranes, DNA, RNA, and quantum systems
   D) Plastic and glass

Lesson 6:

1. ***Computing inspired by nature is also called:***
   A) Quantum computing
   B) Bio-inspired or biologically motivated computing
   C) Classical computing
   D) Mechanical computing

2. ***Artificial neural networks originated from the model of:***
   A) Artificial neurons
   B) Artificial chromosomes
   C) Chemical reactions
   D) Swarm robots

3. *Evolutionary computing emerged in the:*
   A) 1920s
   B) 1990s
   C) 2000s
   D) Mid 1960

4. ***Genetic Algorithms, Evolution Strategies, and Genetic Programming are types of:***
   A) Quantum algorithms
   B) Evolutionary algorithms
   C) Neural networks
   D) Immune responses

5. ***The term "swarm intelligence" was coined in:***
   A) Late 1980s
   B) 1920
   C) 2005
   D) Early 1800s

6. ***Artificial Immune Systems (AIS) are inspired by:***
   A) Human heart
   B) Human skeleton

C) Human immune system
D) Human skin

Lesson7:

1. ***Simulation and emulation of nature are mainly aimed at:***
   A) Destroying natural systems
   B) Designing only robots
   C) Replacing mathematics
   D) Synthesizing natural phenomena and patterns
2. ***Two main approaches in simulating nature are:***
   A) Robots and circuits
   B) Artificial life and fractal geometry
   C) Viruses and bacteria
   D) Genes and proteins
3. ***Fractals are:***
   A) Perfect smooth shapes
   B) Only biological cells
   C) Rough or fragmented shapes that repeat at smaller scales
   D) Straight lines
4. ***A common example of fractals in nature is:***
   A) Wheels
   B) Ferns and coastlines
   C) Cars
   D) Buildings
5. ***Artificial life (A-Life) studies:***
   A) Life-like behaviors synthesized in computers or machines
   B) Only real animals
   C) Only DNA sequences
   D) Geological patterns

Lesson 8:

1. ***Computing with natural materials uses substances other than:***
   A) Gold
   B) Wood
   C) Iron
   D) Silicon
2. ***DNA computing was proposed by:***
   A) Watson
   B) Alan Turing

C) Leonard Adleman
D) Newton

3. **DNA computing is powerful mainly because of:**
A) Expensive hardware
B) Massively parallel computation
C) Slow processing
D) Limited memory

4. **Quantum computers operate using:**
A) Classical physics
B) Newtonian mechanics
C) Laws of quantum mechanics
D) Magnetic poles only

Lesson 10 & 11:

1. **Modeling is important because:**
A) It complicates scientific work
B) It helps understand complex systems using simplifications
C) It replaces mathematics
D) It removes natural rules

2. **According to Trappenberg, models are:**
A) Exact replicas of nature
B) Physical objects
C) Random guesses
D) Abstractions of real-world systems

3. **Feature selection is used to:**
A) Reduce dimensionality and improve performance
B) Increase noise
C) Slow down the model
D) Add unnecessary features

4. **A metaphor is used to:**
A) Remove meaning
B) Transfer meaning from one thing to another
C) Describe only physical objects
D) Replace computing

5. **"Artificial neural network" is a metaphor based on:**
A) Human lungs
B) Human heart
C) Human bones
D) Human brain

Lesson 12:

1. ***The first step of Natural Computing development usually involves:***
   A) Writing a program directly
   B) Removing natural features
   C) Observing nature or natural models for inspiration
   D) Only testing algorithms

2. ***The immune system metaphor is commonly used in:***
   A) Game development
   B) Computer security
   C) Graphic design
   D) Database creation

3. ***A major problem with taking metaphors from nature is:***
   A) It is difficult to understand how nature truly works
   B) Nature is simple
   C) Humans rarely observe nature
   D) Computers are faster

4. ***Artificial neural networks are inspired by:***
   A) Circulatory system
   B) Nervous system Human bones
   C) Digestive system
   D) Nervous system

5. ***Evolutionary algorithms were inspired by:***
   A) Classical mathematics
   B) Evolutionary biology
   C) Astronomy
   D) Geometry

Lesson 13:

1. ***The word "agent" comes from the Latin word meaning:***
   A) To sleep
   B) To destroy
   C) To create
   D) To do

2. ***In computer science, an agent refers to:***
   A) Only a physical robot
   B) A software entity that perceives and acts
   C) Only a human operator
   D) A hardware device

3. ***Which is NOT a property of agents?***
   A) Autonomy

B) Pro-activeness
C) Social ability
D) Immortality

4. ***Agents acting without direct user control represent:***
   A) Autonomy
   B) Pro-activeness
   C) Competitiveness
   D) Intelligence

5. ***Agent-Based Models (ABM) can:***
   A) Never show complex behavior
   B) Only simulate hardware
   C) Show complex behavior from simple rules
   D) Be used only in biology

6. ***The ultimate objective of Artificial Intelligence is:***
   A) Creating random programs
   B) Building agents that behave intelligently
   C) Designing only databases
   D) Eliminating human input

Lesson 14:

1. ***Parallel processing in nature can be seen in:***
   A) Isolated animals
   B) Insect societies
   C) Rocks
   D) Planets

2. ***In a colony of ants, different tasks are performed:***
   A) Only by the queen
   B) Only by male ants
   C) Only during night
   D) In parallel and sometimes switched when needed

3. ***Distributed computing means:***
   A) memory Each processor has its own private memory
   B) All processors share the same memory
   C) No communication between processors
   D) One processor controls all others

4. ***Parallel computing means:***
   A) No shared memory
   B) Only one processor active
   C) Shared memory accessible by all processors
   D) No communication allowed

Lesson 15:

1. ***A key feature of natural systems is:***
   A) No interaction
   B) Interaction among agents and environment
   C) Random isolation
   D) No dependency

2. ***Evolution favors individuals who:***
   A) Avoid reproduction
   B) Are less adapted to their environment
   C) Are more adapted and produce more offspring
   D) Avoid competition

3. ***Interactive computing means the software:***
   A) Requires human input during execution
   B) Does not take human input
   C) Runs only offline
   D) Works only in batch mode

4. ***HCI stands for:***
   A) Human Computer Interaction
   B) High Communication Input
   C) Human Control Interface
   D) Hybrid Computing Integration

5. ***Compilers and batch programs are examples of:***
   A) Interactive programs
   B) Social systems
   C) Biological models
   D) Non-interactive programs

Lesson 16:

1. ***Connectionist systems represent information through:***
   A) Single isolated units
   B) Magnetic tapes
   C) Distributed nodes and connections
   D) DNA molecules

2. ***The term "connectionism" became popular i n the:***
   A) 1920s
   B) Mid-1980s
   C) 1700s
   D) 2010s

3. ***A key feature of connectionist systems is:***
   A) Units interact only if linked by connections
   B) All units interact freely
   C) No need for connections
   D) Only one unit is active

4. ***Spreading activation is commonly found in:***
   A) Quantum machines
   B) Neural network models
   C) Mechanical engines
   D) Chemical reactor

5. ***The most commonly used connectionist model today is:***
   A) Immune networks
   B) Genetic networks
   C) Chemical networks
   D) Artificial neural networks (ANN)

Lesson17:

1. ***Stigmergy refers to:***
   A. Direct communication between agents
   B. Indirect coordination through the environment
   C. Communication through speech
   D. Centralized control

2. ***The term Stigmergy was coined by:***
   A. Alan Turing
   B. John Holland
   C. Pierre-Paul Grasse
   D. Darwin

3. ***Stigmergy is mostly seen in:***
   A. Human societies
   B. Computer networks
   C. Termite colonies
   D. Aquatic life

4. ***Stigmergy produces complex structures without:***
   A. Self-organization
   B. Environment
   C. Agents
   D. Planning or direct communication

Lesson 18:

1. ***Adaptation refers to:***
   A. Random changes
   B. Traits helping organisms survive
   C. Only physical changes
   D. Human-made change

2. ***Desert plants with thick stems represent:***
   A. Behavioral adaptation
   B. Genetic drift
   C. Structural adaptation
   D. Mutation

3. ***Animal migration is an example of:***
   A. Structural adaptation
   B. Behavioral adaptation
   C. Mutation
   D. Evolution

Lesson 18-20:

1. ***Microevolution refers to:***
   A. Origin of new species
   B. Major evolutionary changes
   C. Small changes within a type
   D. Extinction

2. ***Dog breeding is an example of:***
   A. Natural selection
   B. Artificial selection
   C. Macroevolution
   D. Mutation

3. ***Dog breeding is an example of:***
   A. Natural selection
   B. Artificial selection
   C. Macroevolution
   D. Mutation

4. ***Macroevolution involves:***
   A. Small variations
   B. Horizontal changes
   C. No genetic change
   D. Formation of new types of organisms

5. ***Natural selection works on:***
   A. Genetic variation

B. Learned behaviors
C. Environmental temperature only
D. Non-living things

6. ***A beneficial mutation will:***
   A. Disappear immediately
   B. Spread in the population
   C. Stop evolution
   D. Harm all organisms

7. ***"Survival of the fittest" means:***
   A. Strongest survives
   B. Fastest survives
   C. Best adapted survives
   D. Largest survives

Lesson 21:

1. ***Feedback refers to:***
   A. Input given to a computer
   B. Portion of output returned to input
   C. Only positive responses
   D. Noise in a system

2. ***Type of feedback that stabilizes a system:***
   A. Positive feedback
   B. Neutral feedback
   C. Zero feedback
   D. Negative feedback

3. ***16. Brain activity involves:***
   A. Single neuron
   B. No feedback
   C. Large feedback loops of neural circuits
   D. No synapses

4. ***Repeating neural circuits contribute to:***
   A. Learning
   B. Forgetting
   C. Sleep
   D. Breathing

Lesson 22:

1. ***Negative feedback works by:***
   A. Increasing the original stimulus
   B. Reversing the original stimulus

C. Amplifying system output
D. Causing instability

2. **Most feedback systems in the human body are:**
   A. Positive
   B. Random
   C. Neutral
   D. Negative

3. **The thermostat is an example of:**
   A. No feedback
   B. Positive feedback
   C. Negative feedback
   D. Mechanical feedback

4. **Negative feedback controls a process to:**
   A. Avoid accumulation of a product
   B. Accelerate it nonstop
   C. Destroy the system
   D. Increase instability

5. **Blood glucose regulation after a meal is controlled by:**
   A. Positive feedback
   B. Negative feedback
   C. No change
   D. Mutation

6. **When blood pressure increases, baroreceptors cause vessels to:**
   A. Constrict
   B. Stop functioning
   C. Shrink
   D. Dilate

Lesson 24:

1. **Self-organization refers to:**
   A. Patterns created by central control
   B. Patterns formed spontaneously without extern al control
   C. Random arrangements
   D. Human-made structures only

2. **13. Which one is an example of self-organization?**
   A. Cloud formation
   B. DNA mutation
   C. Aging
   D. Melting ice

3. ***14. Self-organization emerges from:***
   A. A single powerful controller
   B. Government rules
   C. No interactions
   D. Simple local interactions

4. ***15. The flocking of birds is an example of:***
   A. Negative feedback
   B. Chaos
   C. Self-organization
   D. Structural adaptation

5. ***16. Self-organization can influence:***
   A. Only behavior
   B. Only physical structure
   C. Both behavior and physical patterns
   D. Only chemical reactions

6. ***17. Pattern formation refers to:***
   A. Disorder in systems
   B. Organized arrangement in space or time
   C. Random selection
   D. Mutation only

Lesson 25:

1. ***Self-organization refers to:***
   A. Externally controlled ordering
   B. Random behavior in systems
   C. Spontaneous ordering in complex systems
   D. Ordering caused by a leader

2. ***A key feature of self-organized systems is:***
   A. Very few interacting elements
   B. Large number of interacting elements
   C. No interaction between elements
   D. Interaction only with humans

3. ***Self-organized systems require:***
   A. Continual dynamic interactions
   B. Static components
   C. No feedback
   D. External command

4. ***The overall pattern that appears in a self-organized system is called:***
   A. Noise
   B. Emergent property

C. Random drift
D. Direct command

5. **Non-linearity in SOS means:**
   A. Output is equal to the sum of inputs
   B. Simple addition of behaviors
   C. New properties arise from interactions
   D. No change occurs

6. **Which of the following is true about SOS (Self-Organized Systems)?**
   A. They are always simple
   B. They cannot be complex
   C. They avoid rules
   D. They can be complex

7. **Dead-body clustering in ant colonies demonstrates that SOS are:**
   A Rule-based
   B. Leader-driven
   C. Random
   D. Non-interactive

8. **What contributes to the formation and regulation of self -organized processes?**
   A. Only positive feedback
   B. Only negative feedback
   C. Feedback loops (positive + negative)
   D. No feedback at all

9. **In self-organized systems, patterns form due to:**
   A. Centralized control
   B. External algorithms
   C. Local interactions among components
   D. Human instructions

10. **Complexity in SOS refers to:**
    A. Systems where many simple parts create complex behavior
    B. Systems that are easy to predict
    C. Systems with no interactions
    D. Systems with zero feedback

Lesson 26:

1. **Which statement is TRUE about self-organization?**
   A. It is the only way patterns form in nature
   B. It never involves other mechanisms
   C. Many natural patterns may involve other mechanisms like genetic encoding
   D. It replaces all other pattern-forming processes

2. ***Which of the following is an alternative to self -organization?***
   A. Random movement
   B. Following a leader
   C. Spontaneous pattern growth
   D. Emergent behavior

3. ***Following a leader means:***
   A. Every agent creates its own rules
   B. A well-informed individual directs the entire group
   C. No instructions are given
   D. The pattern forms automatically

4. ***A blueprint is:***
   A. A random drawing used for decoration
   B. A full-sized mold
   C. A compact representation of spatial/temporal relationship s
   D. A chemical signal

5. ***An example of a blueprint is:***
   A. Ants clustering bodies
   B. A captain giving commands
   C. A musician receiving a musical score
   D. A baby crying

6. ***A recipe refers to:***
   A. A mold used to shape raw material
   B. A sequence of steps an individual must follow
   C. A leadership structure
   D. A random set of actions

7. ***Following a recipe means:***
   A. Each member follows a sequential set of actions
   B. Everyone acts randomly
   C. A leader controls the actions
   D. A template forms the pattern

8. ***Templates are***
   A. Full-sized guides or molds used to shape a final pattern
   B. Random structures found in nature
   C. Genetic codes
   D. Improvised plans

9. ***Which is an example of a template?***
   A. Streets you follow to reach a place
   B. A musical score
   C. A captain directing troops
   D. A mold used to shape car parts

10. ***Which alternative involves detailed instructions from one individual?***
    A. Template
    B. Recipe
    C. Blueprint
    D. Following a leader

Lesson 27:

1. ***A complex system is best described as a system that has:***
   A) Few components with simple interactions
   B) Many interacting components with nonlinear behavior
   C) Components that never interact
   D) Linear and predictable behavior

2. ***Complex systems usually exhibit:***
   a) Random disorganization
   b) perfect predictability
   c) Self-organization
   d) No interaction between parts

3. ***To study complex systems, they are often represented as:***
   a) Arrays
   b) Networks
   c) Loops
   d) Single equations

4. ***In a network representation of a complex system, the nodes represent:***
   a) Environment
   b) Interactions
   c) Components
   d) Noise

5. ***Which of the following is NOT an example of a complex system?***
   a) Human brain
   b) Ecosystem
   c) A simple calculator
   d) Earth's climate

6. ***Can we fully understand the human body by only studying its major systems?***
   a) Yes
   b) No
   c) Sometimes
   d) only the nervous system

7. ***Studying all cells and molecules of an organism is:***

8. *a) Enough to understand the whole system*
   b) Still not enough to understand it

c) A complete explanation
d) not related to complexity

9. ***The behavior of a complex system cannot be understood by:***
   a) Studying all interactions
   b) examining component parts alone
   c) Considering the environment
   d) looking at its network

10. ***Complexity studies show that understanding a system requires:***
    a) Only knowing internal organization
    b) Only knowing environmental factors
    c) Understanding both internal structure and interactions with environment
    d) Ignoring interactions

11. ***To explore natural complexity, one must focus on:***
    a) Very low levels of detail only
    b) Very high levels of detail only
    c) The right level of description
    d) No level of description

12. ***In natural computing, the preferred descriptions are:***
    a) Very detailed physical models
    b) Higher-level descriptions
    c) Randomly chosen levels
    d) Purely chemical models

13. ***Most systems in natural computing***
    a) Exact copies of biological systems
    b) Unrelated to biology
    c) Highly abstract biological models
    d) Not influenced by nature

Lesson 28:

1. ***Emergence refers to the phenomenon where:***
   a) Smaller entities lose their properties
   b) Nothing new is formed
   c) Only physical properties change
   d) Larger entities arise with new properties not present at lower levels

2. ***Emergence plays a central role in:***
   a) Classical mechanics
   b) Integrative levels and complex systems
   c) Thermodynamics only
   d) Simple linear systems

3. ***Life as studied in biology is an emergent property of:***
   a) Chemistry
   b) Physics
   c) Mathematics
   d) Geography

4. ***Which of the following is an example of emergence?***
   a) Molecule breaking down
   b) Psychological phenomena arising from neural interactions
   c) A stone falling
   d) a simple machine operating

5. ***Proteins form complex biological structures because of:***
   a) Simple movement
   b) Gravity
   c) Their spatial conformation
   d) Randomness only

6. ***Emergence is tightly linked with:***
   Complex systems
   b) Reductionism
   c) Linear equations
   d) Isolated particles

7. ***In emergent systems, agents working at one level:***
   a)Produce behaviors at the same level
   b) Produce behaviors at a higher scale
   c) Do not interact
   d) Cancel each other out

8. ***The movement from low-level rules to high-level behavior is called:***
   a) Reduction
   b) Emergence
   c) Dissolution
   d) Abstraction

Lesson 29:

1. ***Reductionism attempts to explain phenomena by:***
   a) Using higher-level models only
   b) studying only the whole
   c) Ignoring constituent parts
   d) reducing them to simpler, fundamental parts

2. ***"Pain is nothing but neuron firing" is an example of:***
   a) Emergence
   b) Reductionism

c) Dualism
d) Humanism

3. ***In science, reductionism explains entire systems based on:***
   a) Whole-system behavior only
   b) Social theories
   c) Their constituent parts and interactions
   d) External appearance

4. ***Temperature of a gas explained as "average kinetic energy of molecules" is an example of:***
   a) Systems theory
   b) Emergence
   c) Reductionism
   d) Idealism

5. ***Which scientists strongly rely on reductionism?***
   a) Physicists, chemists, biologists
   b) Historians
   c) Astrologers
   d) Poets

6. ***Biologists use reductionism when they:***
   a) Study whole species only
   b) Scrutinize DNA sequences to understand organisms
   c) Analyze stars
   d) Ignore molecular structure

7. ***A key idea in reductionism is:***
   a) Questions can be answered at the constituent level
   b) Complex systems cannot be broken down
   c) The whole is always more than its parts
   d) Smaller entities do not matter

Lesson 30:

1. ***A top-down approach mainly involves:***
   a) Combining small units to form larger systems
   b) Breaking a system into smaller sub-systems
   c) Ignoring system structure
   d) Random system analysis

2. ***A bottom-up approach is best described as:***
   a) Reverse engineering a system
   b) Decomposing a system step-by-step
   c) Building complex systems from simpler compon ents
   d) Predicting outcomes from initial conditions
   Correct answer: c

3. ***Another name for the top-down approach is:***
   a) Stepwise design
   b) Chaos
   c) Emergence
   d) Reduction

4. ***Lesson 31:***

5. ***Determinism is the belief that:***
   a) Events occur randomly without cause
   b) A set of conditions can produce multiple outcomes
   c) Every event has a cause and leads to only one possible outcome
   d) Nature is unpredictable

6. ***Which group believes humans cannot affect their lives in any way?***
   a) Fatalists
   b) Determinists
   c) Reductionists
   d) Chaos theorists

7. ***The main characteristic of a deterministic system is:***
   a) Stability
   b) Predictability
   c) Randomness
   d) Inconsistency

8. ***According to determinism, all events are:***
   a) Independent
   b) Unrelated to nature's laws
   c) Without any patterns
   d) Caused by sufficient prior conditions

9. ***Chaos theory caused:***
   a) Stronger link between determinism and predictability
   b) A separation between determinism and predictability
   c) End of scientific explanation
   d) Complete removal of causation

Lesson 32:

1. ***Chaos theory mainly studies:***
   a) Linear and predictable systems
   b) Completely random phenomena
   c) Nonlinear systems highly sensitive to initial conditions
   d) Equilibrium in nature

2. ***The "butterfly effect" refers to:***
   a) Small changes causing large effects
   b) Systems with no measurable changes
   c) Large causes leading to small effects
   d) Predictable behavior of natural systems

3. ***Before chaos theory, scientists believed chaotic systems were:***
   a) Predictable and simple
   b) Random and unimportant
   c) Highly structured
   d) Well understood

4. ***Which of the following is an example of a chaotic system?***
   a) Planetary motion
   b) Simple chemical equations
   c) Clock mechanisms
   d) Traffic flow patterns

5. ***Chaos theory attempts to uncover:***
   a) Total randomness in nature
   b) Deterministic laws of linear systems
   c) Statistical patterns hidden in seemingly random processes
   d) Only astronomical phenomena

Lesson 33:

1. ***The word "fractal" refers to shapes that are:***
   a) Perfectly smooth
   b) Regular and geometric
   c) Irregular, fragmented, jagged
   d) Always circular

2. ***A fractal is:***
   a) A simple repeating number
   b) A never-ending, self-similar complex pattern
   c) A 2D straight-line shape
   d) Only an artistic pattern

3. ***Fractal geometry studies:***
   a) Irregular patterns similar to the whole
   b) Perfectly regular shapes
   c) Only triangles and circles
   d) Only man-made structures

4. ***Fractals are commonly found in:***
   a) Clouds and rivers
   b) Squares and rectangles

c) Ladders
d) Mechanical gears

Lesson 34:

1. ***A model is:***
   a) An exact copy of reality
   b) A simplified representation of reality
   c) A random guess
   d) A physical device only
2. ***. Models are useful for:***
   a) Decoration
   b) Entertainment
   c) Forecasting, simulation, diagnostics
   d) None
3. ***Physiological models can be classified as:***
   a) Black, white, grey box
   b) Linear only
   c) Regular and irregular
   d) Only static
4. ***Which of the following is not a purpose of modeling?***
   a) Prediction
   b) Design
   c) Diagnostics
   d) making systems more complex

Lesson 35:

1. ***The process of forming a hypothesis based on observations is called:***
   a) Deduction
   b) Induction
   c) Abduction
   d) Translation
2. ***A system is defined as:***
   a) A single object only
   b) A collection of interconnected processes
   c) Always a physical machine
   d) Something without inputs
3. ***A model represents:***
   a) Approximate behavior of a real system
   b) Random data

c) The exact laws of nature
d) Only physical systems

4. ***The two most important variables in system modeling are:***
a) Heat and sound
b) Height and width
c) Mass and weight
d) Input and output

Lesson 36:

1. ***High precision means:***
a) Close to true value
b) Correct without error
c) Both accurate and correct
d) Results are consistent with each other

2. ***Physiological modeling begins with:***
a) Guessing blindly
b) Experimental observations
c) Computer programming
d) Human opinions

3. ***If a model fails accuracy tests, we must:***
a) Ignore the data
b) Stop modeling
c) Refine the model and run new experiments
d) Change the output

4. ***The model is accepted only when:***
a) It matches data adequately
b) It looks nice
c) It is very long
d) It has many equations

Lesson 37:

1. ***Input of a system is:***
a) The result of the system
b) Information entering the system
c) Noise
d) A random value

2. ***Output of a system is:***
a) The signal after processing
b) The external environment
c) Always voltage
d) The same as input

3. ***A major challenge in biological I/O measurement is:***
   a) Unlimited access to organs
   b) No effect on patient comfort
   c) Cheap equipment
   d) Inaccessibility of crucial variables

4. ***Patient comfort mainly depends on:***
   a) The color of equipment
   b) Level of invasiveness
   c) Size of the room
   d) Duration of experiment

Lesson 38 & 39:

1. ***Physiological system modeling dates back to:***
   a) *2000 AD*
   b) Ancient Greek philosophers
   c) Only the 20th century
   d) Only after computers

2. ***Alcmaeon of Croton believed the center of understanding was:***
   a) Heart
   b) Liver
   c) Brain
   d) Lungs

3. ***Hodgkin and Huxley (1952) developed models for:***
   a) Electrical activity of neurons
   b) Kidney filtration
   c) Lung capacity
   d) Digestion

4. ***Thales believed the basic substance of the universe was:***
   a) Fire
   b) Air
   c) Water
   d) Earth

5. ***The four-element theory (water, earth, air, fire) was pr oposed by:***
   a) Empedocles
   b) Hippocrates
   c) Galen
   d) Anaximander

6. ***Hippocrates' humoral theory stated humans contain:***
   a) Four elements
   b) Four humors

c) Only blood
d) Only bile

7. **Galen emphasized:**
   a) Perfect symmetry
   b) The importance of environment for surviva l
   c) That modeling is unnecessary
   d) That only the heart controls the body

Lesson 40:

1. **The first known biomedical mathematical model was published by:**
   a) Hodgkin & Huxley
   b) Krogh and Erlang
   c) Noble
   d) Wiggers

2. **Hodgkin–Huxley model describes:**
   a) Blood circulation
   b) Digestion
   c) Lung ventilation
   d) Cellular electrical activity

3. **Hodgkin & Huxley received the Nobel Prize in:**
   a) 1928
   b) 1952
   c) 1963
   d) 1990

4. **The first cardiac Purkinje fiber model was presented by:**
   a) Noble
   b) Krogh
   c) Wiggers
   d) Erlang

Lesson 41

1. **Before digital computers, biomedical models were:**
   a) Extremely accurate
   b) Oversimplified or hand-calculated
   c) Never used
   d) Fully automated

2. **The major turning point in worldwide modeling collaboration was:**
   a) Printing press
   b) Discovery of DNA
   c) The internet boom
   d) Discovery of antibiotics

3. ***Since the 1990s, the terms modeling & simulation became almost:***
   a) Synonymous
   b) Opposites
   c) Irrelevant
   d) Prohibited

4. ***Modern models are more realistic because:***
   a) They ignore data
   b) They use grid computing & high computer power
   c) They avoid programming
   d) They only use hand calculations

Lesson 42:

1. ***The Physiome Project was proposed to IUPS in:***
   a) 1952
   b) 1993
   c) 2006
   d) 2010

2. ***Physiome refers to:***
   a) Only anatomy
   b) Only genome
   c) Quantitative description of whole or ganism function
   d) Chemical reactions only

3. ***Morphome includes:***
   a) Anatomy, biochemical composition & material properties
   b) Only psychology
   c) Only physiology
   d) Weather patterns

4. ***Human physiome is also called:***
   a) Virtual human
   b) Artificial genome
   c) Bio-robot
   d) Meta-protein

Lesson 43:

1. ***The Physiome Project aims to model:***
   a) Only molecules
   b) Only humans
   c) Organisms from bacteria to man
   d) Only plants

2. ***A major feature of the Physiome Project is:***
   a) Hiding data

b) Databasing experimental observations
c) Eliminating computation
d) Reducing internet use

3. ***Physiomics deals with:***
a) Integration of genome, proteome, metabolome in organisms
b) Only anatomy
c) Only proteins
d) Only mathematical formulas

4. ***Physiome Project data will be available through:***
a) Private paid servers only
b) Internet public access
c) USB drives
d) Newspapers

Lesson 44:

1. ***The Physiome concept assumes biology is explainable through:***
a) Religion
b) Magic
c) Physics and chemistry
d) Astrology

2. ***Vitalism is considered:***
a) A historical belief
b) Essential for physiome
c) Modern science
d) A proven theory

3. ***Physiome explanations must be expressed as:***
a) Stories
b) Emotional descriptions
c) Guesswork
d) Mathematical models

4. ***Physiome strategies must first satisfy:***
a) Patients
b) Clinicians
c) Pure scientists
d) Journalists

Lesson 45:

1. ***Biology is described as:***
a) Single-scale
b) Multiscale

c) Non-scientific
d) Purely molecular

2. ***Myocardial excitation depends on:***
   a) Only genes
   b) Only proteins
   c) Cell fiber direction and cell-to-cell coupling
   d) Random factors

3. ***Stretching of cells affects:***
   a) Hair growth
   b) Conductance channels & action potentials
   c) Bone density
   d) Memory

4. ***The Physiome Project is:***
   a) A short-term project
   b) A temporary study
   c) A very long-term effort
   d) A finished project

Lesson 46:

1. ***Organs such as heart and lungs are:***
   a) Simple
   b) Single-level
   c) Complex and multiscalar
   d) Not important

2. ***Modeling at organ and system levels uses:***
   a) Poetry
   b) Paintings
   c) Astrology
   d) Differential equations

3. ***A major reward of physiome modeling is:***
   a) Confusion
   b) Health improvement & understanding nature
   c) Entertainment
   d) Destroying data

4. ***The central physiological concept underlying Physiome is:***
   a) Homeostasis
   b) Vitalism
   c) Chaos
   d) Randomness

Lesson 47:

1. ***Physiome databases aim to cover:***
   a) Only humans
   b) Only microbes
   c) All of biology
   d) No living things

2. ***The gene (4 letters) and amino acid (20 letters) alphabets:***
   a) Are enough for physiome databases
   b) Cannot serve as the full database backbone
   c) Replace all physiological data
   d) Are no longer used

3. ***A complete individual physiome database includes:***
   a) Only genome
   b) Only diet patterns
   c) Genome, proteome, morphome & physicochemical status
   d) Only tissue images

4. ***Functional models eventually aim to:***
   a) Entertain users
   b) Predict health issues
   c) Replace doctors
   d) Ignore physiology

Lesson 50:

1. ***The last 50 years of molecular biology mainly provided:***
   a) Full-body integration models
   b) A detailed parts list for life
   c) Clinical treatment plans
   d) Engineering designs

2. ***What helps integrate biological parts into whole -body understanding?***
   a) Astrology
   b) Philosophy alone
   c) Mathematics, physics, computing, engineering
   d) Guesswork

3. ***Engineering contributes to biology by:***
   a) Making drugs
   b) Reducing cell growth
   c) Eliminating lab experiments
   d) Providing systematic, multiscale modelling

4. ***Major diseases like cancer and neurological disorders are:***
   a) Complex and multilevel
   b) Only genetic

c) Simple
d) Entirely environmental

5. ***Integrating all biological components into computer models will help create*** *:*
   a) Entertainment apps
   b) New therapies and diagnostic tools
   c) Fashion trends
   d) Random predictions

6. ***Global research institutions are contributing to:***
   a) Gaming technology
   b) Social media platforms
   c) Online computational modelling of human biology
   d) Weather forecasting only

7. ***The VPH/Physiome Project ultimately aims to build:***
   a) A virtual robot
   b) A virtual physiological human
   c) Geological maps
   d) Space travel systems

8. ***The virtual physiological human will be:***
   a) A standard generic model
   b) Only for hospitals
   c) Only for animals
   d) A personalised 3-D model of each individual

9. ***Clinicians will use virtual individuals to:***
   a) Teach basic math's
   b) Play simulation games
   c) Trial drugs and personalize medicine
   d) Replace all surgeries

10. ***Virtual surgery allows clinicians to:***
    a) Perform operations on robots
    b) Predict outcomes before real surgery
    c) Avoid medical practice
    d) Only treat skin diseases

Lesson 51 & 52:

1. ***Large scale biological modeling requires****:*
   a.Only one expert
   b. Involvement of many lab groups
   c. No collaboration
   d. Only computer scientists

2. ***The breadth of scientific knowledge from genomics to whole organism function means:***
   a.One expert can cover everything
   b. everyone should work alone
   c. No one can be expert in every aspect
   d. everyone should work alone

3. ***Databasing systems and modeling projects are recommended for:***

   a.Ending the Physiome Project
   b. Clinical trials only
   c. Entertainment purposes
   d. initiating the Physiome Project

4. ***According to Dao and Dewey (2000), databasing involves issues related to:***
   a.Semantics and technology of biology
   b. Sports
   c. Only physics
   d. Only mathematics

5. ***Experimental data in large-scale modeling are:***
   a.Optional
   b. Not required
   c. Critical
   d. Preventive

6. ***Subtargets within each area allow:***
   a.No independence
   b. Fully independent modeling
   c. Partially independent development
   d. No collaboration

7. ***Breaking a system into small components helps because:***
   a.It increases complexity
   b. It minimizes interactions
   c. It stops modeling
   d. It removes hierarchy

8. ***Modeling stages include all EXCEPT:***
   a.Schema of relationships
   b. defining characteristics
   c. Quantitation of kinetics
   d. Building random models

9. ***Inputs and outputs of submodules are also called:***
   a. Keys
   b. Gates

c. Hooks
d. Codes

10. **The influence of one submodule on another is handled through:**
    a. Hidden pathways
    b. These variables (inputs/outputs)
    c. Random links
    d. No connections

11. **The original developer of a submodule is considered its:**
    a. Destroyer
    b. Caretaker
    c. Competitor
    d. Owner without responsibility

12. **Curation and maintenance of submodules require:**
    a. No effort
    b. Another level of effort
    c. Stopping collaboration
    d. Only clinical knowledge

13. **Distribution efforts require writing code that is:**
    a. Proprietary only
    b. Hidden
    c. Encrypted
    d. Standard and accessible

14. **Preparing test solutions helps new users:**
    a. To verify correct implementation
    b. To avoid modeling
    c. To learn programming only
    d. To ignore errors

Lesson 53:

1. **The VPH initiative mainly focuses on:**
    a. Entertainment technology
    b. Personalised prediction and optimisation of treatment
    c. Designing new organs
    d. Space research

2. **A major challenge in understanding the human body is:**
    a. Lack of computers
    b. Poor lab equipment
    c. No medical knowledge
    d. Understanding how all components work together

3. ***Computer models today can simulate:***
   a. Only bones
   b. Only digestion
   c. A beating heart and its response to trauma
   d. Only the nervous system

4. *The Virtual Physiological Human initiative aims to:*
   a. Delete patient data
   b. Integrate all patient information into predictive computer models
   c. Replace doctors
   d. Build robots

5. ***VPH intends to predict:***
   a. Patient's future health under certain conditions
   b. Weather
   c. Stock market trends
   d. None of the above

Lesson 54:

1. ***The biggest problem faced when trying to understand life is:***
   a. Lack of interest
   b. Complexity
   c. Expensive machinery
   d. Too many researchers

2. ***Dividing a complex problem into smaller parts is known as:. a.Evolution***
   b. Simulation
   c. Reductionism
   d. Mutation

3. ***Reductionism worked for many years but now fails because:***
   a.Body parts have very little in common and work through interactions
   b. Too many scientists
   c. Computers stopped evolving
   d. Cells became simpler

4. ***The best hope for dealing with complexity in modern biology is:***
   a. More microscopes
   b. Guesswork
   c. Dissection
   d. Computer simulations

5. ***The complete model built using simulations of all body parts and interactions is called:***
   a. ATP
   b. DNA sequence

c. VPH
d. MRI

6. **VPH represents a shift from personalised medicine to:**
   a. Ancient medicine
   b. artificial organs
   c. Individualized medicine
   d. Chemical medicine

Lesson 55:

1. **The Cardiovascular system is suitable for modeling because:**
   a. It has no complexity
   b. It has a long history of quantitative data
   c. It is not important
   d. It is small in size

2. **The Cardiome Project aims to build:**
   a. A visualisable, interactive model of the normal heart
   b. A robotic heart
   c. A new surgery technique
   d. Artificial blood

3. **The Cardiome describes:**
   a. Only heart diseases
   b. Only heart anatomy
   c. functioning of the normal heart in quantitative, testable form
   d. Only blood pressure

4. **The Cardiome Project is a:**
   a. Single lab project
   b. Large-scale multidisciplinary effort
   c. One-person experiment
   d. Short-term study

5. **Cardiome involves contributions from:**
   a. Only cardiologist's
   b. Only engineers
   c. Physicians, computer scientists, pharmacologists, elect rophysiologists, biomedical engineers
   d. Only students

6. **The Cardiome covers fields such as:**
   a. Transport in blood vessels
   b. Electrophysiology
   c. Metabolism

d. All of the above

Good Luck ☺