5. A Representative Study of Mammals

Part-A

1. Question

Select important characteristic features of mammals

A. four-chambered heart

B. fore-limbs and hind limbs

C. milk-producing glands

D. post anal tail

Answer

All mammals have mammary glands that are structures which make milk. These mammary glands are actually glandular tissues that produce and secrete milk thus helping to nourish the young ones.

2. Question

Carnivorous animals use these teeth to tear flesh.

A. incisors

B. canines

C. premolars

D. molars

Answer

Carnivores mouth is designed for quick ripping any prey it catches rather than grinding. Carnivores have sharp and pointed teeth called canines which helps them to tear flesh of the prey they catch. They have strong molars for chewing the flesh and bones.

3. Question

The Henle’s loop of nephron is mainly responsible for reabsorption of water in the kidney. Which of the following has a long loop of Henle in its nephrons to conserve water?

A. polar bear

B. camel

C. frog

D. whale

Answer

Animals that are adapted to dry habitats will have long loop of Henle. In animals, the length of loop of Henle is directly related with the need of water conservation in them. The longer the loop of Henle, the more water will be conserved.

4. Question

Which blood cells of mammals are concerned with immunity?

A. Young Erythrocytes

B. Leucocytes

C. Thrombocytes

D. Matured Erythrocytes

Answer

Leucocytes originate in the bone marrow and circulate throughout the lymphoid tissues of the body. They

help to provide immunity and defend the body against diseases and infections from microbes.

5. Question

You were given two unlabelled slides with blood smears of an amphibian and a mammal.

You would differentiate the blood samples by observing the _____.

A. colour

B. nature of RBC’s

C. nature of WBC’s

D. contents of plasma

Answer

The blood sample of an amphibian and a mammal can be differentiated by observing the nature of RBC’s. Human red blood cells lack nuclei while amphibians have nuclei in their blood cells.

6. Question

For the digestion of cellulose, an enzyme called cellulase is required. Some mammals lodge cellulase producing bacteria in their digestive system by offering them food and shelter. These mammals are mostly _____.

A. Herbivores

B. Carnivores

C. Omnivores

D. Sanguivores

Answer

Mammals like herbivores cannot produce cellulose digesting enzymes. So, they lodge cellulase producing bacteria in their alimentary tract which aids plant digestion and offer them food and shelter in return.

7. Question

Forelimbs of mammals have a common basic structure or pattern, but are different in their usage/ function in different animals. They can be called _____.

A. Homologous organs

B. Analogous organs.

C. Vestigial organs

D. Rudimentary organs

Answer

organs that are similar in structure and have a common origin but are different in their function in different animals are called homologous organs. For example- limb of dog, dolphin, horse, human, wing of bat, all have a common pattern but are adapted to perform different functions.

8. Question

Sensitive whiskers are found in _____.

A. Bat

B. Elephant

C. Deer

D. Cat

Answer

Sensitive whiskers are found in cat. They help by providing the cat with sensory feedback about its

environment. These are touch receptors rooted more deep than normal hair and are rich in nerve endings.

9. Question

The tusks of elephants are modified _____.

Answer

Canines

Elephants have long modified tusks called canines which are used for defence. Rest of the teeth are used for eating grass and are also very large due to the size of the animal.

10. Question

Pick out an animal which has a four-chambered stomach.

A. Elephant

B. Dolphin

C. Deer

D. Kangaroo

Answer

Mammals like deer, cows that are called ruminants have a 4 chambered stomach which helps to break down the grasses they consume. These chambers are- rumen, reticulum, omasum and abomasum. The first chamber is rumen that stores the food which is later regurgitated, chewed and swallowed.

11. Question

Normal body temperature of man is _____.

A. 98.4 – 98.6^{o} F

B. 96.6 – 96.8^{o} F

C. 94.4 – 98.6^{o} F

D. 98.4 – 99.6^{o} F

Answer

the normal body temperature of man is 98.6^{o} F. It ranges between 98.4 – 98.6^{o} F and is lowest in early morning hours while highest in late afternoon and evening hours.

12. Question

Mitral valve is found between _____.

A. Right auricle and right ventricle

B. Left auricle and left ventricle

C. Right ventricle and pulmonary artery

D. Left ventricle and aorta

Answer

Mitral valve is found between left auricle and left ventricle. It lets blood flow from left atrium to left ventricle and prevents backflow of blood into the left atrium from the ventricle.

13. Question

Assertion (A): Mammalian heart is called myogenic heart.

Reason (R): Heartbeat is regulated by a specialized muscle bundle (pacemaker) in mammals.

A. Both ‘A’ and ‘R’ are true and ‘R’ explains ‘A’.

B. Both ‘A’ and ‘R’ are true but ‘R’ doesn’t explain ‘A’.

C. ‘A’ is true but ‘R’ is false.

D. A is false but ‘R’ is true.

Answer

Mammalian heart is called myogenic heart because in them the setting of rhythm is done by specialized muscle bundles called pacemaker. they are highly specialized for conducting and generating the impulses. The heart muscles contract and relax without receiving impulses from nervous system, thus mammalian heart is called myogenic heart.

14. Question

One of the following groups contains a non-mammalian animal. Pick up the group.

A. dolphin, walrus, porcupine, rabbit, bat

B. elephant, pig, horse, donkey, monkey

C. antelope, deer, cow, buffalo, black buck

D. dog, cat, crocodile, lion, tiger

Answer

Crocodile is a non-mammalian animal. It is a large aquatic reptile. Mammals are characterized by presence of hair, are warm blooded and ability to nourish their young ones with milk. Dog, cat, lion and tiger are all mammals while crocodile is not.

15. Question

The epidermis of mammals contains _____.

A. hair, bristles, quills

B. hair, nails, claws

C. hair, bristles, horns

D. hair, nails, scales

Answer

The epidermis of mammals has hairs arising from hair follicles. These hairs are specialized into bristles, whiskers and quills. Nails and claws are derivatives of epidermis.

16. Question

Based on relationship, fill in:

Whale: Flippers:: Bat : _____

Answer

Whale: Flippers:: Bat : Wing (Patagium)

Whale has flippers, bat has wings (patagium). These are homologous structures. Organs that are similar in structure and have a common origin but are different in their function in different animals are called homologous organs.

17. Question

Fill in the blank.

RBC: Carrier of oxygen;

WBC: ––––––––––––

Answer

WBC: Immunity.

Red Blood cells carry oxygen (bound to haemoglobin) from lungs to body and brings back carbon dioxide from body to lungs. White Blood Cells help to provide immunity and defend the body against diseases and infections from microbes.

18. Question

Based on modifications, make the pairs:

incisor: tusks of elephant; _____: quills of porcupine

Answer

Epidermal hair: quills of porcupine

Elephants have long modified tusks called canines which are used for defence. Quills are modified hair embedded in the epidermis of porcupine. These quills are used as defence by porcupine, they shake their tails thus the sound of quills makes distracting noise and runs from predator.

Part-B

1. Question

Mention the two unique characteristics of mammals.

Answer

Mammals are the most evolved animals of animal kingdom. Their two unique characteristics are- presence of epidermal hair, and ability to nourish their young ones with milk. They are the only animals that have body covered with hair and fur and have mammary glands as the structures that make milk.

2. Question

Give two examples each:

(i) ruminating mammals

(ii) marine mammals.

Answer

i) Ruminating animal- Cow and Deer. Mammals like deer, cows and goats are called ruminants. They have a 4 chambered stomach which helps to break down the grasses they consume.

ii) Marine animal- Dolphin and Shark. Marine animals are characterised by presence of hair or fur (insulation), are arm blooded, nurse young ones with mammary glands, etc.

3. Question

What type of dentition is seen in mammals? What are elephant tusks?

Answer

Mammals have heterodont dentition. The teeth are in the sockets of the jab and have different functions. They have 2 sets of teeth throughout their life span (milk teeth and permanent teeth) and 4 kinds of teeth- incisors, canines, molars and premolars.

Elephants have long modified tusks called canines which are used for defence. Rest of the teeth are used for eating grass and are also very large due to the size of the animal.

4. Question

Mention any four adaptations seen in the camel so that it can live successfully in deserts.

Answer

Camels have several adaptations that help them to survive the extreme harsh conditions of desert.

1- They have feet with large surface area that enables them to walk on sand.

2- They store large amount of water in the fat in their humps.

3- They have bushy eyebrows and long eyelashes to protect themselves from sand storms.

4- They have long loops of Henle and thus concentrated urine, thereby retaining s much water as possible.

5. Question

What is echo location? Give an example.

Answer

Echo location is a biological sonar like system phenomenon that is used by bats, dolphins etc to locate and detect objects by emitting high pitch sounds that reflect back the object and return to animal's sensory receptors. For example- Echolocation is used by dolphins to help them find and capture food.

6. Question

Mention the various valves and their location in the human heart.

Answer

there are 4 valves found in the human heart.

1. Bicuspid valves are atrioventricular valves found between left atrium and left ventricle.

2. Tricuspid valves are formed by three cusps and is found between the right atrium and right ventricle.

3. Pulmonary Semi lunar valve is found at the base of the pulmonary artery. Blood is forced through this valve to enter pulmonary trunk when the right ventricle contracts.

4. Aortic Semi lunar valve is found at the base of the aorta. Blood is forced through this valve to enter the aorta when the left ventricle contract.

7. Question

Write any four differences between arteries and veins in mammals.

Answer

ARTERIES	VEINS
These distribute blood to the body organs.	These collect blood from body organs.
Arteries are round and have thick walls.	Veins are collapsed/ flattened and have thin walls.
Lumen is small.	Lumen is large.
These carry oxygenated blood except the pulmonary artery.	These carry deoxygenated blood except the pulmonary vein.

8. Question

Name the three important blood proteins seen in plasma. Add a note on their functions.

Answer

the three important blood proteins seen in plasma and their functions are as follow-

• Fibrinogens- they are produced by liver and function in blood clotting and constitute 4%.

• Albumin- they are also produced by liver and function to transport proteins for steroid hormones and fatty acids. Albumin constitute 60%.

• Globulins- they are produced by liver and plasma cells. Alpha and beta globulin function to transport lipids and fat-soluble vitamins whereas gamma globulin function as immunoglobulins to provide immunity. Globulin constitute 35%

9. Question

Which blood cells are without nuclei? What is the advantage of this condition?

Answer

Mature Red blood cells lack nuclei, they have nuclei only in early development. Lack of nuclei makes more room for haemoglobin and thus enable them to carry more oxygen.

10. Question

Name the protein and the blood-cells responsible for the clotting of blood.

Answer

The protein responsible for clotting of blood is Fibrinogen. It accounts for 4% of all plasma proteins. The blood cells responsible for clotting of blood are blood platelets. When a blood vessel is damaged, the vessel wall's cell releases a sticky substance. Platelets stick and accumulate at the area of injury and hence form a clot.

11. Question

i) What are the structural and functional units of kidney?

ii) Arrange the organs of the human excretory system in the correct order, based on the passage of urine.

Ureter, Urethra, Kidney, Urinary bladder

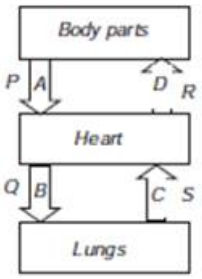
Answer

i) The structural and functional unit of kidney is nephron. The nephrons are responsible for forming the urine. A nephron is composed of Glomerulus and renal tubules.

ii) Kidney, Ureters, Urinary bladder, Urethra. Urine produced by nephrons in the kidney travel down through the ureters to the urinary bladder. The urinary bladder can expand for storage or collapse when empty. The urine is expelled outside the body through the urethra.

12. Question

Observe the following flow-chart depicting blood-circulation in mammals.



Pick out the correct blood vessels A, B, C, D from the following:

i) Pulmonary veins

ii) Venacava

C. Pulmonary artery

D. Aorta

Among the P,Q,R and S samples, identify the correct match from the following

a) P & Q = Oxygenated and R& S = Deoxygenated

b) P & Q = Deoxygenated and R& S = oxygenated

c) All are Oxygenated

d) All are Deoxygenated

Answer

The correct blood vessels are

A-Vena cava. It brings unoxygenated blood from body to heart.

B-Pulmonary artery. It receives blood from right ventricle and carries it to lungs for gaseous exchange.

C-Pulmonary vein. It returns oxygen rich blood from lungs to left atrium.

D-Aorta. It takes oxygenated blood from left ventricle to the body parts.

b) P & Q = Deoxygenated and R& S = oxygenated

13. Question

Study the following passage:

Most of the vertebrates have jaws with teeth. The mode of arrangement of teeth on the jaws is called dentition.

The various types of teeth seen in mammals are incisors(I) canines (C) premolars (P) and molars (M). They are used for biting, tearing, chewing and grinding respectively.

Canines, the tearing teeth are well-developed in carnivores and ill-developed or absent in herbivores.

Now answer the following questions:

i) In frogs, all the teeth in the upper jaw look alike, whereas in human beings they are different. The type of dentition in man can be called_____.

a) Homodont

b) Isodont

c) Heterodont

d) Acrodont

ii) The dental formula of a mammal is written as ICPM =2023/1023. The teeth missing in it are _____ .

a) incisors

b) b) canines

c) c) premolars

d) d) molars

Answer

i) This type of dentition in man is known as heterodont dentition. They have 2 sets of teeth throughout their life span (milk teeth and permanent teeth) and 4 kinds of teeth- incisors, canines, molars and premolars.

ii) b) Canines

Dental formula is defined as an expression of number of teeth of each type in one half of upper and lower jaw. Dental formula of a mammal is 2123/2123. Incisors-2, canines-1, Premolars-2, Molars-3 in each half of upper and lower jaw.

14. Question

Fill in the empty boxes with suitable answers with respect to the valves of a mammalian heart.

Valve(s)	Location	Function
Bicuspid valve or Mitral valve		Prevents the backward flow of blood from left ventricle to left auricle
	At the right auricular ventricular aperture	Regulates the flow of blood from right auricle to right ventricle
Aortic valve	At the base of Aorta	
Semilunar valve		Regulates the flow of blood from right ventricle to pulmonary artery

Answer

VALVE	LOCATION	FUNCTION
Bicuspid valve or mitral valve	**Between the left atrium and left ventricles.**	Prevents the backward flow of blood from left ventricle to left auricle.
Tricuspid valve	At the right auricular ventricular aperture.	Regulates the flow of blood from right auricle to right ventricle.
Aortic valve	At the base of aorta.	**Regulates the flow of blood from left ventricle to aorta.**
Semilunar valve	**At the base of the large pulmonary artery exiting the ventricles.**	Regulates the flow of blood from right ventricle to pulmonary artery.

15. Question

Any change in the lifestyle, the food habits and the body form of an organism in order to make it comfortable in the environment / habitat, is called adaptation. Identify the suitable adaptation given below against each mammal.

i) conservation of body heat in large marine mammals like whale (Jaws are modified into baleen plates / Forelimbs are modified into flippers /

Fat is deposited in subcutaneous tissue.)

ii) Locating food source by bats-(Forelimbs are modified into wings / Hanging upside down using legs / Production of sounds and detection of the echo)

Answer

i) Fat is deposited in subcutaneous tissue. Whales need to conserve their body heat in cold waters. Their body is surrounded by thick layer of fat called blubber just under the skin that helps to keep them warm.

ii) Production of sounds and detection of the echo. Echo location is a biological sonar like system phenomenon that is used by bats, to locate and detect objects by emitting high pitch sounds that reflect back the object and return to animal’s sensory receptors. So, bats use echo location to locate food source.

16. Question

The Master chemists of our body are the kidneys. Justify.

i) Kidneys filter all chemicals in the body.

ii) Kidneys maintain the chemical composition of blood.

iii) Kidneys eliminate all chemicals absorbed by the body.

iv) Kidneys store the chemicals accumulated in the body.

Answer

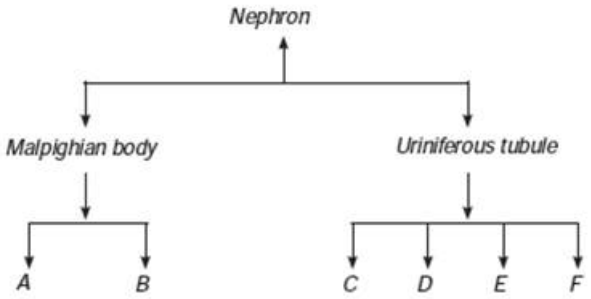
ii) Kidneys maintain the chemical composition of blood.

Kidneys are called the master chemists of our body because they maintain the chemical composition of human blood by cleaning blood, producing hormones, enzymes and also managing fluid levels.

Part-C

1. Question

Observe the chart depicting the structure of a nephron.



i) Mention the structures A to F

ii) Explain the main function of a nephron.

Answer

i) A- Glomerulus

B- Bowman’s capsule

C- Proximal convoluted tubule

D- Loop of Henle

E- Distal Convoluted tubule

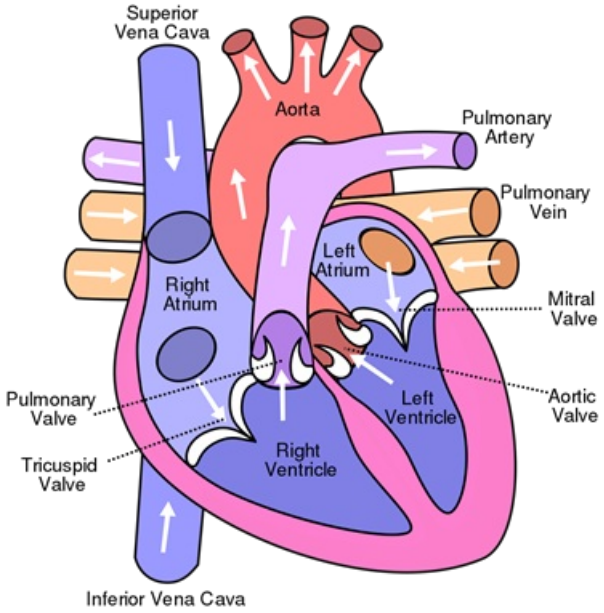
F- Collecting duct

ii) Nephron is the structural and functional unit of kidney. Their function is to filter substances from the blood, regulate blood pressure, blood pH and blood volume, control electrolyte and metabolite balance. Nephrons basically filter the blood and form urine.

2. Question

With a suitable diagram, describe the structure and functions of the human heart.

Answer



• The heart is an organ derived from the **mesoderm.**

• It is located in the **thoracic cavity**, at the centre of the chest.

• An outer, double membranous bag protects the heart. This is the pericardium, which also contains the pericardial fluid.

• The **heart** wall **has three layers thar are the endocardium** (innermost thin layer), the **myocardium** (middle thick layer) and **the epicardium** (outer thin layer).

• The myocardium is thick since it is made up of **cardiac muscle fibres.**

• It is **four chambered** and has **several valves** that regulate the normal blood flow in the body.

• The upper two chambers are called **atria**. The atria receive oxygen-free (deoxygenated) blood. The two atria are separated by **inter-atrial septum** from each other.

• The lower two chambers are **theventricles.** They pump oxygen-rich (oxygenated) blood.

• The two ventricles are separated via **the inter-ventricular septum.**

• On the same side, the atrium and ventricle are separated by the **atrioventricular septum.**

• All these septums have openings which are guarded by **valves** which prevent oxygenated and deoxygenated blood from mixing.

 The valve between the right atrium and the right ventricle is the **tricuspid valve.**

 The valve between the left atrium and left ventricle is **the bicuspid valve** (as called **mitral valve**).

 Valves at the ventricular outlets are known as **semilunar valves.** There are two semilunar valves: the **pulmonary** and the **aortic valves**.

 The pulmonary valve controls the blood flowing from the right ventricle into the **pulmonary arteries,** which carry blood to the lungs.

 The aortic valve allows oxygen-rich blood to pass from the left ventricle into the **aorta** (the largest artery).

• A patch of specialized cardiac musculature (known as **nodal tissue**) is found in the upper right corner of the right atrium. This is the **sino-atrial node or SAN.**

• A similar mass of tissue is present in the left lower corner of the right atrium. This is called the **atrioventricular node of AVN.**

Function:

• The heart is the **principle organ of the circulatory system.**

• **It circulates and delivers oxygen and nutrients in the entire body** . This is done via the **cardiac cycle.**

• The heart circulates blood via two pathways: **pulmonary and systemic.**

o In the pulmonary pathway, **deoxygenated blood moves out of the right ventricle** through the pulmonary artery and travels to the lungs. The blood gets **oxygenated and returns to the left atrium via the pulmonary vein.**

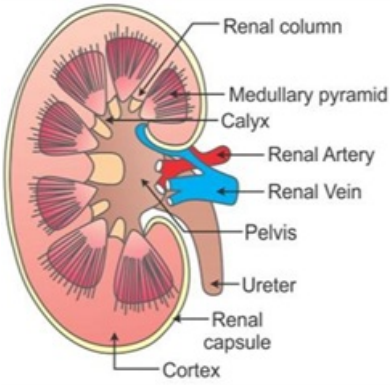
o In the systemic pathway, the oxygenated blood moves through the left ventricle to the aorta. From there, it enters the various arteries and capillaries which supply oxygen to the various body tissues and organs. Deoxygenated blood returns to the heart via veins to the vena cava, thus re-entering the heart's right atrium.

• The heart contains special cells that contract and **produce the heartbeat.**

3. Question

Draw the L.S of kidney and label the parts.

Answer



4. Question

What is adaptation? Mention the adaptations found in the following mammals.

a) Whale b) Polar bear

c) Kangaroo d) Herbivorous mammals.

Answer

Adaptation is defined as the adjustment of an organism to its surroundings or environment in order to survive and stay safe.

a) Whale- Whales need to conserve their body heat in cold waters. Their body is surrounded by thick layer of fat called blubber just under the skin that helps to keep them warm. Whale have flippers that help them to swim properly in water.

b) Polar bear- The small and round ears help to maintain body heat and do now allow the cold water to enter the ear. They also dig dens to protect themselves from cold winds.

c) Kangaroo- Kangaroos have large ears which help to keep them cool in the hot and arid environment where they are usually found. The ears also help in sensing danger.

d) Herbivorous animal- Herbivores cannot produce cellulose digesting enzymes. So, they lodge cellulase producing bacteria in their alimentary tract which aids plant digestion and offer them food and shelter in return. They have special sharp straight edged teeth called incisors which help them to eat plants or grasses.