



General Instructions

- (i) The test is of 1 hours duration.
- (ii) This test paper consists of 45 questions. The maximum marks are 180.
- (iii) Each question carries +4 marks for correct answer and –1 mark for wrong answer.

Zoology

136. Insertion of a foreign DNA at BamHI site in an E. coli cloning vector pBR322 results in the loss of antibiotic resistance towards :

- (1) Gentamycin
- (2) Ampicillin and tetracycline
- (3) Tetracycline
- (4) Ampicillin

137. The sixth mutant codon of beta globin gene causing polymerization of Haemoglobin and change in RBC shape is :

- (1) CAG
- (2) GUG
- (3) AUG
- (4) GAG

138. Choose the correct statement regarding GIFT to overcome infertility.

- (1) Ova collected from a female donor are transferred to the uterus of an infertile female.
 - (2) It is the transfer of an ovum collected from a donor into the fallopian tube of another female who cannot produce ovum but can provide suitable environment for fertilization and development.
 - (3) Early embryos with up to 8 blastomeres are transferred to the uterus of an infertile female.
 - (4) Early embryos with up to 8 blastomeres are transferred into the fallopian tube of an infertile female.
-

139. Which one of the following is an appropriate example of 'sexual deceit' ?

- (1) Female wasp and fig
 - (2) Cuckoo and crow
 - (3) Ophrys and bumblebee
 - (4) Sea anemone and clown fish
-

140. Evolution of human appears parallel to the progressive development of brain and language skills. As such, the evolution of individual species in the sequence of their appearance is :

- (1) Homo habilis → Homo erectus → Ramapithecus → Neanderthal → Homo sapiens.
 - (2) Ramapithecus → Homo habilis → Homo erectus → Neanderthal → Homo sapiens.
 - (3) Homo sapiens → Ramapithecus → Homo habilis → Neanderthal → Homo erectus.
 - (4) Neanderthal → Ramapithecus → Homo habilis → Homo erectus → Homo sapiens.
-

141. Match List I with List II related to embryonic development at various months of pregnancy :

List I	List II
A. The foetus movement starts and hair appears on the head	I. 24 weeks of pregnancy
B. The foetus develops limbs and digits	II. End of 2 months of pregnancy
C. The foetus develops external genital organs	III. 5 months of pregnancy
D. The foetus body is covered with fine hair	IV. 12 weeks of pregnancy

Choose the correct answer from the options given below :

- (1) A-III, B-II, C-IV, D-I
- (2) A-II, B-IV, C-III, D-I

(3) A-IV, B-II, C-III, D-I

(4) A-III, B-I, C-IV, D-I (Note: Reviewing marking in image A-III, B-II, C-IV, D-I)

142. A group of researchers procured some fish-like animals and upon investigation the following characters were observed :

A. Endoskeleton was made of cartilage.

B. Ectoparasitic; as they were found attached on fish skin with their circular sucking mouth.

C. Paired fins and scales were absent, but 7 pairs of gill slits were present.

Which of the following species of animals did to fit best with these characters ?

(1) Exocoetus sp.

(2) Branchiostoma sp.

(3) Petromyzon sp.

(4) Scoliodon sp.

143. Spermatogonia undergo a series of cell divisions to produce sperms. Select the correct statements from the following :

A. Spermatogonia always undergo meiotic cell division.

B. Primary spermatocytes divide mitotically to produce secondary spermatocytes.

C. Secondary spermatocytes, through their second meiotic division, produce haploid spermatids.

D. Spermatids produce spermatozoa through mitosis.

E. Spermatids transform into spermatozoa by spermiogenesis.

Choose the correct answer from the options given below :

(1) C and E only

(2) A, C and E only

(3) B, C and D only

(4) A and E only

144. What is the probability of having children with 'O' blood group, where both mother and father are heterozygous for 'A' and 'B' blood group, respectively ?

- (1) 50%
 - (2) 0%
 - (3) 75%
 - (4) 25%
-

145. Arrange the following events occurring in Renin-Angiotensin-mechanism in the correct order :

- A. Increase in blood pressure and Glomerular filtration rate.**
- B. Reabsorption of Na^+ and water from distal parts of tubule due to Aldosterone.**
- C. Fall in Glomerular filtration rate.**
- D. Vasoconstriction by Angiotensin II and release of Aldosterone.**
- E. Renin converts Angiotensinogen into Angiotensin I, followed by Angiotensin II.**

Choose the correct answer from the options given below :

- (1) C, A, B, D, E
 - (2) A, D, B, E, C
 - (3) A, C, E, B, D
 - (4) C, E, D, B, A
-

146. Match List I with List II :

List I (Respiratory Volume)	List II (Capacity in mL)
A. ERV (Expiratory Reserve Volume)	I. 2500 - 3000 mL
B. RV (Residual Volume)	II. 500 mL
C. IRV (Inspiratory Reserve Volume)	III. 1000 - 1100 mL
D. TV (Tidal Volume)	IV. 1100 - 1200 mL

Choose the correct answer from the options given below :

- (1) A-III, B-I, C-IV, D-II
 - (2) A-III, B-IV, C-I, D-II
 - (3) A-I, B-III, C-II, D-IV
 - (4) A-I, B-II, C-I, D-IV
-

147. Match List I with List II :

List I	List II
A. Progestasert	I. Barrier made of rubber used by females
B. Multiload 375	II. Oral contraceptive
C. Diaphragm	III. Hormone releasing IUD
D. Saheli	IV. Copper releasing IUD

Choose the correct answer from the options given below :

- (1) A-III, B-IV, C-I, D-II
 - (2) A-III, B-IV, C-II, D-I
 - (3) A-IV, B-II, C-I, D-III
 - (4) A-IV, B-III, C-I, D-II
-

148. Non-membrane bound cell organelles found in both prokaryotic and eukaryotic cells are :

- (1) Centrosomes
 - (2) Ribosomes
 - (3) Lysosomes
 - (4) Mitochondria
-

149. Ecological pyramids represent the relationship between the organisms at different trophic levels and they are generally inverted for :

- (1) Pyramid of energy in pond ecosystem
 - (2) Pyramid of biomass in sea
 - (3) Pyramid of number in grassland
 - (4) Pyramid of biomass in grassland
-

150. The flightless bird with forelimbs modified as paddle-like structures suited for swimming is known as :

- (1) Struthio

- (2) Psittacula
(3) Neophron
(4) Aptenodytes
-

151. Match List I with List II :

Choose the correct answer from the options given below :

List I (Bioactive molecules)	List II (Importance)
A. Streptokinase	I. Immunosuppressive agent
B. Statins	II. Removal of clots from the blood vessels
C. Lipases	III. Blood cholesterol-lowering agent
D. Cyclosporin A	IV. Detergent formulations

- (1) A-II, B-III, C-IV, D-I
(2) A-IV, B-III, C-II, D-I
(3) A-II, B-III, C-I, D-IV
(4) A-III, B-II, C-I, D-IV
-

152. Choose the correct statements regarding cell organelles and their inclusions.

- A. The endomembrane system includes Golgi complex, endoplasmic reticulum and mitochondria.
B. Rough endoplasmic reticulum bears ribosomes on its surface.
C. Both mitochondria and plastids have circular DNA.
D. A network of microtubules, microfilaments and intermediate filaments present in the cytoplasm is called cytoskeleton.
E. Mitochondrion is a single membrane-bound structure.

Choose the correct answer from the options given below :

- (1) C, D and E only
(2) A and B only
(3) B, C and D only
(4) B, C and D only (Duplicate in original paper)
-

153. Select the set of fishes which belong to the class Osteichthyes :

- (1) Devil fish, Cuttlefish and Hagfish
 - (2) Starfish, Hagfish and Cuttlefish
 - (3) Flying fish, Angel fish and Fighting fish
 - (4) Saw fish, Fighting fish and Dog fish
-

154. In a population of a grasshopper species, the chromosome number of some members is 23 and some other members possess 24 chromosomes. The 23 and 24 chromosome-bearing members in this species are _____.

- (1) all males
 - (2) all females
 - (3) females and males, respectively
 - (4) males and females, respectively
-

155. The WBC count of a person's blood sample is 8000/cu.mm. How many eosinophils and lymphocytes would be in the same blood sample approximately ?

- (1) 160 - 240/cu.mm and 1600 - 2000/cu.mm, respectively
 - (2) 100 - 120/cu.mm and 160 - 200/cu.mm, respectively
 - (3) 300 - 500/cu.mm and 500 - 700/cu.mm, respectively
 - (4) 300 - 500/cu.mm and 1200 - 1500/cu.mm, respectively
-

156. The toxin proteins isolated from *Bacillus thuringiensis*, coded by which of the following genes would control cotton bollworms and corn borer, respectively ?

- (1) *cryIAc* and *cryIIAb*
 - (2) *cryIAc* and *cryIIAb*
 - (3) *cryIAc* and *cryIIAb* and *cryIAb*
 - (4) *cryIIAb* and *cryIAc*
-

157. Match List I with List II :

List I (Drug)	List II (Effect)
A. Nicotine	I. Causes sense of euphoria and increased energy
B. Morphine	II. Stimulates adrenal gland to release catecholamines into blood circulation
C. Heroin	III. Effective sedative and painkiller
D. Cocaine	IV. A depressant; slows down body function

Choose the correct answer from the options given below :

- (1) A-III, B-II, C-IV, D-I
- (2) A-II, B-III, C-IV, D-I
- (3) A-II, B-III, C-I, D-IV
- (4) A-III, B-II, C-I, D-IV

158. Match List I with List II related to muscular/skeletal system :

List I	List II
A. Tetany	I. Inflammation of joints
B. Arthritis	II. Autoimmune disorder affecting neuromuscular junction
C. Myasthenia gravis	III. Wild contraction in muscle due to low Ca^{++} in body fluid
D. Muscular dystrophy	IV. Progressive degeneration of skeletal muscle

Choose the correct answer from the options given below :

- (1) A-III, B-I, C-II, D-IV
- (2) A-IV, B-III, C-II, D-I
- (3) A-I, B-II, C-III, D-IV
- (4) A-III, B-II, C-I, D-IV

159. In which animal do haploid cells divide mitotically to produce gametes ?

- (1) Male honeybees
- (2) Male grasshoppers
- (3) Male earthworms
- (4) Male frogs

160. In humans, respiration occurs in the following steps. Arrange these steps in the correct order.

- A. Diffusion of O_2 and CO_2 between blood and tissues.
- B. Diffusion of O_2 and CO_2 across alveolar membrane.
- C. Pulmonary ventilation by which atmospheric air is drawn in and CO_2 rich alveolar air is released out.
- D. Cellular respiration.
- E. Transport of gases by the blood.

Choose the correct answer from the options given below :

- (1) A, B, C, D, E
 - (2) E, A, C, D, B
 - (3) C, A, B, E, D
 - (4) C, B, E, A, D
-

161. Arrange the following cell layers/structures around the female gamete, from outer to inner side :

- A. Zona pellucida
- B. Perivitelline space
- C. Corona radiata
- D. Plasma membrane of ovum

Choose the correct answer from the options given below :

- (1) C, A, D, B
 - (2) C, A, B, D
 - (3) D, B, A, C
 - (4) A, C, B, D
-

162. The human protein named α -1-antitrypsin, obtained from transgenic animals, is used for the treatment of _____.

- (1) Alzheimer's disease
- (2) Emphysema
- (3) Rheumatoid arthritis
- (4) Cystic fibrosis

163. Select the correct statements regarding cell membrane in eukaryotic cell.

- A. Membrane of human RBCs has approximately 52% protein.
- B. Major phospholipids are arranged in a bilayer.
- C. Extensions of the plasma membrane into the cell form mesosomes.
- D. Tails towards the inner part of lipids are hydrophobic and thus protected from aqueous medium.
- E. Glycocalyx is present on the outer surface of the plasma membrane.

Choose the correct answer from the options given below :

- (1) A, C and E only
- (2) B, C and E only
- (3) D and E only
- (4) A, B, D and E only

164. Male frogs can be distinguished from female frogs due to the presence of :

- A. Bulging eyes
- B. Vocal sacs
- C. Webbed digits in feet
- D. Copulatory pad on first digit of fore limbs
- E. Olive green-coloured skin with dark irregular spots

Choose the correct answer from the options given below :

- (1) B and D only
- (2) B and C only
- (3) A, B and D only
- (4) C and E only

165. Which of the following equations depicts Verhulst-Pearl logistic population growth ?

- (1) $\frac{dN}{dt} = rN \left(\frac{K-N}{K} \right)$
- (2) $\frac{dN}{dt} = rN \left(\frac{K+N}{K} \right)$
- (3) $\frac{dN}{dt} = rN \left(\frac{N-K}{K} \right)$

(4) $\frac{dN}{dt} = rN$

166. Choose the correct statements regarding frog's anatomy :

- A. Hepatic portal system is the special venous connection between liver and intestine.
- B. There are twelve pairs of cranial nerves arising from the brain.
- C. The ureters and oviducts open separately into the cloaca in female frogs.
- D. Hind-brain consists of cerebellum, medulla oblongata and optic lobes.
- E. Sinus venosus joins the right atrium of heart.

Choose the correct answer from the options given below :

- (1) B and D only
 - (2) A, C and E only
 - (3) A, B and C only
 - (4) B and C only
-

167. Select the *incorrect* statements with reference to Rh grouping.

- A. Erythroblastosis foetalis is a condition observed having foetus with Rh^{-ve} blood and mother with Rh^{+ve} blood.
- B. Rh antigen is observed on RBCs in the majority of human beings.
- C. Before blood transfusion, Rh group should also be matched.
- D. Rh incompatibility is observed when a pregnant mother is Rh^{-ve} and the foetus is Rh^{+ve} .
- E. Erythroblastosis foetalis can be avoided by administering anti-Rh antibodies to the mother immediately after the delivery of the second child.

Choose the answer from the options given below :

- (1) A and E only
 - (2) A and B only
 - (3) B and C only
 - (4) C and D only
-

168. Which of the following statements are correct with reference to human endoskeleton ?

- A. Human skull is monocondylic.
- B. The joint between any two adjoining vertebrae is a cartilaginous joint.

- C. In human beings, the number of cervical vertebrae is seven.
D. All ribs except the last 2 pairs are bicephalic.
E. The occipital bone of skull is articulated with atlas vertebra.

Choose the correct answer from the options given below :

- (1) A, B and D only
(2) B and E only
(3) B, C and E only
(4) C, D and E only
-

169. Match List I with List II :

List I (Hormone) - List II (Function)

- A. Cortisol - I. Stimulates the formation of alveoli in mammary glands
B. Aldosterone - II. Produces anti-inflammatory reactions
C. Cholecystokinin - III. Stimulates reabsorption of Na^+ and water from renal tubule
D. Progesterone - IV. Stimulates secretion of pancreatic enzymes and bile juice

Choose the correct answer from the options given below :

- (1) A-III, B-II, C-IV, D-I
(2) A-II, B-III, C-IV, D-I
(3) A-IV, B-II, C-I, D-III
(4) A-II, B-III, C-I, D-IV
-

170. The following are the stages of life cycle of Plasmodium. Arrange the stages in the proper order.

- A. The parasites reproduce asexually in RBCs, bursting the cells.
B. The parasites reproduce asexually in liver cells, bursting the cells and releasing into blood.
C. Gametocytes develop in RBCs.
D. Sporozoites reach the liver through the blood.
E. Female mosquito injects sporozoites into humans during bite.

Choose the correct answer from the options given below :

- (1) A, B, C, D, E

- (2) E, D, B, A, C
 - (3) C, A, B, D, E
 - (4) E, C, D, B, A
-

171. Select the *incorrect* statements from the following :

- A. Digestive system in Platyhelminthes is incomplete.**
- B. Bilateral symmetry is a characteristic feature of adult Echinoderms.**
- C. Pseudocoelom is possessed by Aschelminthes.**
- D. Notochord is persistent throughout life in the class Chondrichthyes.**
- E. Members of class Reptilia maintain a constant body temperature.**

Choose the answer from the options given below :

- (1) B and D only
 - (2) B and E only
 - (3) A and C only
 - (4) B and C only
-

172. The specific receptors for neurotransmitters in a synapse are present on _____.

- (1) Post-synaptic membrane
 - (2) Pre-synaptic membrane
 - (3) Myelin sheath
 - (4) Schwann cell
-

173. Choose the correct statements regarding muscle contraction.

- A. A motor neuron carries a signal sent by the Central Nervous System (CNS) to the sarcolemma of the muscle fibre.**
- B. The neural signal generates an action potential which causes the release of Ca^{++} into sarcoplasm.**
- C. Increase in Ca^{++} inactivates the actin for breaking cross bridges.**
- D. Actin binds to the myosin head to form a cross bridge.**
- E. Shortening of sarcomere takes place by pulling actin filaments towards the centre of 'A' band.**

Choose the correct answer from the options given below :

- (1) A, B, D and E only
 - (2) C and D only
 - (3) C and E only
 - (4) A and B only
-

174. Which of the following is *not* an example of convergent evolution ?

- (1) Eyes of octopuses and mammals
 - (2) Fore limbs of whales and bats
 - (3) Wings of butterflies and birds
 - (4) Flippers of penguins and dolphins
-

175. The JGA (Juxta Glomerular Apparatus) is a special sensitive region formed by cellular modifications in _____ related to the same nephron.

- (1) Distal convoluted tubule and efferent renal arteriole
 - (2) Proximal convoluted tubule and afferent renal arteriole
 - (3) Distal convoluted tubule and afferent renal arteriole
 - (4) Proximal convoluted tubule and efferent renal arteriole
-

176. The following reaction depicts the activity of a particular class of enzymes :

Identify the enzyme class 'E' from the following options :

- (1) Ligases
- (2) Lyases
- (3) Isomerases
- (4) Transferases

177. Match List I with List II :

List I - List II

A. Molluscs - I. Pulmonary respiration only

B. Reptiles - II. Branchial respiration

C. Adult amphibians - III. Cellular respiration

D. Amoeba - IV. Pulmonary and Cutaneous respiration

Choose the correct answer from the options given below :

(1) A-III, B-II, C-I, D-IV

(2) A-II, B-I, C-IV, D-III

(3) A-II, B-I, C-III, D-IV

(4) A-I, B-II, C-IV, D-III

178. What is the reason behind production of large holes in 'Swiss Cheese' ?

(1) The production of large amount of CO₂ by *Clostridium butyricum*

(2) The production of large amount of CO₂ and H₂ by *Trichoderma polysporum*

(3) The production of large amount of CO₂ and H₂ by lactic acid bacteria called *Lactobacillus*

(4) The production of large amount of CO₂ by *Propionibacterium sharmanii*

179. Match List I with List II with respect to chronology of evolution of life forms :

List I - List II

A. About 65 mya - I. Jawless fish probably evolved

B. About 500 mya - II. The dinosaurs suddenly disappeared from the earth

C. About 350 mya - III. Seaweeds and few plants probably existed

D. About 320 mya - IV. Invertebrates were formed and became active

Choose the correct answer from the options given below :

(1) A-II, B-IV, C-I, D-III

(2) A-II, B-I, C-IV, D-III

(3) A-I, B-II, C-III, D-IV

(4) A-III, B-IV, C-I, D-II

180. Choose the correct statements regarding population interactions between two species.

A. In both parasitism and commensalism, only one species benefits and the other is harmed.

B. Both species benefit in mutualism.

C. Both species benefit in commensalism.

D. In parasitism, only one species benefits and the other is harmed.

E. In amensalism, one species is harmed and the other is unaffected.

Choose the correct answer from the options given below :

(1) A and D only

(2) A and B only

(3) B and E only

(4) B, D and E only
