**Chapter 4 - Urinary System**

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**MCQs:**

1. D
2. D
3. B
4. D
5. B
6. A
7. D
8. D
9. B
10. D
11. A
12. D
13. D
14. A

### **Section II: Short Answer Questions**

**1. What is the role of the urinary system in the body?** The urinary system removes waste products like urea, maintains water and salt balance, and regulates blood pressure. It also controls the pH level of the blood and ensures proper fluid balance in the body. Filtering the blood through the kidneys helps keep the internal environment stable.

**2. Name the structures of the urinary system.** The urinary system includes the kidneys, ureters, urinary bladder, and urethra. Blood vessels like the renal artery and renal vein are also associated with this system. Together, these organs filter waste from the blood and excrete it as urine.

**3. Write the functions of: the kidney, the ureter, the urinary bladder, the urethra, the pelvis of the kidney, capsule of the kidney, and dialysis.** The **kidney** filters blood and form urine. The **ureter** carries urine from the kidneys to the bladder. The **urinary bladder** temporarily stores urine. The **urethra** expels urine out of the body. The **pelvis of the kidney** collects urine before it moves to the ureter. The **capsule of the kidney** protects the kidney from injury. **Dialysis** is an artificial method to remove waste and excess fluid when the kidneys fail.

**4. What materials are returned to the blood?** Useful substances such as glucose, amino acids, water, and certain salts are reabsorbed from the filtrate back into the blood during the process of selective reabsorption in the nephrons. This helps maintain the body’s balance and prevents loss of essential nutrients.

**5. What materials leave the body in urine?** Urine contains waste products like urea, uric acid, creatinine, excess salts, and water. Sometimes, small amounts of drugs and toxins are also excreted. These substances are removed to maintain chemical balance and prevent toxicity in the body.

**6. Name the disorders of kidney.** Common kidney disorders include kidney stones, glomerulonephritis, polycystic kidney disease, and kidney failure. Urinary tract infections (UTIs) can also affect the kidneys if not treated properly. These conditions can interfere with the kidneys’ ability to filter waste.

**7. Write the causes of the formation of kidney stones.** Kidney stones form when substances like calcium, oxalate, or uric acid become highly concentrated in urine. Low water intake, high protein or salt diet, genetic factors, and certain medical conditions contribute to their formation. They can cause pain and block urine flow.

**8. Name the structures in the urinary system of man that is associated with each of these:**

* **a. Urea formation:** Liver (not in the urinary system but related to excretion).
* **b. Urine formation:** Nephrons in the kidney.
* **c. Filtration:** Glomerulus in the nephron.
* **d. Reabsorption:** Proximal convoluted tubule and loop of Henle.
* **e. Tubular secretion:** Distal convoluted tubule.
* **f. Temporary storage of urine:** Urinary bladder.
* **g. Conduction of urine out of the body:** Urethra.

**9. Diagram - Pathway of Blood in Nephron:** The blood enters the nephron through the afferent arteriole into the glomerulus, where filtration occurs. The filtered blood exits the glomerulus via the efferent arteriole and then moves through capillaries that surround the nephron tubules for reabsorption and secretion processes, before exiting through the renal vein.

**10. Describe the kidney transplant.** A kidney transplant is a surgical procedure where a healthy kidney from a donor is placed into a person whose kidneys have failed. The donor can be living or deceased. This new kidney takes over the job of filtering blood and producing urine. Immunosuppressant drugs are given to prevent rejection.

**11. What is kidney failure and dialysis?** Kidney failure occurs when the kidneys are no longer able to filter waste and excess fluid from the blood. Dialysis is an artificial method used to perform the kidneys' function. It removes waste products and excess substances using a dialysis machine (hemodialysis) or the peritoneal membrane inside the body (peritoneal dialysis).

### **Section III: Extensive Answer Questions**

**1. Describe the human urinary system.** The human urinary system consists of two kidneys, two ureters, one urinary bladder, and one urethra. The kidneys filter blood and produce urine, which travels through the ureters to the bladder. The bladder stores urine until it is excreted through the urethra. This system removes waste, maintains fluid balance, and regulates blood pressure and pH. It plays a vital role in homeostasis by controlling the internal chemical composition of the body.

**2. Relate the structure of the kidney with its function.** The kidney’s structure is well-suited to its function. It contains millions of nephrons that perform filtration, reabsorption, and secretion. The cortex houses the glomeruli for filtration, while the medulla has tubules for urine concentration. The pelvis collects urine and passes it to the ureter. The renal artery supplies unfiltered blood, and the renal vein carries filtered blood back. Its compact, layered structure enables efficient waste removal and fluid regulation.

**3. Describe the structure of the nephron.** A nephron is the functional unit of the kidney. It begins with the Bowman’s capsule that encloses a capillary network called the glomerulus. This is followed by the proximal convoluted tubule, loop of Henle, distal convoluted tubule, and collecting duct. Each part has a role: the glomerulus filters blood, the tubules reabsorb useful materials, and the collecting duct channels urine to the renal pelvis. Its microscopic structure supports its filtering and reabsorption functions.

**4. Explain the process of urine formation in humans.** Urine formation occurs in three steps: filtration, reabsorption, and secretion. Blood is first filtered in the glomerulus, where water, salts, and small molecules pass into Bowman’s capsule. Useful substances like glucose and water are reabsorbed in the tubules. Waste substances like hydrogen ions and drugs are secreted into the tubules. The remaining fluid, now urine, moves into the collecting duct and then into the bladder for excretion.

**5. Describe the osmoregulatory function of the kidney.** The kidneys regulate the water and salt balance of the body, a process known as osmoregulation. They adjust the concentration of urine based on hydration levels. When dehydrated, kidneys reabsorb more water and produce concentrated urine. When hydrated, they excrete more water as dilute urine. Hormones like ADH (antidiuretic hormone) help control this process. Osmoregulation is vital for maintaining blood pressure and cellular function.

**6. Discuss the kidney stones and its treatment.** Kidney stones are hard mineral deposits that form in the kidneys due to high concentrations of calcium, oxalate, or uric acid. Symptoms include severe pain, nausea, and difficulty urinating. Small stones may pass naturally with increased water intake, while larger ones might need medication, ultrasound shock therapy (lithotripsy), or surgery. Preventive measures include staying hydrated, reducing salt and protein intake, and managing metabolic conditions.

**7. Describe the following two types of Dialysis:**

* **a. Haemodialysis:** This involves filtering blood using a dialysis machine outside the body. Blood is passed through a dialyser, cleaned, and returned. It is usually done at a hospital.
* **b. Peritoneal Dialysis:** This uses the lining of the abdomen (peritoneum) as a natural filter. A special fluid is introduced into the abdomen and later removed, carrying waste with it. It can be done at home and is to be done regularly 3-4 times a day.

**8. Outline the causes of kidney failure and its treatment.**Kidney failure can result from diabetes, high blood pressure, infections, prolonged use of certain drugs, or genetic diseases. When kidneys fail, waste builds up in the body, causing symptoms like swelling, fatigue, and nausea. Treatment includes lifestyle changes, medications, dialysis, and a kidney transplant. Early diagnosis and management of underlying conditions are key to preventing progression.



