

# DPP - Daily Practice Problems

## Chapter-wise Sheets

Date :

Start Time :

End Time :

# BIOLOGY

CB19

**SYLLABUS** : Excretory Products and Their Elimination

**Max. Marks : 180**

**Marking Scheme** : + 4 for correct & (–1) for incorrect

**Time : 60 min.**

**INSTRUCTIONS** : This Daily Practice Problem Sheet contains 45 MCQs. For each question only one option is correct. Darken the correct circle/ bubble in the Response Grid provided on each page.

1. Toxic substances are detoxified in human body in  
(a) kidney (b) lungs (c) liver (d) stomach
2. The function of rennin is  
(a) vasodilation  
(b) reduce blood pressure  
(c) degradation of angiotensinogen  
(d) None of the above
3. Proximal and distal convoluted tubules are parts of  
(a) Seminiferous tubules (b) Nephron  
(c) Oviduct (d) Vas deferens
4. Antidiuretic hormone  
(a) Secretion is determined by plasma osmolarity  
(b) Increases permeability of renal collecting duct cells to water  
(c) Is secreted by nerve cells with their cell bodies in hypothalamus  
(d) All the above
5. Which one of the following is correctly matched pair of the given secretion and its primary role in human physiology?  
(a) Sebum — Sexual attraction  
(b) Sweat — Thermoregulation  
(c) Saliva — Tasting food  
(d) Tears — Excretion of salts
6. A person who is one along hunger strike and is surviving only on water, will have  
(a) less amino acids in his urine  
(b) more glucose in his blood  
(c) less urea in his urine  
(d) more sodium in his urine
7. Uricotelism is found in  
(a) Frogs and toads  
(b) Mammals and birds  
(c) Birds, reptiles and insects  
(d) Fishes and fresh water protozoans
8. If Henle's loop were absent from mammalian nephron which of the following is to be expected?  
(a) The urine will be more concentrated  
(b) The urine will be more dilute  
(c) There will be no urine formation  
(d) There will be hardly any change in the quality and quantity of urine formed
9. The basic functional unit of the human kidney is  
(a) nephron (b) nephridia  
(c) pyramid (d) Henle's loop

**RESPONSE  
GRID**

- |                 |                 |                 |                 |                 |
|-----------------|-----------------|-----------------|-----------------|-----------------|
| 1. (a)(b)(c)(d) | 2. (a)(b)(c)(d) | 3. (a)(b)(c)(d) | 4. (a)(b)(c)(d) | 5. (a)(b)(c)(d) |
| 6. (a)(b)(c)(d) | 7. (a)(b)(c)(d) | 8. (a)(b)(c)(d) | 9. (a)(b)(c)(d) |                 |

Space for Rough Work

10. Reabsorption of water in distal parts of kidney tubules/urine formation is controlled by  
 (a) relaxin (b) calcitonin  
 (c) oxytocin (d) vasopressin
11. Urea from the blood can be removed by  
 (a) Uremia (b) Diuresis  
 (c) Dialysis (d) Micturition
12. In mammals, the urinary bladder opens into  
 (a) Uterus (b) Urethra  
 (c) Vestibule (d) Ureter
13. Which of the following components of blood does not enter into the nephron?  
 (a) urea (b) water  
 (c) glucose (d) plasma protein
14. Which one of the following correctly explains the function of a specific part of a human nephron ?  
 (a) Podocytes : create minute spaces (slit pores) for the filtration of blood into the Bowman's capsule.  
 (b) Henle's loop : most reabsorption of the major substances from the glomerular filtrate.  
 (c) Distal convoluted tubule : reabsorption of  $K^+$  ions into the surrounding blood capillaries.  
 (d) Afferent arteriole : carries the blood away from the glomerular towards renal vein.
15. The condition of excess urea in blood is known as  
 (a) Polyuria (b) Haematuria  
 (c) Uraemia (d) Diuresis
16. Urine under normal conditions does not contain glucose because  
 (a) The normal blood sugar is fructose  
 (b) Glucose of blood is not filtered in the glomerulus  
 (c) Glucose in glomerular filtrate is reabsorbed in the uriniferous tubules  
 (d) Glucose in glomerular filtrate is converted into glycogen.
17. Which is not correct with respect to human kidney?  
 (a) The peripheral region is called cortex and central medulla  
 (b) Malpighian capsules are present in the cortex region  
 (c) Blood enters glomerulus through efferent arterioles  
 (d) The concave part of kidney is called hilus
18. Atrial natriuretic factor (ANF) is released in response to the increase in blood volume and blood pressure. Which of the following is not the function of ANF?  
 (a) Stimulates aldosterone secretion  
 (b) Inhibits the release of renin from JGA  
 (c) Stimulates salt loss in urine  
 (d) Inhibits sodium reabsorption from collecting duct
19. Reabsorption of chloride ions from glomerular filtrate in kidney tubule occurs by  
 (a) Active transport (b) Diffusion  
 (c) Osmosis (d) Brownian movement
20. Metanephric kidneys are found in  
 (a) Reptiles only (b) Birds only  
 (c) mammals only (d) All of these
21. In Prawn, excretion is carried out by  
 (a) Nephrons (b) Malpighian tubules  
 (c) Flame cells (d) Green glands
22. Consider the following four statements (i - iv) about certain desert animals such as kangaroo rat  
 (i) They have dark colour and high rate of reproduction and excrete solid urine  
 (ii) They do not drink water, breathe at a slow rate to conserve water and have their body covered with thick hairs  
 (iii) They feed on dry seeds and do not require drinking water  
 (iv) They excrete very concentrated urine and do not use water to regulate body temperature.  
 Which two of the above statements for such animals are true?  
 (a) (i) and (ii) (b) (iii) and (iv)  
 (c) (ii) and (iii) (d) (iii) and (i)
23. The longest loop of Henle is found in  
 (a) kangaroo rat (b) opossum  
 (c) rhesus monkey (d) porcupine
24. In peritoneal dialysis  
 (a) the blood is removed from the body and a natural filter is used  
 (b) the blood is not removed from the body and a natural filter is used  
 (c) the blood is not removed from the body and an artificial filter is used  
 (d) the blood is removed from the body and an artificial filter is used
25. Diabetes insipidus is a condition in which a person is unable to produce sufficient levels of the hormone ADH. The hormone increases the permeability to water of the second (distal) convoluted tubule and collecting duct in the kidney nephrons.  
 What is produced as a result?  
 (a) large volumes of concentrated urine  
 (b) large volumes of dilute urine  
 (c) small volumes of concentrated urine  
 (d) small volumes of dilute urine

**RESPONSE  
GRID**

- |                     |                     |                     |                     |                     |
|---------------------|---------------------|---------------------|---------------------|---------------------|
| 10. (a) (b) (c) (d) | 11. (a) (b) (c) (d) | 12. (a) (b) (c) (d) | 13. (a) (b) (c) (d) | 14. (a) (b) (c) (d) |
| 15. (a) (b) (c) (d) | 16. (a) (b) (c) (d) | 17. (a) (b) (c) (d) | 18. (a) (b) (c) (d) | 19. (a) (b) (c) (d) |
| 20. (a) (b) (c) (d) | 21. (a) (b) (c) (d) | 22. (a) (b) (c) (d) | 23. (a) (b) (c) (d) | 24. (a) (b) (c) (d) |
| 25. (a) (b) (c) (d) |                     |                     |                     |                     |

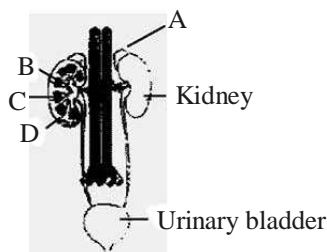
26. By definition, an ectotherm  
 (a) is cold-blooded.  
 (b) is warm-blooded.  
 (c) obtains most of its heat from its environment.  
 (d) derives most of its heat from its own metabolism.
27. Which region of the kidney nephron is the main site of amino acid reabsorption?  
 (a) glomerulus  
 (b) Bowman's capsule  
 (c) proximal convoluted tubule  
 (d) distal convoluted tubule
28. Long term kidney failure can be treated by introducing sterile dialysis fluid into the abdominal cavity. The fluid is drained and replaced regularly using a tube inserted surgically through the abdominal wall.  
 Why does this method work well?  
 (a) because osmoregulation and excretion are achieved by diffusion between the blood in the abdominal capillaries and the dialysis fluid.  
 (b) because osmoregulation and excretion are achieved by the active transport of ions, water and urea between the abdominal capillaries and the dialysis fluid.  
 (c) because the fluid is in direct contact with the kidneys, the urea and excess ions can pass into it without being filtered by the glomeruli.  
 (d) because the fluid is in direct contact with the liver and the large intestine, and wastes and excess ions can pass into it from these organs.
29. Which of the following describes the route of urine out of the body after it leaves the kidney?  
 (a) renal vein-urinary bladder-urethra-ureter  
 (b) urethra-urinary bladder-ureter  
 (c) renal vein-ureter-urinary bladder-urethra  
 (d) ureter-urinary bladder-urethra
30. If the human kidneys filter 150 litres of plasma in a 24 hour period, what is the typical amount of urine produced and eliminated in that time period?  
 (a) 0.15 litres (b) 1.5 litres  
 (c) 15 litres (d) 30 litres
31. A number of hormones help to regulate water and solute uptake and release in the nephron. Antidiuretic hormone (ADH) promotes \_\_\_\_\_ in response to \_\_\_\_\_.  
 (a) active transport of  $\text{Cl}^-$ , increased solute concentration  
 (b) active transport of  $\text{Na}^+$ , increased blood pressure  
 (c) increased permeability of the collecting duct to water, increased blood pressure  
 (d) decreased permeability of the collecting duct to water, increased solute concentration
32. The filtrate formed by the nephrons in the kidney is not the same as urine. The filtrate is first refined and concentrated by the processes of \_\_\_\_\_, forming the urine that leaves the body.  
 (a) filtration and secretion  
 (b) reabsorption and secretion  
 (c) reabsorption and excretion  
 (d) filtration and reabsorption
33. What pathway is taken by water and solutes as they travel through a nephron?  
 (a) Glomerulus, to Bowman's capsule, to proximal tubule, to loop of Henle, to distal tubule, to collecting ducts  
 (b) Bowman's capsule, to glomerulus, to distal tubule, to loop of Henle, to proximal tubule, to collecting ducts  
 (c) Glomerulus, to Bowman's capsule, to distal tubule, to loop of Henle, to proximal tubule, to collecting ducts  
 (d) Glomerulus, to Bowman's capsule, to proximal tubule, to collecting ducts, to distal tubule, to loop of Henle
34. The kidney's filtration process is nonselective, so  
 (a) many valuable substances are lost in the urine.  
 (b) the proportions of substances in urine are the same as in blood.  
 (c) urine is much less concentrated than blood.  
 (d) useful substances must be selectively reabsorbed.
35.  $\text{Na}^+$  and  $\text{Cl}^-$  are actively transported out of the tubules to help set up the countercurrent multiplier. Which the following are sites of active  $\text{Na}^+$  and  $\text{Cl}^-$  transport in the nephron?  
 (a) Proximal tubule, ascending limb of the loop of Henle  
 (b) Descending limb of the loop of Henle, ascending limb of the loop of Henle  
 (c) Ascending limb of the loop of Henle, proximal tubule  
 (d) Collecting duct, descending limb of the loop of Henle
36. Which of the following is not a normal constituent of the glomerular filtrate?  
 (a) Red blood cells (b) Urea  
 (c) Sodium ion (d) Glucose
37. Kidneys help in the conservation of useful materials and excretion of wastes and therefore they receive 20% of the hearts output of blood (as much as the heart and brain combined). On a percentage basis which substance is most completely reabsorbed by the kidneys ?  
 (a) Water (b) Glucose  
 (c) Urea (d) Sodium
38. The sole mechanism for water reabsorption by the renal tubules is :  
 (a) active transport  
 (b) osmosis.  
 (c) cotransport with sodium ions  
 (d) cotransport with bicarbonate ions

**RESPONSE  
GRID**

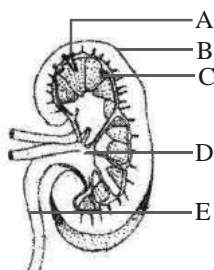
- |                  |                  |                  |                  |                  |
|------------------|------------------|------------------|------------------|------------------|
| 26. (a)(b)(c)(d) | 27. (a)(b)(c)(d) | 28. (a)(b)(c)(d) | 29. (a)(b)(c)(d) | 30. (a)(b)(c)(d) |
| 31. (a)(b)(c)(d) | 32. (a)(b)(c)(d) | 33. (a)(b)(c)(d) | 34. (a)(b)(c)(d) | 35. (a)(b)(c)(d) |
| 36. (a)(b)(c)(d) | 37. (a)(b)(c)(d) | 38. (a)(b)(c)(d) |                  |                  |

Space for Rough Work

39. Figure shown human urinary system with structures labelled A to D. Select option which correctly identifies them and gives their characteristics and /or functions.



- (a) B-pelvis-broad funnel shaped space inner to hilum, directly connected to loops of Henle.  
 (b) C-Medulla-inner zone of kidney and contains complex nephrons.  
 (c) D - Cortex - outer part of kidney and do not contain any part of nephrons  
 (d) A-Adrenal gland - located at the anterior part of kidney. Secrete Catecholamines which stimulate glycogen breakdown.
40. Refer the following diagram and identify the parts of a kidney indicated



- (a) A = cortex, B = nephron, C = pelvis, D= medulla, E = ureter  
 (b) A = cortex, B = medulla, C = nephron, D = pelvis, E = ureter

- (c) A = nephron, B = cortex, C = medulla, D = ureter, E = pelvis  
 (d) A = nephron, B = cortex, C = medulla, D = pelvis, E = ureter

41. Select the option which shows correct matching of animal with excretory organs and excretory product

Animal	Excretory organs	Excretory product
(a) Housefly	Renal tubules	Uric acid
(b) <i>Labeo</i> (Rohu)	Nephridial tubes	Ammonia
(c) Salamander	Kidney	Urea
(d) Peacock	Kidney	Urea

42. The appearance of albumin in the urine is most likely due to

- (a) Increase in the blood pressure  
 (b) Decrease in the blood osmotic corpuscles  
 (c) Damage to the Malpighian corpuscles  
 (d) Damage to the proximal convoluted tubules

43. Kidney crystals are solid clusters of

- (a) Calcium nitrate and uric acid  
 (b) Phosphate and uric acid  
 (c) Calcium carbonate and uric acid  
 (d) Calcium metabisulphite and uric acid

44. The liquid which is collected in the cavity of Bowman's capsule is

- (a) Concentrated urine  
 (b) Blood plasma minus blood proteins  
 (c) Glycogen and water  
 (d) Sulphates and water

45. A person who is on a long hunger strike and is surviving only on water, will have –

- (a) less amino acids in his urine  
 (b) more glucose in his blood  
 (c) less urea in his urine  
 (d) more sodium in his urine

**RESPONSE  
GRID**

39. (a) (b) (c) (d)  
 44. (a) (b) (c) (d)

40. (a) (b) (c) (d)  
 45. (a) (b) (c) (d)

41. (a) (b) (c) (d)

42. (a) (b) (c) (d)

43. (a) (b) (c) (d)

Space for Rough Work

**DAILY PRACTICE PROBLEM DPP CHAPTERWISE 19 - BIOLOGY**

Total Questions	45	Total Marks	180
Attempted		Correct	
Incorrect		Net Score	
Cut-off Score	45	Qualifying Score	60
Success Gap = Net Score – Qualifying Score			
Net Score = (Correct × 4) – (Incorrect × 1)			

# HINTS & SOLUTIONS

## DPP/CB19

1. (c) Liver is the primary site of detoxification and elimination of body wastes and poisons. Liver detoxifies endotoxins, e.g. toxic  $\text{NH}_3$  combined with  $\text{CO}_2$  to form less toxic urea. It also detoxifies alcohol and convert them to acetaldehyde and then harmless acetyl CoA.
2. (d) Renin (also called rennet or chymosin) is an coagulating enzyme produced from stomach of human body. It catalyzes the coagulation of milk by converting milk with soluble protein caesin into insoluble semi fluid calcium paracaesinate. This is called curdling of milk. Rennin produced in the infants immediately after birth. As the child grows, rennin production goes down and is replaced by pepsin digestive enzymes.  
Renin is an enzyme which acts as hormone secreted by juxtaglomerular cells. It converts angiotensinogen into angiotensin.
3. (b) Nephron is the excretory unit of human excretory system. Each nephron has a Bowman's Capsule, a Proximal Convoluted Tubule (PCT), Loop of Henle (Descending & Ascending limbs) and Distal Convoluted Tubule (DCT) which then enter into collecting duct.
4. (d)
5. (b) Thermoregulation is the ability of an organism to keep its body temperature within certain boundaries, even when temperature surrounding is very different. In humans, sweating is primarily a means of thermoregulation.
6. (c) Due to a long hunger strike and survival on water, a person will have less urea in his urine because urea comes to kidney as a waste product from liver which is formed after the breakdown of protein fat, carbohydrate during hunger. It is not synthesised but the synthesised ones are catabolised.
7. (c)
8. (b) It is named after its discoverer, F. G. J. Henle. In the kidney, the loop of Henle is the portion of the nephron that leads from the proximal convoluted tubule to the distal convoluted tubule. The loop has a hairpin bend in the renal medulla. The main function of this structure is to reabsorb water and ions from the urine. To do this, it uses a countercurrent multiplier mechanism in the medulla.
9. (a) 10. (d) 11. (c) 12. (b) 13. (d)
14. (a) Glomerular podocytes are highly specialized cells with a complex cytoarchitecture plays a major role in establishing the selective permeability of glomerular filtration barrier.
15. (c) Haematuria is the presence of blood cells in urine.
16. (c) 17. (c)
18. (a) ANF stimulates the loss of sodium in urine while aldosterone absorbs sodium from glomerular filtrate.
19. (b) 20. (d) 21. (d) 22. (b)
23. (a) Kangaroo rat lives in desert, therefore, it needs to conserve water in the body. In kangaroo rat, loop of Henle is significantly longer as it descends further into the medulla and produces a higher concentration gradient in the surrounding tissue so as to produce urine which is 18 times concentrated than that of their blood. This gradient allows more water to diffuse into the surrounding tissues to be reabsorbed.
24. (b) Dialysis is of two types : haemodialysis and peritoneal dialysis. Peritoneal dialysis uses a natural filter inside the body i.e. peritoneal membrane to remove wastes and extra fluid from the body. The dialysis fluid fills the belly and pulls out wastes and extra fluid from the body. Blood is not removed from the body as in the case of haemodialysis.
25. (b) If the walls of the collecting duct are water-permeable, water leaves the ducts to pass into the hyperosmotic surrounding and concentrated urine is produced. Thus, when there is insufficient ADH, less water is reabsorbed and more dilute urine is produced in copious amounts.
26. (c) Ectotherms on poikilothermic animals are cold-blooded animals whose body temperature is dependent upon their environment.
27. (c) A and B involve ultrafiltration.  
In the proximal convoluted tubules, the mitochondria provide energy for active transport. The cells here are adapted for reabsorption. The amino acids diffuse into the cells and are actively transported to the intercellular spaces, where they diffuse into the surrounding capillaries.
28. (a) The removal of urea and excess ions occurs by diffusion from the blood in the abdominal capillaries to the dialysis fluid, down a concentration gradient.
29. (d) This is the correct flow of urine after it leaves the kidney.
30. (b) About 1 percent of the filtrate is excreted as urine, so about 1.5 litres of the original 150 litres would be urinated.
31. (c) Antidiuretic hormone acts on the collecting ducts by increasing the permeability to water. Antidiuretic hormone secretion is stimulated by a decrease in blood pressure.
32. (b) Reabsorption returns substances to the blood, secretion moves substances from blood into the kidney tubules.
33. (a) The route of water and solutes through the nephron from the glomerulus, to Bowman's capsule, to proximal tubule, to loop of Henle, to distal tubule, to collecting ducts.
34. (d) Glucose and amino acids found in the filtrate are reabsorbed.
35. (a) The proximal tubule is the site of active transport of  $\text{Na}^+$  out of the tubule.  $\text{Na}^+$  also moves out of the tubule at the ascending limb of the loop of Henle, but this is a passive transport with  $\text{Cl}^-$  being actively transported out.
36. (a) Red blood cells are too large to be filtered out of the blood at the glomerulus and thus will not be found in the filtrate.
37. (b) Glucose is 100% reabsorbed and thus a healthy person will excrete no glucose in the urine. Sodium and water are usually over 99% reabsorbed. Urea is the main excretory product formed as a result of protein breakdown.
38. (b) The sole mechanism for water reabsorption in the renal tubules is by osmosis.
39. (d) A – Adrenal gland – located at the anterior part of kidney, secrete Catecholamines which stimulate glycogen breakdown.
40. (d)
41. (c) Salamander (Amphibia; Caudata) excrete urea by help of kidneys.
42. (c) Normally albumin can't pass out through the filtering pores due to their large size but in some pathological conditions viz. anoxia or heart failure, the filtration membrane becomes damaged and filtering pores enlarge in size, so that serum albumin passes out in the largest amount and appears in the urine.
43. (b) 44. (b) 45. (c)