

CBT JANUARY 2026
CLASS – XI: BIOLOGY

GENERAL INSTRUCTION :

SCORE AND REVIEW OF ALL THE QUESTIONS WILL BE PROVIDED IN THE EMAIL TO ALL THE STUDENTS ON NEXT DAY AND AFTER CLOSING OF QUIZ TIME.

IMPORTANT : ALL THE STUDENTS SHOULD FILL THE CORRECT SCHOOL NAME FROM DROP DOWN BUTTON

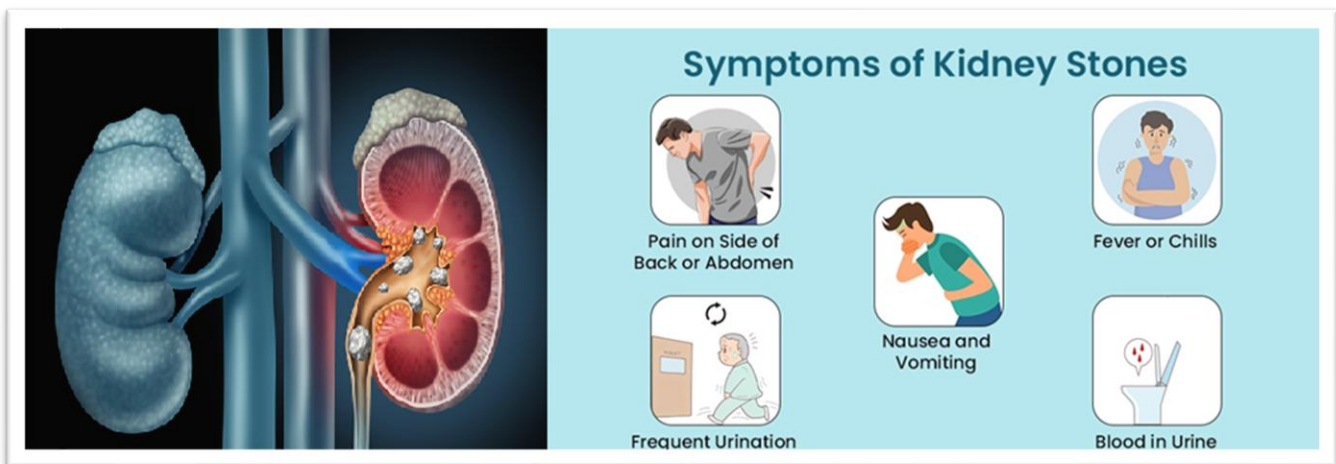
CHAPTERS COVERED:

Chapter 16: Excretory Products and Their Elimination

Chapter 17: Locomotion and Movement

Question 1: A Painful Diagnosis

A 45-year-old patient presents to the emergency room with severe, intermittent pain in his lower back that radiates towards the groin. He also reports nausea. An ultrasound scan reveals a dense, crystalline mass lodged in his right ureter, causing a blockage. Lab analysis of his urine shows microscopic blood and high levels of calcium and oxalate crystals.



1. The medical term for the dense, crystalline mass described in the case is:

- (a) Glomerulonephritis
- (b) Uremia
- (c) Renal Calculi
- (d) Pyelonephritis

Answer: (c) Renal Calculi

Explanation: Renal calculi, or kidney stones, are insoluble masses of crystallized salts (like calcium oxalate) that form within the kidney and can get lodged in the urinary tract, as described.

2. A doctor advises the patient to avoid foods like spinach, beetroots, and certain nuts. This dietary advice is aimed at:

- (a) Increasing the pH of the urine
- (b) Decreasing the concentration of oxalates in the filtrate
- (c) Increasing the Glomerular Filtration Rate
- (d) Decreasing the reabsorption of water in the collecting duct

Answer: (b) Decreasing the concentration of oxalates in the filtrate

Explanation: Spinach, beetroots, and nuts are rich in oxalates. Consuming them

increases the oxalate concentration in the blood, which is then filtered into the renal tubules. A higher concentration of oxalate in the filtrate increases the likelihood of it combining with calcium to form calcium oxalate stones.

3. If such a condition becomes chronic and leads to complete, irreversible kidney failure, the patient would require which long-term treatment to remove urea from the blood?

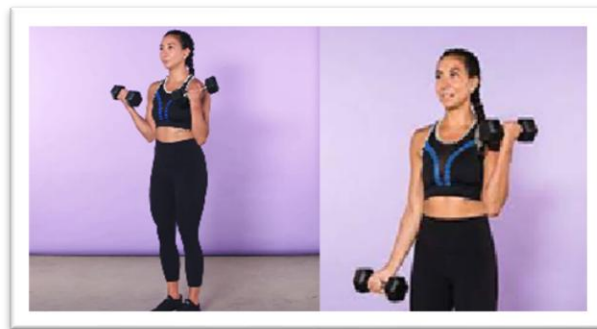
- (a) Kidney Transplantation
- (b) Hemodialysis
- (c) Diuretic therapy
- (d) Lithotripsy

Answer: (b) Hemodialysis

Explanation: Hemodialysis is the process of using an "artificial kidney" to filter nitrogenous wastes like urea from the blood when the patient's own kidneys fail. While kidney transplantation (a) is a cure, hemodialysis is the more common long-term management procedure. Lithotripsy is a treatment to break up existing stones, not for kidney failure.

Question 2: The Gym Workout

Priya is at the gym performing bicep curls with a dumbbell. As she lifts the weight, she can feel her biceps brachii muscle tense and shorten. The movement is controlled and deliberate. After several sets of repetitions, her muscle begins to feel a burning sensation and fatigues, making it difficult to lift the weight. The signal for each contraction originates from her central nervous system.



1. The "burning sensation" Priya feels during fatigue is primarily due to the accumulation of which substance from anaerobic metabolism?

- (a) Acetylcholine
- (b) Uric Acid
- (c) Lactic Acid
- (d) Creatine Phosphate

Answer: (c) Lactic Acid

Explanation: During intense exercise, the demand for ATP exceeds the supply from aerobic respiration. The muscle cells switch to anaerobic glycolysis to produce ATP quickly. A byproduct of this process is lactic acid, which accumulates in the muscle, lowers the pH, and contributes to the sensation of burning and fatigue.

2. The release of which ion from the sarcoplasmic reticulum is the final trigger that directly initiates the binding of myosin to actin?

- (a) Sodium (Na^+)

- (b) Potassium (K^+)
- (c) Calcium (Ca^{2+})
- (d) Chloride (Cl^-)

Answer: (c) Calcium (Ca^{2+})

Explanation: An action potential traveling down the T-tubules triggers the sarcoplasmic reticulum to release its stored calcium ions (Ca^{2+}) into the sarcoplasm. These Ca^{2+} ions then bind to troponin, causing a conformational change that moves tropomyosin away from the active sites on the actin filaments, allowing the myosin heads to bind.

3. Assertion (A): Each muscle contraction requires the hydrolysis of ATP.

Reason (R): The binding of a new ATP molecule to the myosin head is required for the detachment of the cross-bridge from the actin filament.

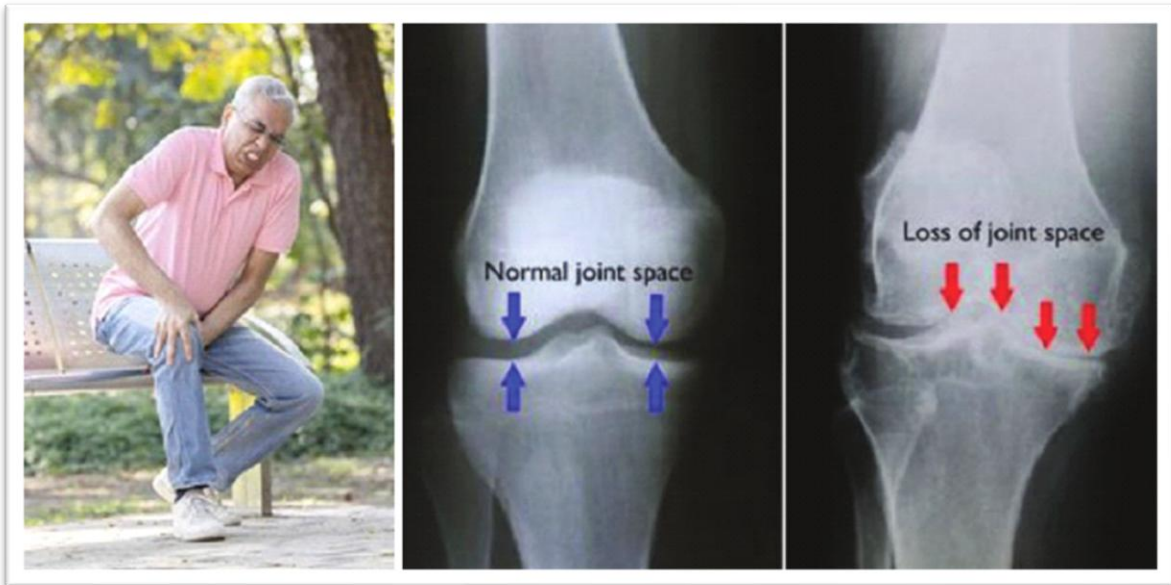
- (a) Both A and R are true and R is the correct explanation of A.
- (b) Both A and R are true but R is not the correct explanation of A.
- (c) A is true but R is false.
- (d) A is false but R is true.

Answer: (b) Both A and R are true but R is not the correct explanation of A.

Explanation: Both statements are true facts about the cross-bridge cycle. The hydrolysis of ATP (to ADP + Pi) energizes the myosin head for the power stroke (Assertion). The binding of a *new* ATP molecule causes the myosin head to detach from actin (Reason). However, the reason (detachment) does not explain the assertion (energy for contraction). They are two distinct, sequential steps in the same cycle that both involve ATP.

Question 3: An Elderly Patient's Knee Pain

A 70-year-old man complains of deep, aching pain and stiffness in both of his knees, which is worse after periods of rest, like in the morning. He finds it difficult to walk for long distances. An X-ray of his knees reveals a narrowing of the joint space and signs of degradation of the smooth, white tissue covering the ends of the femur and tibia. The doctor diagnoses him with osteoarthritis.



1. The joints in the knee, affected in this patient, are an example of which type of joint?

- (a) Fibrous joint
- (b) Cartilaginous joint

- (c) Synovial joint
- (d) Pivot joint

Answer: (c) Synovial joint

Explanation: The knee is a classic example of a synovial joint (specifically, a hinge type). These joints are characterized by a fluid-filled synovial cavity, allow for considerable movement, and have their bone ends covered by articular cartilage, which is the tissue being degraded in this patient. A pivot joint is a *type* of synovial joint, but 'synovial' is the major structural classification.

2. The "smooth, white tissue" that is degrading is the articular cartilage. What is its primary function in a healthy joint?

- (a) To secrete synovial fluid
- (b) To provide a smooth, low-friction surface for movement and to absorb shock
- (c) To bind the bones together tightly
- (d) To provide a rich blood supply to the bone ends

Answer: (b) To provide a smooth, low-friction surface for movement and to absorb shock

Explanation: Articular (hyaline) cartilage is a firm, rubbery, and smooth tissue that covers the ends of bones in a synovial joint. Its main roles are to reduce friction between the bones during movement and to act as a cushion to absorb the compressive forces of activities like walking and running.

3. The degradation of this tissue directly leads to pain and stiffness because:

- (a) The synovial fluid leaks out of the joint capsule.
- (b) Nerves within the cartilage become exposed and irritated.
- (c) The underlying bone ends become exposed and rub against each other, causing friction and inflammation.
- (d) The muscles surrounding the joint become permanently contracted.

Answer: (c) The underlying bone ends become exposed and rub against each other, causing friction and inflammation.

Explanation: Cartilage itself has no nerves, so its degradation isn't directly painful. The pain arises when the cartilage wears away, leaving the bone ends unprotected. The rough surfaces of the bones then grind against each other, causing friction, inflammation (synovitis), and pain.

4. Assertion (A): The patient's condition, Osteoarthritis, is an autoimmune disorder.

Reason (R): In autoimmune disorders, the body's immune system mistakenly attacks its own tissues.

- (a) Both A and R are true and R is the correct explanation of A.
- (b) Both A and R are true but R is not the correct explanation of A.
- (c) A is true but R is false.
- (d) A is false but R is true.

Answer: (d) A is false but R is true.

Explanation: Reason (R) provides a correct definition of an autoimmune disorder. However, Assertion (A) is false. Osteoarthritis is a degenerative or "wear-and-tear" disease, not an autoimmune one. Rheumatoid arthritis is the common form of arthritis that is autoimmune. This question tests the ability to differentiate between types of joint disorders.