Book Name: Selina Concise

A. MULTIPLE CHOICE TYPE:
(select the most appropriate option in each case)

Solution 1:

(c) Removal of nitrogenous wastes.

Solution2:

(a)Proximalconvolutedtubule

Solution 3:

(c) Sweating

Solution 4:

(b) liver

B. VERY SHORT ANSWER TYPE:

Solution 1:

(a) Liver
(b) Cortex
(c) Glomerulus
(d) Collecting duct
(e) Renal artery (Renal vein has urea but renal artery has higher concentration of urea as compared to renal vein).

Solution 2:

(a) Afferent arteriole, glomerulus, efferent arteriole, capillary network, renal vein
(b) Renal artery, kidney, ureter, urinary bladder, urethra

Solution 3:

(a) Ultrafiltration
(b) Excretion
(c) Osmoregulation
(d) Excretion

C. SHORT ANSWER TYPE:

Solution 1:

(a) Glomerulus is involved in the process of ultrafiltration. The liquid part of the blood which is plasma including urea, salts, glucose filters out from the glomerulus into the renal tubule.
(b) Henle's loop is involved in reabsorption of water and sodium ions.
(c) Ureter carries urine to the urinary bladder by ureteral peristalsis.
(d) Renal artery supplied blood to the kidney.
(e) Urethra is involved in the process of micturition i.e. expelling urine out of the body.

Solution 2:

Excretion helps in removing toxic wastes from our body and it also plays an important role osmoregulation i.e. the maintenance of the homeostasis of the body.
Carbon dioxide, water, nitrogenous compounds such as urea, uric acid and excess salts are some common excretory products.

Solution 3:

A uriniferous tubule also known as the kidney tubule is the structural and functional unit of the kidney.
It takes in impure blood from the renal artery and removes wastes in the form of urine. It also provides a larger surface area for reabsorption of salts and water.

Solution 4:

Maintaining a normal osmotic concentration in the body means regulating the percentage of water and salts. If this regulation mechanism fails we either end up losing vital salts and water or may accumulate unwanted salts and excess water in our body.

Solution 5:

If one kidney is donated to a needy patient, the other kidney alone is sufficient for removing wastes or excretion. Thus, the donor can live a normal life.

Solution 6:

During summer, a considerable part of water is lost through perspiration so the kidneys have to reabsorb more water from the urine. This makes the urine thicker in summer than in winters.

Solution 7:

(a) **Bowman's capsule** is a thin walled cup containing the glomerulus. This Bowman's capsule along with the glomerulus is known as **malpighian capsule**.
(b) The **renal cortex** is the outer darker region of the kidney whereas the **renal medulla** is the inner lighter region of the kidney.
(c) **Renal pelvis** is the expanded front end of the ureter in the kidney whereas the **renal papilla** is the apex of the renal pyramid which projects into the pelvis.
(d) **Urea** is the chief excretory product which is excreted in the form of urine whereas **urine** is the filtrate left after reabsorption and tubular secretion which contains 95% water and 5% solid wastes.
(e) **Excretion** is the process of removal of chemical wastes especially nitrogenous wastes from the body.
Catabolism on the other hand is the set of metabolic pathways which break down molecules into smaller units and release energy.

Solution 8:

Urea, creatinine, uric acid

Solution 9:

Column I	Column II
(a) Bowman's Capsule	Glomerulus
(b) Contains more CO_2 and less urea	Renal Vein
(c) Anti-diuretic hormone	Regulates amount of water excreted
(d) Contains more urea	Renal artery

Solution 10:

In a nephron, the blood flows through the glomerulus under great pressure. The reason for this great pressure is that the efferent (outgoing) arteriole is narrower than the afferent arteriole (incoming). This high pressure causes the liquid part of the blood to filter out from the glomerulus into the renal capsule.

D. LONG ANSWER TYPE:

Solution 1:

(a) **Ultrafiltration** - The process of the filtration of blood in the glomerulus under great pressure during which the liquid part of the blood i.e. plasma along with urea, glucose, amino acids and other substances enter the renal tubule.
(b) **Micturition**: The process of expelling urine out of the body through urethra by opening the sphincter muscles passing of urine involving relaxation of sphincter muscles between the urinary bladder and urethra.
(c) **Renal pelvis** - Renal pelvis is the expanded front end of the ureters into the kidney.
(d) **Urea** - A nitrogenous waste produced primarily in the liver due to the break down dead protein remains and extra amino acids.
(e) **Osmoregulation** It is a process of maintaining the blood composition of the body i.e. the normal osmotic concentration of water and salts in the body.

Solution 2:

Ultrafiltration-

Ultrafiltration involves filtration of the blood which takes place in the glomerulus. The blood containing urea from the afferent arteriole enters the glomerulus under high pressure. The high pressure is created because the efferent arteriole is narrower than the afferent arteriole. The high pressure causes the liquid part of the blood to filter out from the glomerulus into the renal tubule. This filtrate is known as 'glomerular filtrate'.

Glomerular filtrate consists of water, urea, salts, glucose and other plasma solutes. Blood corpuscles, proteins and other large molecules remain behind in the glomerulus. Therefore the blood which is carried away by the efferent arteriole is relatively thick.

Selective absorption

The Glomerular filtrate entering the renal tubule contains a lot of usable materials such as glucose and sodium. As this filtrate passes down the renal tubule, a lot of water along with these usable materials is reabsorbed. Such reabsorption is called 'selective absorption'. The reabsorption occurs only to the extent that the normal concentration of the blood is undisturbed.

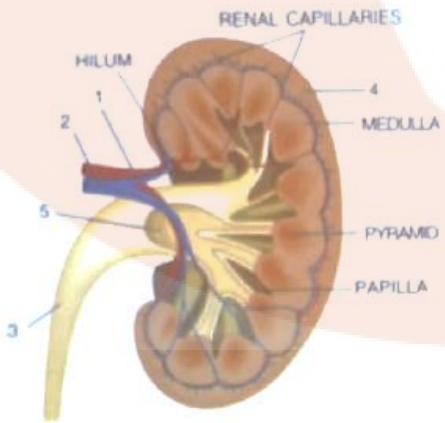
Solution 3:

Dialysis involves the use of artificial kidney or a dialysis machine. The patient's blood is from the radial artery is led through the machine where excess salts and urea is removed. The purified blood is then returned to a vein in the same arm.

Dialysis is carried out in case of failure of both the kidneys. In case there is a permanent damage, then the dialysis is to be repeated for about 12 hours twice a week.

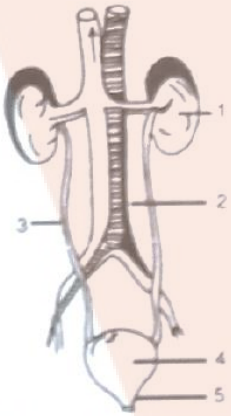
E. STRUCTURED / APPLICATION/ SKILL TYPE:

Solution 1:



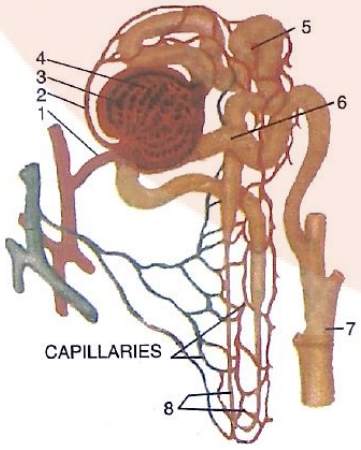
(a) The image shown can be left or right kidney. As the right kidney is slightly lower than the left one, so we need to have the images of both the kidneys for comparison.
(b) It is a longitudinal section of the kidney.
(c) 1-renal artery, 2-renal vein, 3-ureter, 4-cortex, 5-pelvis
(d) (i) 4/cortex
(ii) medulla
(iii) 5/pelvis

Solution 2:



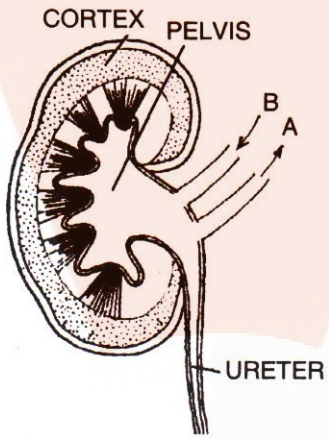
(a) Excretory system and Circulatory system.
(b) 1-kidney, 2-renal artery, 3-ureter, 4-urinary bladder, 5-urethera
(c) Nephron
(d) Urea and ammonia
(e) Ultrafiltration and selective reabsorption

Solution 3:



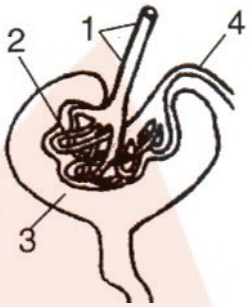
(a) 4/Glomerulus
(b) 2/Efferent arteriole
(c) 1/ Afferent arteriole from renal artery
(d) 7/Collecting tubule
(e) 5/ Proximal convoluted tubule with blood capillaries

Solution 4:



(a) The process of removal of chemical wastes especially nitrogenous waste from the body is known as excretion.
(b) Nephrons
(c) As the cortex region contains numerous nephrons or kidney tubules, therefore, it shows a dotted appearance.
(d) Kidneys help in removing wastes or excretion and osmoregulation.
(e) The blood vessel 'B' is renal artery and the blood vessel 'A' is renal vein.
So the blood vessel 'B' contains oxygenated blood with high concentration of urea and glucose whereas the blood vessel 'A' contains deoxygenated blood with low concentration of urea and glucose as compared to renal artery.

Solution 5:



(a) The structure is a Bowman's capsule, which is part of the nephron. The Bowman's capsule is found in the cortex of the kidney.
(b) 1 - Afferent arteriole
2 - Glomerulus
3 - Bowman's capsule
4 - Efferent arteriole
(c) Urine formation occurs in two steps - ultrafiltration and reabsorption.
(d) The process occurring in 2 and 3 is known as ultrafiltration.
In the glomerulus, the blood flows under high pressure because of the narrow lumen of the capillary network of the glomerulus. This forces most of the components (both waste and useable materials) of the blood out of the capillaries. This process of the filtration of blood under high pressure in the Bowman's capsule is known as ultrafiltration.