

Sharath Gore

Biology mock test 5 2022-23

Time : 45 Min

Bio : Full Portion Paper

Marks : 400

Hints and Solutions

101) Ans: **B)** All cyclostomes do not possess jaws and paired fins.

Sol: Ornithorhynchus and Tachylossus are oviparous mammals. Crocodile is a reptile which possesses four chambered hearts. In cartilaginous fish (except Chimaera) gills are not covered by an operculum.

102) Ans: **D)** productivity, gross primary productivity

Sol: The rate of biomass production and the rate of production of organic matter during photosynthesis are known as productivity, gross primary productivity. The productivity of an ecosystem is the rate of biomass production, i.e., the amount of organic matter accumulated by any trophic level per unit area in unit time. Gross primary productivity is the total organic matter synthesised by the producers in the process of photosynthesis per unit time and area.

103) Ans: **D)** 6 ATP

Sol: In mitochondrial electron transport system, a pair of electrons passing from NADH molecules by sequential series of cytochrome enzymes to molecular oxygen, give rise to 3 ATP. Thus two pairs of electrons will give 6 ATP.

104) Ans: **C)** Myosin binding sites on actin

Sol: Tropomyosin is a protein present in the actin filaments in muscles. The molecule consists of two elongated strands that run along the length of the filament. When the muscle is at rest, the tropomyosin molecule covers the binding site of the actin molecule, where interaction with myosin occurs. On contraction of the muscle, the tropomyosin is displaced by another protein, troponin, allowing the interaction of actin with myosin.

105) Ans: **D)** To facilitate communication between adjoining cells by connecting the cytoplasm for rapid transfer of ions, small molecules and some large molecules

Sol: Most cells in animal tissues (with the exception of a few terminally differentiated cells like skeletal muscle cells and blood cells) are in communication with their adjoining cells via gap junctions. At the place where gap junction is present, membranes of two adjacent cells are separated by a uniform narrow gap of about 2-4 nm. The gap is spanned by channel forming proteins called connexins, which allow inorganic ions, and other small water soluble molecules to pass directly from cytoplasm of one cell to cytoplasm of other cell.

106) Ans: **C)** It traps infrared radiations

Sol: Carbondioxide is a greenhouse gas, i.e., it traps a substantial amount of long -wave infrared radiation emitted back by earth's surface and not let it leave the earth's atmosphere. It causes increased temperature. So, in the absence of carbondioxide in our atmosphere, temperature of earth's surface would have been less than the present level.

107) Ans: **C)** Glycerol and fatty acids

108) Ans: **C)** Rhizobium

109) Ans: **C)** Homeostasis

110) Ans: **A)** fungi

Sol: More than 70% of all the species recorded on earth are animals, while plants (including algae, fungi, bryophytes, gymnosperms and angiosperms) consist no more than 22% of the total. Among plants, fungi are much more in number as compared to lichens, algae, ferns and mosses.

111) Ans: **A)** Carpals

Sol: Gliding joints are found between the carpal bones and between the tarsal bones. The elbow, the knee and ankle are examples of hinge joint. Whereas the joint between the atlas and axis is pivot joint and the joint between the carpal and metacarpal thumb of the hand is an example of saddle joint. Ball and socket joint is present between glenoid cavity of the pectoral girdle and head of the humerus.

112) Ans: **D)** ozone

Sol: The thickness of the ozone in a column of air from the ground to the top of the atmosphere is measured in terms of Dobson Unit (DU)

113) Ans: **D)** A tertiary consumer

Sol: Because lamb is a primary consumer and it is grazing the grass and small herbs and wolf eats lamb means it is secondary consumer. The tiger eats wolf (the secondary consumer) thus it is called tertiary consumer.

114) Ans: **D)** 7 years

Sol: Gregor Johann Mendel (1822-1884) is known as Father of Genetics as he was the first to demonstrate the mechanism of transmission of characters from one generation to the other. He conducted hybridization experiments on Garden pea (*Pisum sativum*) for 7 years (from 1856-1863). Initially, he selected 34 pairs of varieties of pea

plants, then 22, but ultimately worked with only 7 pairs of varieties.

115) Ans: C) Himgiri

116) Ans: A) Anemophilous

Sol: In Pinus the pollination is anemophilous, (wind) i.e., pollen grains are carried to the ovule through wind.

117) Ans: D) At high altitude O_2 level is less hence more RBCs were required to absorb enough oxygen

118) Ans: A) Xylem with vessels

119) Ans: B) Cretinism

Sol: Here, cystic fibrosis, thalassaemia and haemophilia are the hereditary diseases.

120) Ans: B) Both the statement 1 and the statement 2 are true and the statement 2 is a correct explanation of the statement 1

Sol: In gymnosperms, the xylem consists only of tracheids and xylem parenchyma. There are no wood vessels. The phloem contains sieve tubes with sieve plates out hence no companion cells.

121) Ans: D) Both (B) and (C)

122) Ans: B) Spinach

Sol: Spinach is a long day plant. Long day plants flower when they receive long photo periods or light hours which are above a critical length, e.g., wheat, oat, sugarbeet. Glycine max (soyabean), Chrysanthemum and tobacco are short day plants. They flower when the photoperiod or day length is below a critical period.

123) Ans: B) The sperm lysins in the acrosome dissolve the egg envelope facilitating fertilization
Sol: Acrosome is the cap-like structure on the front end of a spermatozoon and it breaks down just before fertilization (the acrosome reaction), releasing a number of hydrolytic enzymes, also known as sperm lysins that assist penetration between the follicle cells that still surround the ovum, thus facilitating fertilization. Failure of the acrosome reaction is a cause of male infertility.

124) Ans: A) Hypo tonic

Sol: If the plasmolysed cell (flaccid cell) is placed in hypotonic solution then endosmosis occurs. It makes the cell again turgid (volume increases).

125) Ans: C) Companion cells

Sol: Companion cells are found in angiosperms only while in gymnospermic plants albuminous cells are found in place of companion cells.

126) Ans: C) DNA

127) Ans: D) Transpiration cohesion theory of Dixon

128) Ans: D) Promotes bolting

Sol: Auxins have been used extensively in agricultural and horticultural practices and help to initiate rooting in stem cuttings, promote flowering in pineapples. They prevent fruit and leaf drop at early stages but promote the abscission of older mature leaves and fruits. Auxins also induce parthenocarpy, e.g., tomatoes. They are widely used as herbicides. Auxins also control xylem differentiation and help in cell division. They prevent growth of lateral buds and ensure apical dominance. Bolting is induced by gibberellins which induce sub apical meristem to develop faster. This causes elongation of reduced stem or bolting in case of rosette plants.

129) Ans: A) Condensation → Nuclear membrane disassembly → Arrangement at equator → Centromere division → Segregation → Telophase

Sol: Mitosis is divided into four phases: prophase, metaphase, anaphase and telophase. During prophase the indistinct and intertwined DNA molecules condenses to form elongated chromosomes. The nuclear membrane disintegrates during prometaphase. During metaphase, the chromosomes align themselves at the equatorial plate. During anaphase, centromere of each chromosome divides into two so that each chromosome comes to have its own centromere. Chromatids move towards opposite poles along the path of their chromosome fibres. Finally during telophase, two chromosome groups reorganise to form two nuclei. Nuclear envelope reappears, Golgi complex and endoplasmic reticulum are reformed. Options (c) also gives the correct sequence of events but it misses step II (nuclear membrane disassembly).

Hence, is rules out as best appropriate answer is option (a).

130) Ans: B) A-(iii), B-(iv), C-(i), D-(ii)

131) Ans: D) S.G. Nawaschin

Sol: Double fertilisation is the process of fusion of two male gametes brought by a pollen tube to two different cells of the same female gametophyte in order to produce two different structures. It is found only in angiosperms where it was first discovered by Nawaschin in 1898 in Fritillaria and Lilium. Out of the two male gametes one fuses with egg or oosphere to perform generative fertilisation (syngamy or true fertilisation). It gives rise to a diploid zygote or oospore. The second male gamete fuses with the two haploid polar nuclei or diploid secondary nucleus of the central cell to form a triploid primary endosperm nucleus (PEN) and it is known as vegetative fertilisation (or triple fusion).

132) Ans: D) ureotelic mode of excretion

Sol: Excretion of urea is called as ureotelism and the animals which excrete urea are called ureotelic. Ureotelic animals include Ascaris, earthworm (both

are ammonotelic and ureotelic), cartilaginous fishes like sharks and sting rays, semi-aquatic amphibians such as frogs and toads, aquatic or semi-aquatic reptiles like turtles, terrapins and alligators, and man and all other mammals. Urea is less soluble and less toxic in water than ammonia. So, it can stay for some time in the body. Amphibian tadpole (e.g., tadpole of frog) excrete ammonia but after metamorphosis frog excretes urea.

133) Ans: B) Proteins can also undergo flip-flop movements in the lipid bilayer

Sol: According to fluid mosaic model, there is rapid internal motion involving flexing, within each lipid molecule a rapid lateral diffusion of the lipids is possible and a slow 'flip-flop' motion, i.e., a transfer of lipid molecules from one side of the bilayer to the other, is also possible. The lipid molecules might also rotate about their axes. The proteins of the membrane are concerned with the enzymatic activity of the membrane, with transport of molecules, and with a receptor function whereas, the lipid bilayer provides the permeability barrier.

134) Ans: A) Thalamus may elongate to show inter nodes

Sol: Thalamus may show inter nodes, between various types of floral organs anthophore, androphore, gynophore. This evidence shows that flower is a modified shoot.

135) Ans: B) ganglionic cells and amacrine cells

Sol: Different neuronal cell types like rods and cones, horizontal cells, bipolar cells, amacrine cells, ganglionic cells, etc present in retina. The bipolar cells transmit signals vertically from the rods, cones and horizontal cells to the inner plexiform layer, where they synapse with ganglionic cells and amacrine cells.

136) Ans: A) Mandya

Sol: Kokkarebellur Bird Sanctuary is located in Mandya. Kokkarebellur is a village in Maddur taluka of Mandya district of Karnataka, India. The main species of birds that nest in Kokkarebellur- the spot- billed pelican and painted stork (Ibis leucocephalus) are given the conservation status of 'near threatened category' in the IUCN red list of 2008.

137) Ans: B) Parathyroid hormone decrease the Ca^{2+} levels in blood.

Sol: Parathyroid hormone or parathormone is released by parathyroid glands and it also known as Collip's hormone after the name of its discoverer. This hormone regulates the calcium and phosphate balance between blood and other tissues. It increases calcium resorption in nephron, mobilises the release of calcium into blood from bones and hence increases blood calcium level.

138) Ans: D) All of these

Sol: Thorns are defensive organs against

herbivorous animals. It helps in climbing and reducing the loss of water (transpiration) from the exposed parts of the plants.

139) Ans: C) Hutchinson

140) Ans: A) Controls more than one phenotype

141) Ans: D) aldosterone

Sol: The hormones not involved in sugar metabolism is aldosterone. Aldosterone (salt-retaining hormone) is the principal mineralocorticoid in humans, secreted by adrenal cortex and its main function is to regulate sodium content of the body.

Insulin and glucagon are respectively secreted by beta cells and alpha cells of islets of Langerhans of pancreas. Cortisone is a glucocorticoid secreted by adrenal cortex. All these three hormones are involved in sugar metabolism.

142) Ans: A) 31

Sol: The equation of photosynthesis is $6\text{CO}_2 + 12\text{H}_2\text{O} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{H}_2\text{O} + 6\text{O}_2$

No. of CO_2 molecules utilized = 6

No. of H_2O molecules utilized = 12

No. of $\text{C}_6\text{H}_{12}\text{O}_6$ (sugar) molecules produced = 1

No. of H_2O molecules produced = 6

No. of O_2 molecules produced = 6

So, total number of CO_2 , H_2O , O_2 and sugar utilized and produced = $6 + 12 + 1 + 6 + 6 = 31$.

143) Ans: A) 1960's

Sol: The development and usage of several high yield varieties of wheat and rice, better irrigation facilities, fertilizer application, weed, pest and pathogen control and better agricultural management in 1960s, increased the yields per unit area. This phase is often known as green revolution. In India, it was witnessed during mid 1960s.

144) Ans: C) 0.5 ppm

Sol: Heavy metals and persistent pesticides like organochlorine or chlorinated hydrocarbons like DDT enter into food chain and increase in amounts per unit weight of organisms with the rise in trophic level because of their accumulation in fat. This phenomenon is known as biomagnification, e.g., 0.003 parts per billion (ppb) of DDT concentration in water changes to 30 ppb or 0.003 parts per million (ppm) in phytoplankton, 0.04 in zooplankton, 0.5 ppm in clams and small fish, 2.0 ppm in predator fish and 25 ppm in fish eating birds like sea gulls. This was discovered when in an island of USA, regular DDT spray for a few years, resulted in drastic decline in the population of fish eating birds.

145) Ans: D) Platyhelminthes

146) Ans: D) one glycerol and three fatty acid molecules

Sol: Neutral or true are triglycerides which are formed by esterification of three molecules of fatty acids with one molecule of trihydric molecules of fatty acids with one molecule of trihydric alcohol, glycerol (glycerine or trihydroxy propane)

147) Ans: D) Corpus luteum

Sol: Corpus luteum is responsible for the production of progesterone, (the hormone responsible for the maintenance of endometrium). Progesterone hormone is secreted by the corpus luteum of the ovary. It stimulates further development of the uterine epithelium and mammary glands and also required for the formation of the placenta and for the maintenance of pregnancy.

148) Ans: D) a, c and e

Sol: The correct statements are as follows:

Ovules generally differentiates a single megaspore mother cell (MMC) in the micropylar region of the Nucellus.

In a majority of angiosperms, one of the megaspore remains functional while the other three degenerated.

These mitotic division are strictly free nuclear, that is, nuclear, that is, nuclear division are not immediately followed by cell wall formation.

149) Ans: B) Avicennia

150) Ans: A) Azotobacter

Sol: Azotobacter (aerobic) is a free living N_2 , fixing bacteria. it is developed in root nodules and fix atmospheric N_2 into ammonia in symbiotic association with leguminous plants.

151) Ans: D) Infront of the lens

Sol: Aqueous humour is the watery fluid in the anterior chamber of the eye between the lens and the corena.

152) Ans: C) This Statement 1 is true, but the Statement 2 is false

Sol: Saline water is not given to a patient of hypertension because it may cause rise in blood pressure which may be fatal to patient.

153) Ans: D) Mucous cells of the salivary glands

154) Ans: B) Albuminous cells

Sol: Albuminous cells are storage cells which are found in pteridophytes and gymnosperms stem, they store minerals as well as starch.

155) Ans: A) Both statement 1 and statement 2 are true and statement 2 is the correct explanation of statement 1.

Sol: Consciousness refer to awareness of the surroundings to external stimuli. The external stimuli can be physical, chemical or biological. All organisms, from primitive prokaryotes to most advanced and complex eukaryotes, are able to sense and respond to environmental factors. So,

consciousness is said to be the defining property of living organisms.

156) Ans: D) the pressure of flowing blood exerted on the wall of arteries and veins

157) Ans: C) interstitial fluid

Sol: All the fluids outside the cells are collectively termed the extracellular fluid. The extracellular fluid is mainly present as interstitial fluid and plasma and the interstitial fluid surrounds each cell. The plasma is the noncellular part of the blood and communicates continuously with the interstitial fluid through the pores of the capillary membranes.

158) Ans: B) Protogyny

159) Ans: D) All the above

160) Ans: A) help in eliminating the non-transformants, so that the transformation can be regenerated

161) Ans: B) Saprophytic

162) Ans: A) Testis

Sol: Each testicular lobules of testis has two to three seminiferous tubules. Wall of each seminiferous tubules is formed of a single layered germinal epithelium.

163) Ans: A) Phagocytic

Sol: Histocyte is a phagocytic cell. It is found in loose connective tissue.

164) Ans: A) Lateral meristem

165) Ans: B) All enzymes are proteins

166) Ans: B) Gibberellin

Sol: Gibberellin phytohormones promotes male flowering and parthenocarpy. It has masculating effect in some plants e.g., it promotes male flowering in genetically female flowers of Cannabis and seedless pomaceous fruits can be produced by application of gibberellins to unpollinated flowers (parthenocarpy).

167) Ans: C) Conversion of pyruvate to acetyl CoA

Sol: Oxidative decarboxylation is the link reaction or gateway step as it links glycolysis with Krebs' cycle and pyruvate which is formed in cytoplasm by glycolysis produce CO_2 , $NADH_2$ and acetyl CoA by oxidative decarboxylation reaction. Acetyl CoA functions as substrate entrant for Krebs' cycle.

168) Ans: A) PEP carboxylase

169) Ans: D) a-8th sternum, b-anal cercus, c-10th tergum d-anal

170) Ans: C) Dedifferentiation

Sol: Under certain condition, parenchymatous cells

of a plant tissue which is a permanent tissue undergoes dedifferentiation and start dividing and form undifferentiated mass of cell called callus. Dedifferentiation process involves activation of certain genes which not only reverse differentiation but also stimulates cell division. Cork cambium, and interfascicular vascular cambium are always produced through dedifferentiation.

171) Ans: D) gets implanted in endometrium by the trophoblast cells

Sol: In human female the blastocyst gets implanted in endometrium by the trophoblast cells.

Implantation in endometrial uterine wall takes place at blastocyst stage of embryonic development. Before implantation, the blastomeres of early blastocyst get arranged into an outer layer called trophoblast and an inner group of cells attached to trophoblast called inner cell mass. It is the trophoblast layer through which blastocyst gets attached to the endometrium and the inner cell mass gets differentiated as the embryo.

172) Ans: C) Both Statement 1 and Statement 2 are false

Sol: Prokaryotic cells are not compartmentalized by endomembranes, However, invaginations of the plasma membrane may provide internal membrane surface for specialized functions e.g., mesosomes.

173) Ans: D) Vitamin of 'B' group

Sol: Commonly known as vitamin B₁

174) Ans: D) A codon in mRNA is read in a non-contiguous

Sol: The relationship between the sequence of amino acids in a polypeptide and nucleotide sequence of DNA or mRNA is called genetic code. The genetic code is continuous and does not possess pause after the triplets. So, a codon in mRNA is present in contiguous fashion. If a nucleotide is deleted or added, the whole genetic code will read differently.

175) Ans: A) Whale

Sol: Whale is a mammal and in mammals, two separate circulatory pathways are found-systemic circulation and pulmonary circulation and oxygenated and deoxygenated blood received by the left and right atria respectively pass on to the left and right ventricles.

Therefore, oxygenated and deoxygenated bloods are not mixed. This is referred to as double circulation.

176) Ans: D) Both A and B

Sol: The organism's habitat, its internal physiology and several other factors are collectively responsible for the process of reproduction.

177) Ans: A) Insulin - Gluconeogenesis

Sol: Gluconeogenesis is the process of glucose synthesis from noncarbohydrate sources, eg. fat and protein. It meets the needs of the body for glucose when carbohydrate is not available in

sufficient amounts in the diet. Insulin (a hormone) promotes the uptake of glucose by body cell, and thereby controls its concentration in the blood.

178) Ans: D) tensile strength of water

Sol: A column of water within xylem vessels of tall trees does not break under its weight due to tensile strength of water. Cohesion, adhesion and surface tension are the forces responsible for movement of water up the tracheary elements. Water molecules remain attached to one another by a strong mutual force of attraction known as cohesion force. On account of cohesion force, the water column can bear a tension or pull of upto 100 atm. Therefore, the cohesion force is also called tensile strength. Its theoretical value is about 15000 atm but the measured value inside the tracheary elements ranges between 45 atm to 207 atm. Water column does not further break its connection from the tracheary elements due to another force called adhesion force between their walls and water molecules. Another force called surface tension accounts for high capillarity through tracheids and vessels.

179) Ans: B) Juxtaglomerular cells to release renin

Sol: The kidneys have built-in mechanisms for the regulation of glomerular filtration rate. One such efficient mechanism is carried out by JGA (juxtaglomerular apparatus) which is a special sensitive region formed by cellular modifications in the distal convoluted tubule and the afferent arteriole at the location of their contact. A fall in GFR can activate the JG cells to release renin which can stimulate the glomerular blood flow and thereby the GFR come back to normal.

180) Ans: D) Mucor / Rhizopus

Sol: Fusion of coenogametes (Rhizopus and Mucor) produced a diploid resting spore called zygospore.

181) Ans: A) Test cross

182) Ans: A) Both the statement 1 and statement 2 are true but the statement 2 is not a correct explanation of the statement 1

Sol: Some erythrocytic merozoites enter fresh RBCs and form rounded gametocytes (gamonts). The gametocytes are of two types such as (i) smaller male gametocytes or microgamete and (ii) Larger female gametocytes or macrogametocytes.

183) Ans: B) heterochromatin

Sol: In a typical nucleus, some region of region of chromatin are loosely packed (and stains light) and are referred to as euchromatin.

The chromatin that is more densely packed and stains dark are known as Heterochromatin. Euchromatin is said to be transcriptionally active chromatin, whereas heterochromatin is inactive.

184) Ans: B) (ii) and (iv)

Sol: Z scheme consist of both PSI and PSII to

transfer electron excited by light starting from PSII uphill to the acceptor, down to the electron transport chain to PSI, which further comprise of excitation of electrons, transfer to another acceptor and finally down hill to NADP^+ causing reduction of it to $\text{NADPH} + \text{H}^+$. Stroma lamella contains PSI only.

185) Ans: C) II, III, I, IV

186) Ans: B) Stomach

Sol: The wall of stomach contains innumerable, simple, tubular glands called gastric glands. Five types of cells are as follows:

- (i) peptic (chief or zymogen cells),
- (ii) oxyntic (acid, parietal) cells,
- (iii) mucous cells,
- (iv) argentaffin cells and
- (v) endocrine cells.

Argentaffin cells are less common and are generally located at the base of the glands and secrete serotonin, a potent vasoconstrictor.

187) Ans: C) Solar energy

Sol: In any ecosystem, sunlight is the basic or ultimate source of energy.

188) Ans: A) Chloroplast

Sol: Since chloroplast containing cells are known as chlorenchyma.

189) Ans: C) Presence of long tap root system

Sol: Xerophytes are the plants living in xeric (dry) habitats. For example desert habitat. Plants growing in xerophytic habitats develop various morphological and physiological adaptations. Roots of these plants may be deep tap roots penetrating the soil to great depths so as to absorb water to the maximum. Roots can also be shallow but extensive and spreading so as to collect and hold rain water. In many xerophytes, leaves are reduced to form spines to reduce the transpiration losses as in cacti.

190) Ans: D) Dolly

Sol: Plants, bacteria, fungi and animals which contains foreign gene are called Genetically Modified Organisms (GMO). They contain and express one or more useful foreign genes (transgenes). Bt brinjal, golden rice, tracy, rosie, etc., are genetically modified organisms. Whereas Dolly was a cloned sheep (first mammals to cloned) born on 5th July 1996 at Roslin Institute in Edinburgh, Scotland.

191) Ans: C) Parthenium hysterophorus - Threat to biodiversity

Sol: Parthenium hysterophorus is commonly called as congress grass or carrot weed. It is herbaceous annual plant of Family Asteraceae. It is a deadly invasive, noxious weed infesting cropped and non-cropped areas. It rapidly colonises area replacing the native vegetation and causes a number of human health related problems such as skin

allergy, rhinitis and eye irritations. Also, being toxic and unpalatable it causes fodder scarcity. Therefore, it is considered a threat to the biodiversity.

192) Ans: D) The Statement 1 is false but the Statement 2 is true

Sol: Sensory cells are tall, narrow thread like and bear short sensory processes at their outer free end. These are specialized for sensitivity of touch, temperature, light and other stimuli. Sexual reproduction in Hydra does not involve pseudopodia and flagella.

193) Ans: B) Funaria

Sol: Protonema occurs in the life cycle of Funaria. The spore is the first cell of gametophytic generation and it germinates to form a filamentous branched alga like structures called protonema. It gives rise to new plant

194) Ans: C) Leghemoglobin

195) Ans: D) Nervous tissue of brain

196) Ans: C) in the form of bicarbonate ions

197) Ans: B) Corpora allata

198) Ans: B) Root

199) Ans: C) Conservation of Succinyl CoA to succinic acid

Sol: The direct synthesis of ATP from metabolites is known as substrate level phosphorylation and this is seen during conversion of Succinyl CoA to succinate acid. Succinyl CoA is acted upon by enzyme succinate or Succinyl CoA synthetase thiokinase to form succinate (a 4C compound) and the reaction releases sufficient energy to form ATP (in plants) or GTP (in animals). GTP can form ATP through a coupled reaction.

200) Ans: C) Upper chamber and is concerned with maintenance of equilibrium