SAMPLE PURPOSES ONLY

ATU\_11\_bio\_ch19\_tq19\_5\_1\_Retire

This document will have:

* TQ Summary (answer to the TQ)
* NOTES is the expansive version -- it leaves nothing significant out.
* REVISE Questions
* PRACTICE questions

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| **Class** | **Subject** | **Ch No.** | **Ch Name** | **TP Name** | **TQ Name** | **TP No.** | **TQ No.** | **Micro Concepts** | **Media Type** |
| 11 | Biology | 19 | Excretory Products and their Elimination | Micturition and Role of Other Organs in Excretion | How do lungs, liver and skin help in excretion? | 19\_5 | 19\_5\_1 | Micturition and the role of lungs, liver and skin in excretion | Retire |

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| **SUMMARY** |
| **How do lungs, liver and skin help in excretion?**   * Micturition is the process of release of urine which is caused by the neural mechanism. This is called the “micturition reflex”. * Ammonia is the most toxic form. * This requires a large amount of water for its elimination. * Uric acid is the least toxic. * It can be removed with a minimum loss of water. * Kidneys are the main organs for excretion. * But there exist various other organs which also help in the process of excretion apart from kidneys. * Organs like “lungs and liver” and sense organs like “skin” also help in the excretion process by removing certain harmful and toxic substances from the human body. * Lungs help in the removal of carbon dioxide as well as water. * The liver also helps in the removal of steroid hormones, drugs, vitamins as well as bile pigments. * These sense organs' skills play a very crucial role in the process of excretion with the help of sweat and sebaceous glands. * It releases certain harmful products from the body. |

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| **TQ Notes** |
| **How do lungs, liver and skin help in excretion?**  **Screen 1 (Title): Micturition**   * The nephron forms urine which is ultimately carried to the urinary bladder. * It is stored there until a voluntary signal is given by the CNS or central nervous system. * When the urinary bladder gets filled with urine, a signal is initiated by the stretching of the urinary bladder. * In response, a signal is sent by the stretch receptors on the walls of the urinary bladder to the central nervous system. * The central nervous system (CNS) then gives motor messages to initiate the contraction of smooth muscles of the bladder and relaxation of the urethral sphincter. * This results in the release of urine. * This process of release of urine is termed micturition which is caused by the neural mechanism called “micturition reflex”.   **Screen 2 (Title): Urine**   * On average, an adult human excretes about one litre of urine in a day. * Urine is a light yellow coloured watery fluid that is slightly acidic. * It has a characteristic odour. * It is a fact that an average healthy human excretes 25-30 grams of urea per day**.** * The characteristics of urine can be changed due to various factors. * Thus, the analysis of urine helps in the diagnosis of several metabolic disorders or malfunctioning of the kidney. * For example, if ketone bodies (Ketosuria) and glucose (Glycosuria) are present in urine, it indicates “diabetes mellitus”.   **Screen 3** (**Title): Role of lungs in excretion**   * Our lungs are well developed to remove a large amount of carbon dioxide (two hundred millilitres/minute). * This also removes significant quantities of water every day in normal resting conditions. * Loss or removal of water occurs through the lungs is small in places that generally have a hot and humid climate. * The water loss is large in habitats or places that have a cold and dry climate.   **Screen 4** (**Title): Role of lungs in excretion (Contd…)**   * The rate by which the ventilation occurs along with the form of ventilation pattern plays a vital role in the water loss through the lungs. * A large number of volatile materials are also frequently removed with the help of the lungs.   **Screen 5 (Title): Role of liver in excretion**   * The liver is the largest gland of our body. * It is the main site for the elimination of cholesterol, bile pigments, degraded steroid hormones, drugs and many vitamins. * The liver excretes all the substances in the form of bile. * Bile then carries these materials to the intestine. * These are finally eliminated with the help of faeces.   **Screen 6 (Title): Role of skin in excretion**   * The sweat and sebaceous glands in the skin eliminate certain substances through their secretions are sweat and sebum, respectively. * Sweat is produced by sweat glands. * This is a type of watery fluid and contains sodium chloride, small amounts of urea, amino acids (lactic acid), glucose, etc. * The major and most significant function of sweat is to provide a cooling effect on the body surface. * It also removes some of the excretory wastes.   **Screen 7 (Title): Role of skin in excretion (Contd…)**   * Sebaceous glands secrete certain substances. * For example, hydrocarbons, waxes, and sterols with the help of sebum. * Sebum is a kind of waxy protective secretion and its function is to provide a protective oily covering around the skin of humans. |

**Total Questions: 6+ 10**

**REVISE:**

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| **Construct** | **Micro-concept** | **Bloom’s level** | **Difficulty Level** | **Question Tag** | **Question Type** | **Marks** |
| **Foundational Facts** | Micturition and the role of lungs, liver and skin in excretion | Recall | Easy | Revise | Open-ended | 3 |
| Q1. List the excretory products removed by the lungs.  **Answer:** | | | | | |  |
| * Lungs are well developed to remove various substances like water. | | | | | | 1 |
| * Lungs help to remove carbon dioxide. | | | | | | 1 |
| * Lungs also help in removing volatile substances. | | | | | | 1 |

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| **Construct** | **Micro-concept** | **Bloom's level** | **Difficulty Level** | **Question Tag** | **Question Type** | **Marks** |
| **Foundational Facts** | Micturition and the role of lungs, liver and skin in excretion | Recall | Average | Revise | Open-ended | 3 |
| Q2. List a few characteristics of Urine.  **Answer:** | | | | | |  |
| * Urine is formed yellow due to the presence of pigment named “Urochrome”. | | | | | | 1 |
| * Urine is generally slightly acidic. | | | | | | 1 |
| * An average healthy person excretes one to one and a half litres of urine per day. | | | | | | 1 |

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| **Construct** | **Micro-concept** | **Bloom's level** | **Difficulty Level** | **Question Tag** | **Question Type** | **Marks** |
| **Core Ideas** | Micturition and the role of lungs, liver and skin in excretion | Comprehension | Average | Revise | Open-ended | 3 |
| Q3. Explain briefly how the liver helps in the process of excretion.  **Answer:** | | | | | |  |
| * The liver is the largest gland of our body. * It plays a very crucial role in the removal of bile pigments, degraded steroid hormones, drugs and many vitamins. | | | | | | 1 |
| * The liver excretes all the substances in the form of bile. | | | | | | 1 |
| * Bile then carries these materials to the intestine, which are finally eliminated with the help of faeces. | | | | | | 1 |

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| **Construct** | **Micro-concept** | **Bloom’s level** | **Difficulty Level** | **Question Tag** | **Question Type** | **Marks** |
| **Core Ideas** | Micturition and the role of lungs, liver and skin in excretion | Comprehension | Average | Revise | Open-ended | 5 |
| Q4. Explain the phenomenon of the “Micturition Reflex”.  **Answer:** | | | | | |  |
| * Nephron helps in the formation of urine. * This is eventually carried to the urinary bladder, where it is stored until a voluntary signal is given by the central nervous system. | | | | | | 1 |
| * When urine is filled in the urinary bladder, stretching occurs in the urinary bladder. | | | | | | 1 |
| * In response, the stretch receptors on the walls of the urinary bladder convey a signal to the central nervous system. | | | | | | 1 |
| * The central nervous system delivers motor messages to start the shrinkage of smooth muscles of the bladder and relaxation of the urethral sphincter causing the release of urine. | | | | | | 1 |
| * Micturition is the process of release of urine and the neural mechanism is the source of it * So, this process is called the “micturition reflex”. | | | | | | 1 |

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| **Construct** | **Micro-concept** | **Bloom's level** | **Difficulty Level** | **Question Tag** | **Question Type** | **Marks** |
| **Core Ideas** | Micturition and the role of lungs, liver and skin in excretion | Comprehension | Difficult | Revise | Open-ended | 5 |
| Q5. Elaborate in detail on the role of skin in excretion.  **Answer:** | | | | | |  |
| * The sweat and sebaceous glands in the skin can remove some substances through their secretions are sweat and sebum consequently. | | | | | | 1 |
| * Sweat which is produced by sweat glands, is a type of watery fluid. * It contains sodium chloride, small amounts of urea, amino acids and glucose. | | | | | | 1 |
| * Sweat plays a very crucial role in cooling the surface of the body, but it also helps in removing excretory products. | | | | | | 1 |
| * Sebaceous glands secrete certain substances. * For example, hydrocarbons, waxes, and sterols with the help of sebum. | | | | | | 1 |
| * Sebum is a kind of waxy protective secretion. * Its function is to provide a protective oily covering around the skin of humans. | | | | | | 1 |

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| **Construct** | **Micro-concept** | **Bloom's level** | **Difficulty Level** | **Question Tag** | **Question Type** | **Marks** |
| **Core Ideas** | Micturition and the role of lungs, liver and skin in excretion | Comprehension | Difficult | Revise | Open-ended | 5 |
| Q6. Kidneys are the prominent excretory organs but these are supported by various other subordinate organs. Elaborate the statement in detail.  **Answer:** | | | | | |  |
| * Kidneys are the major organs of excretion in the human body. * But these are also supported by various subordinate organs. * For example-liver, lungs etc. | | | | | | 1 |
| * Lungs help in removing a large amount of carbon dioxide. * It also removes significant quantities of water every day in a normal healthy human. | | | | | | 1 |
| * The liver is the largest gland of our body. * It helps in the removal of cholesterol, bile pigments and vitamins. | | | | | | 1 |
| * Skin plays a very crucial role in the excretion of harmful waste products with the help of sweat and sebaceous glands present in it. | | | | | | 1 |
| * The sweat glands secrete a watery fluid which is known as sweats and along with it excretes urea, excess glucose as well as amino acids. | | | | | | 1 |

**PRACTICE:**

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| Difficulty levels/Bloom’s Levels | Recall | Comprehension | Application | HOTS |
| Easy | 1 X 1 | 1 X 1 | 1 X 2 |  |
| Average | 1 X 1 | 1 X 1 | 1 X 2 | 1 X 2 |
| Difficult | 1 X 1 | 1 X 1 | 1 X 4 |  |
| **Total Marks** | 3 Marks | 3 Marks | 8 Marks | 2 Marks |

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| **Construct** | **Micro-concept** | **Bloom’s level** | **Difficulty Level** | **Question Tag** | **Question Type** | **Total Marks** |
| **Foundational Facts** | Micturition and the role of lungs, liver and skin in excretion | Recall | Easy | Practice, Assessment | MCQ | 1 |
| Q1. What is the excretory product of sebaceous glands termed? | | | | | | |
| **Options** | **Feedback** | | | | | **Marks** |
| Sebum | * The excretory product of sebaceous glands is **sebum**. * This is an oily substance produced in sebaceous glands. * It mixes with molecules to form a protective layer on the skin surface. | | | | | 1 |
| Mucus |  | | | | | 0 |
| Sweat |  | | | | | 0 |
| Blood |  | | | | | 0 |

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| **Construct** | **Micro-concept** | **Bloom’s level** | **Difficulty Level** | **Question Tag** | **Question Type** | **Total Marks** |
| **Foundational Facts** | Micturition and the role of lungs, liver and skin in excretion | Recall | Average | Practice, Assessment | MCQ | 1 |
| Q2. Which of the following is the correct composition of Sweat? | | | | | | |
| **Options** | **Feedback** | | | | | **Marks** |
| Sodium Chloride, lactic acid and small amounts of urea | * Sweat is produced by sweat glands. * This is a type of watery fluid. * It contains **sodium chloride**, small amounts of urea, amino acids and glucose. * Hence, the correct answer is-**Sodium Chloride, lactic acid and small amounts of urea.** | | | | | 1 |
| Acetic acid, Sodium chloride and small amounts of urea |  | | | | | 0 |
| Ascorbic acid and urea |  | | | | | 0 |
| Sodium chloride, Lactic Acid and a large amount of urea. |  | | | | | 0 |

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| **Construct** | **Micro-concept** | **Bloom’s level** | **Difficulty Level** | **Question Tag** | **Question Type** | **Total Marks** |
| **Foundational Facts** | Micturition and the role of lungs, liver and skin in excretion | Recall | Difficult | Practice, Assessment | MCQ | 1 |
| Q3. Which of the following pigments is responsible for the unique yellow colouration of human urine? | | | | | | |
| **Options** | **Feedback** | | | | | **Marks** |
| Urochrome | * Urine has yellow colour due to the presence of **Urochrome** in it. * Urine is a watery fluid that is slightly acidic. * It has a characteristic odour. * It is a fact that an average healthy human excretes 25-30 grams of urea per day**.** * The characteristics of urine can be changed due to various factors. | | | | | 1 |
| Uric acid |  | | | | | 0 |
| Urea |  | | | | | 0 |
| Melanin |  | | | | | 0 |

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| **Construct** | **Micro-concept** | **Bloom’s level** | **Difficulty Level** | **Question Tag** | **Question Type** | **Total Marks** |
| **Core Ideas** | Micturition and the role of lungs, liver and skin in excretion | Comprehension | Easy | Practice, Assessment | MCQ | 1 |
| Q4. Under which of the following conditions do the lungs remove less amount of water? | | | | | | |
| **Options** | **Feedback** | | | | | **Marks** |
| A hot and humid climate | * Loss or removal of water that occurs through the lungs. * Loss of water is small in places that generally have **a hot and humid climate.** * The water loss is large in habitats or places that have a cold and dry climate. * Hence, the correct answer is **a hot humid climate.** | | | | | 1 |
| The cold and dry climate |  | | | | | 0 |
| Cold and humid climate. |  | | | | | 0 |
| Permafrost and wet climate |  | | | | | 0 |

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| **Construct** | **Micro-concept** | **Bloom’s level** | **Difficulty Level** | **Question Tag** | **Question Type** | **Total Marks** |
| **Core Ideas** | Micturition and the role of lungs, liver and skin in excretion | Comprehension | Average | Practice, Assessment | MCQ | 1 |
| Q5. Which of the following mentioned below is the primary and most significant function of sweat released by sweat glands? | | | | | | |
| **Options** | **Feedback** | | | | | **Marks** |
| Cooling | * Sweat is produced by sweat glands. * This is a type of watery fluid and contains in it sodium chloride, small amounts of urea, amino acids (lactic acid), glucose, etc. * The major and most significant function of sweat is to provide a **cooling** effect on the body surface. * It also helps in removing waste products from the body. * Hence, the correct answer is- **cooling.** | | | | | 1 |
| Heating |  | | | | | 0 |
| Circulation |  | | | | | 0 |
| Excretion of a few products |  | | | | | 0 |

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| **Construct** | **Micro-concept** | | **Bloom’s level** | **Difficulty Level** | **Question Tag** | **Question Type** | **Total Marks** |
| **Critical Thinking** | Micturition and the role of lungs, liver and skin in excretion | | Comprehension | Difficult | Practice, Assessment | MCQ | 1 |
| Q6. In the question given below, there are two statements marked as Assertion (A) and Reason (R). Read the statements and choose the correct option.  Assertion (A): When the process of micturition occurs in the body, urine is inhabited to backflow.  Reason (R): The Backflow is prevented due to the contraction of the Urethral Sphincters. | | | | | | | |
| **Options** | | **Feedback** | | | | | **Marks** |
| A is true, but R is false | | * The micturition is the process of evacuation of the formed urine from the bladder from time to time. * Because the terminal part of each ureter passes obliquely through the bladder wall and is consequently closed due to the compression by the contracting bladder muscles, urine is prevented from flowing back to the ureters. * When a sufficient amount of urine is stored in the urinary bladder, it raises its pressure adequately, are spontaneous nervous reflex is initiated and this causes the smooth muscles of the bladder wall to contract and the urethral sphincter to relax. * Hence, **A is true, but R is false.** | | | | | 1 |
| A is false, but R is true | |  | | | | | 0 |
| Both A and R are true | |  | | | | | 0 |
| Both A and R are false | |  | | | | | 0 |

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| **Construct** | **Micro-concept** | **Bloom’s level** | **Difficulty Level** | **Question Tag** | **Question Type** | **Total Marks** |
| **Critical Thinking** | Micturition and the role of lungs, liver and skin in excretion | Application | Easy | Practice, Assessment | MCQ | 2 |
| Q7. Which two among the following are the chief products removed by the lungs every day? | | | | | | |
| **Options** | **Feedback** | | | | | **Marks** |
| Carbon dioxide and water | * Human lungs are well developed to remove a large amount of carbon dioxide (two hundred millilitres/minute). * Loss or removal of water occurs through the lungs is small in places that generally have a hot and humid climate. * The water loss is large in habitats or places that have a cold and dry climate. * A large number of volatile materials are also frequently removed with the help of the lungs. * Hence, our lungs are developed to remove a large amount of **carbon dioxide and water** every day in normal resting conditions. | | | | | 2 |
| Sebum and water |  | | | | | 0 |
| Salt and water |  | | | | | 0 |
| Sebum and carbon dioxide |  | | | | | 0 |

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| **Construct** | **Micro-concept** | **Bloom’s level** | **Difficulty Level** | **Question Tag** | **Question Type** | **Total Marks** |
| **Critical Thinking** | Micturition and the role of lungs, liver and skin in excretion | Application | Average | Practice, Assessment | MCQ | 2 |
| Q8. In a marriage function, two men did a competition for drinking water in lesser time. The first man drinks a litre of water and the second man drinks one litre of Sodium Chloride solution. What can one expect after a few lapses of the hour? | | | | | | |
| **Options** | **Feedback** | | | | | **Marks** |
| The volume of urine of the first man will be the same and that of the second man will decrease. | * When one litre of water is taken by a healthy man, he releases an adequate volume of urine. * But when a man drinks salty water, the sodium concentration in the blood will increase and water follows it by osmosis. * So, because of the increase in absorption of the water volume of urine decreases. * Therefore, **the volume of urine of the first man will be the same and that of the second man will decrease.** | | | | | 2 |
| The volume of urine of the first man will be less than that of the second man. |  | | | | | 0 |
| The volume of urine of the first man will be equal to that of the second man. |  | | | | | 0 |
| The first man will produce dilute urine and the second man will also produce dilute urine. |  | | | | | 0 |

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| **Construct** | **Micro-concept** | **Bloom’s level** | **Difficulty Level** | **Question Tag** | **Question Type** | **Total Marks** |
| **Scientific Thinking** | Micturition and the role of lungs, liver and skin in excretion | Application | Difficult | Practice, Assessment | Composite | 4 |
| Q9. During an operation on a patient with excretory system problems, a nephrologist finds that the ureters are blocked due to clots. Also, during operations, to avoid complications, he removed the stretch receptors of the patient.  Based on your understanding, answer the following questions. | | | | | | |
| |  |  |  | | --- | --- | --- | | 1 What are the functional and structural units of our kidneys? | | | | **Options** | **Feedback** | **Marks** | | Nephrons | * **Nephrons** are the functional and structural unit of our kidneys. * It is stored there until a voluntary signal is given by the CNS or central nervous system. * When the urinary bladder gets filled with urine, a signal is initiated by the stretching of the urinary bladder. * Hence, the correct answer is **nephrons.** | 1 | | Neurons |  | 0 | | Introns |  | 0 | | Exons |  | 0 | | 2.   What will happen if ureters are blocked? | | | | **Options** | **Feedback** | **Marks** | | Urine will not pass out of the bladder. | * Ureters connect the urinary bladder to the urethra. * The ureters are 8-10 inches long. * A small amount of urine flows from the ureters into the bladder about every 10-15 seconds. * So, if these are blocked, then the **urine will remain in the bladder and will not pass out.** | 1 | | Urine will easily pass into the bladder. |  | 0 | | Urine will not be formed. |  | 0 | | Urine will be passed into the bladder, but it will contain blood in it. |  | 0 | | 3.  What will be the result of removing the stretch receptors from the patient’s urinary bladder? | | | | **Options** | **Feedback** | **Marks** | | Voluntary control of Micturition will be at a halt. | * When the urinary bladder gets filled with urine, a signal is initiated by the stretching of the urinary bladder. * In response, a signal is sent by the stretch receptors on the walls of the urinary bladder to the central nervous system. * If stretch receptors of the urinary bladders are removed, then Voluntary control of Micturition will stop. * Hence, the correct answer is that **Voluntary control of Micturition will be at a halt.** | 1 | | Urine will not be formed. |  | 0 | | Urine formed will be much concentrated. |  | 0 | | Urine formed will be much dilute. |  | 0 | | 4. Which of the following excretory products is not removed along with the urine? | | | | **Options** | **Feedback** | **Marks** | | Haemoglobin | * **Haemoglobin** is not excreted out along with the urine. * **Haemoglobin** is essential for transferring oxygen in the blood from the lungs to the tissues. * This is a carrier of oxygen and carbon dioxide. * This gives a red colour to the blood. * It also maintains the shape of RBCs. | 1 | | Uric acid |  | 0 | | Ketone bodies |  | 0 | | Urea |  | 0 | | | | | | | |

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| **Construct** | | **Micro-concept** | **Bloom’s level** | **Difficulty Level** | **Question Tag** | **Question Type** | | **Total Marks** |
| **Critical Thinking** | | Micturition and the role of lungs, liver and skin in excretion | HOTS | Average | Practice, Assessment | MCQ | | 2 |
| Q10. In a pathology lab, a pathologist was examining the urine of a patient. He mixed a few drops of Benedict reagent of aqua blue colour in the patient’s Urine sample and placed the mixture over a burner. After a few minutes, he observed that the solution colour turned yellow. What can he infer about the glucose percentage from this experiment? | | | | | | | | |
| **Options** | **Feedback** | | | | | | **Marks** | |
| The patient urine has only one percent glucose in it. | * Benedict test is a very simple and effective method for the diagnosis of diabetes. * When a few drops of Benedict reagent are added to a urine sample and heated gently, the colour of the mixture becomes dark yellow. * A change in colour shows the amount of sugar in the urine. * For example, the blue colour indicates the absence of glucose or sugar, the brick red colour indicates two percent sugar and yellow indicates **only one percent sugar.** * Hence, the correct answer is- **The patient's urine has only one percent glucose in it.** | | | | | | 2 | |
| The patient urine has only two percent glucose in it. |  | | | | | | 0 | |
| The patient urine has only three percent glucose in it. |  | | | | | | 0 | |
| The patient urine has only half percent glucose in it. |  | | | | | | 0 | |