Sharath Gore

Biology mock test 4 2022-23

Time : 60 Min	Bio : Full Portion Paper	Marks : 400

Hints and Solutions

101) Ans: **B)** $HgCl_2$
Sol: $HgCl_2$

102) Ans: **B)** Rhodospirillum
Sol: Many free living bacteria and blue green algae are capable to fix atmospheric nitrogen. Rhodospirillum is a free living photosynthetic anaerobic nitrogen fixing non- Sulphur bacteria. It is capable of synthesizing its organic food in presence of light and in absence of O_2 by a process called as bacterial photosynthesis. Beijericnkia and Azotobacter are free living but aerobic nitrogen fixing bacteria and rhizobium is a symbiotic nitrogen fixing bacteria.

103) Ans: **D)** Four
Sol: Number of gametes $2^n = 2^2 = 4$ where n is the number of gene in heterozygous form. The four gametes formed will be $\rightarrow ABc, AbC, Abc$ and ABC

104) Ans: **A)** Binding of calcium ions

105) Ans: **D)** Both statement 1 and statement 2 are false.
Sol: Gap junctions are direct cytoplasm to cytoplasm connections between many kinds of animal cells, these are meant for chemical exchange between cells. Tight junctions are the regions where membranes of adjacent animals cells are held close together by sealing strands. They check movement of materials between them.

106) Ans: **B)** Tobacco
Sol: Photoperiodism is phenomena in which plant response to duration and timings of light and dark period. It was first studied by W.W. Garner and H.A Allard (1920) in tobacco. They observed that Maryland Mammoth variety of tobacco could be made to flower in summer by reducing the light hours with artificial darkening.

107) Ans: **D)** conversion of pro Bt toxin to Bt toxin takes place only in highly alkaline conditions.
Sol: The Bt toxin is not toxic to human beings due to conversion of pro Bt toxin to Bt toxin takes place only in highly alkaline conditions. The Bt toxin proteins exist as inactive protoxins but once an insect ingests the inactive toxin and converted into an active form of toxin due to the alkaline pH of the alimentary canal(gut) that solublises the crystals. The activated toxin binds to the surface of midgut epithelial cells and creates pores which cause cell swelling and lysis and finally cause death of the insect.

108) Ans: **B)** Amoeba, Euglena, Chlamydomonas

109) Ans: **A)** Bacteria

110) Ans: **A)** Pachytene and diplotene
Sol: Crossing overs occurs in the homologous chromosomes only during the four stranded or tetrad stage in between pacytene and diplotene phase of meosis.

111) Ans: **A)** Both statement 1 and statement 2 are true and statement 2 is the correct explanation of statement 1
Sol: Degree of impurity of water because of organic matter is measured in terms of BOD. BOD is the oxygen in milligrams required for five days in 1L water at $20^\circ C$ for the microorganisms to metabolise organic waste and it is measure in the milligrams of oxygen taken up in one litre of sewage. The effluent that is legally allowed to be discharged into a river or stream should be such that BOD at $20^\circ C$ should not be more than 20 ppm, i.e., 20 mg per litre.

112) Ans: **C)** Transcription
Sol: Transfer of genetic information from DNA to m-RNA is known as transcription.

113) Ans: **B)** Oxygen

114) Ans: **B)** Polyarch condition
Sol: Polyarch condition is not characteristic of dicot root as it is a characteristic of monocot root in which numerous vascular bundles are present. Dicot root is diarch to hexarch i.e., 2-6 xylem and phloem patches are present and pith in a dicot root, is either absent or is inconspicuous.
In dicot root, phloem and xylem bundles are separated from each other by one or more layers of small thin walled cells termed as conjunctive parenchyma, which later on becomes meristematic to form vascular cambium.

115) Ans: **D)** All the above

116) Ans: **B)** Myocardial infarction
Sol: Heart attack, also known myocardial infarction (MI), means to a sudden event in which, a portion of the heart muscle stops working because it no longer receives blood usually due to a blockage in the coronary artery. Normally, Generally, a heart attack occurs when plaque (fat, cholesterol, and calcium) builds up and then ruptures in the coronary artery, creating a place where a blood clot

can form (thrombus).

117) Ans: **A)** cones
Sol: Colour blindness is disorder of vision in which colours are confused. Red- green colour blindness is the most common type. Colour blindness is because of recessive gene carried on the X-chromosome and so men are more likely to show the defect although women may be carriers. It results in absence or malfunctioning of one or more of the three types of cone cells responsible for colour vision.

118) Ans: **B)** Gross production
Sol: Gross productivity is the total amount of chemical energy which is stored in plants per unit area and per unit time.

119) Ans: **A)** Both Statement 1 and Statement 2 are true but Statement 2 is not the correct explanation of Statement 1
Sol: Light stimulates the movement of different plant parts in specific direction. It is called photrotropism. On keeping a potted plant near an open window of a dark room, we observe the plant bending towards the light source as a result of phototropism. Teleology involves the explanation of natural phenomena in terms of need of organisms e.g. Stem bends towards light because 'they need light for growth'.

120) Ans: **C)** carrot
Sol: Vernalisation stimulates flowering in carrot plant.
Carrot is a biennial plant which requires stimulus or low temperature for flowering. It remains vegetative during the warm season and bears flowers and fruit only during winter. It can be made to flower in one growing season by providing low temperature treatment to young plants or seedlings which is referred to as vernalisation. So vernatlisation stimulates flowering in carrot.

121) Ans: **C)** Cytons
Sol: Nissle granules or Nissle bodies as basophilic structure of various shapes-angular, conical or rhomboidal. They are pieces of granular endoplasmic reticulum with or without free polyribosomes which are found in cytons.

122) Ans: **C)** Letter L. signifies the taxonomist Linnaeus
Sol: In binomial nomenclature, the first or generic word starts with a capital letter while the second word or specific epithet starts with a small letter and the name of taxonomist appears after the specific epithet i.e., at the end of the biological name and is written in abbreviated form, e.g., Ficus benghalensis L., indicates that this species was first describes by Linnaeus.

123) Ans: **B)** squamous epithelium
Sol: Simple squamous epithelium is composed of large flat cells whose edges fit closely together like the tiles in a floor, hence it is also called pavement epithelium. The nuclei of the cells are flattened and often lie at the centre of the cells and cause bulging of cells surface. The epithelium lines the blood vessels, lymph vessels, heart, terminal bronchioles, alveoli of the lungs, walls of the Bowman's capsules descending limbs of loop of Henle. In the blood vessels and heart it is called endothelium.

124) Ans: **D)** Krebs' cycle
Sol: In cellular respiration glucose is firstly converted into a 3 carbon compound (pyruvic acid) by a series of reactions known as glycolysis. The pyruvic acid enters the mitochondria for its complete oxidation into CO_2 and water. This conversion involves a series of reactions under a cyclic pathway which is known as Krebs' cycle or citric acid cycle or tricarboxylic acid cycle.

125) Ans: **D)** The statement 1 is false but statement 2 is true
Sol: In the stage intervening between plasmogamy and karyogamy the cells often contain two nuclei or dikaryons. Such cells are known as dikaryotic cells. This phase is called as dikaryophase.

126) Ans: **A)** tonsil

127) Ans: **D)** Left auricle and left ventricle
Sol: The left auriculo- ventricular value contains two flaps and is termed bicuspid or mitral valve.

128) Ans: **A)** Calcitonin
Sol: Calcitonin hormone is not involved in tyrosine metabolism. The predominant metabolism of phenylalanine occurs through tyrosine and tyrosine is incorporated into proteins and is involved in the synthesis of variety of biologically important compounds-epinephrine, norepinephrine, dopamine (catecholamine), thyroid hormones-and the pigment melanin.

129) Ans: **C)** Oenothera lamarckiana
Sol: The term mutation was coined by Hugo de Vries (1901) for large spontaneous inheritable changes which occur suddenly in naturally reproducing population. He also proposed mutation theory of evolution in his blood "The Mutation Theory" published in 1903 in which he put forth that evolution occurred due to large discontinuous variations. He worked on Oenothera Lamarckian or evening primrose. During his experiments he found 834 mutations in a population of 54343 plants. It was later on found that the mutations observed by Hugo de Vries were actually chromosomal aberrations.

130) Ans: **A)** Both Statement 1 and Statement 2 are true but Statement 2 is not the correct explanation of Statement 1
Sol: Morphine is an alkaloid obtained from opium. It is an analgesic and used for pain relieve. Brown sugar or smack (Diacetyl morphine hydrochloride)

is more powerful analgesic than morphine.

131) Ans: **D)** The statement 1 is true but the statement 2 is false
Sol: Enzyme has specific site for substrates that is known as active sites and substrate has reactive sites. These active and reactive sites help in making of substrates enzyme complex.

132) Ans: **B)** 8
Sol: No. of phenotypes $= 2^n$
For trihybrid cross, n = 3
Therefore, no. phenotypes $= 2^3 = 8$.

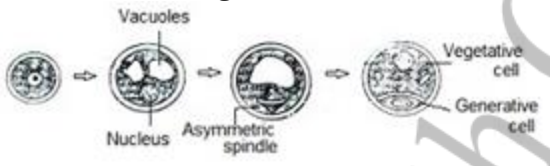
133) Ans: **B)** 40-60 dB

134) Ans: **A)** A = 3, B = 1, C = 5, D = 2

135) Ans: **C)** competition
Sol: Competition is the rivalry between two or more organisms for obtaining the same resources like food, light, water, space, shelter, mate etc. Competitors adversely affect each other.

136) Ans: **B)** multicarpellary apocarpus gynoecium
Sol: An aggregate fruit or etaerio is a group of simple fruitlets that develop from free ovaries (apocarpous condition) of a single flower (single gynoecium)

137) Ans: **B)** b-nucleus, a-vacuoles, c-asymmetric spindle,
e-generative cell, d-vegetative cell
Sol:



138) Ans: **C)** If the statement 1 is true but the statement 2 is false
Sol: Finally, in sigmoid growth curve, growth rate becomes stable as mortality and natality rates become equal to each other and finally the population shows zero growth rate as birth rate equals death rate.

139) Ans: **A)** a proton gradient forms across the inner membrane
Sol: The chemiosmotic coupling hypothesis of oxidative phosphorylation proposed by Mitchell, explains the process of ATP formation. It implies that it is linked to development of a proton gradient across a membrane. ATP synthase, required for ATP synthesis is located in F_1 particles present in the inner mitochondrial membrane and becomes active only when there is high concentration of proton on F_0 side as compared to F_1 side and the flow of proton through F_0 channel induces F_1 particle to function as ATP synthase and the energy of proton gradient produces ATP by attaching a phosphate radical to ADP.

140) Ans: **C)** p-arm and q-arm respectively
Sol: The short arm of chromosome is termed as the p(petit) arm and longer arm is referred as q arm

141) Ans: **A)** Both Statement 1 and Statement 2 are true but Statement 2 is not the correct explanation of Statement 1
Sol: Transformation is the absorption of DNA segment by a living bacteria. Transformation was first studied by a British doctor, S.F. Griffith in 1928 through an experiment on virulent (S-III) and non-virulent (R-II) strains of Diplococcus pneumonia or Pneumococcus. Griffith thought that the transforming agent was a protein. In 1944 Avery, McLeod and McCarty showed that the substance responsible for transformation was DNA.

142) Ans: **D)** Ginger
Sol: Rhizomes are perennial and vegetatively propagating structures and stores food materials and appear tuberous e.g. ginger, turmeric etc.

143) Ans: **B)** Progesterone
Sol: Progesterone hormone level reaches peak during luteal phase of menstrual cycle. Luteal phase/secretory phase usually includes days 15-28 in a 28 days cycle. After ovulation, LH stimulates the development of the corpus luteum and the corpus luteum then secretes increasing quantities of progesterone and smaller amount of estrogens. The progesterone prepares the endometrium for receiving the blastocyst and its implantation.

144) Ans: **D)** A=r,B=p, C=q

145) Ans: **B)** Bi collateral
Sol: Bi collateral vascular bundle is present in members of cucurbitaceae.

146) Ans: **B)** Mangifera
Sol: Since Mangifera (mango) is a dicot plant and reticulate venation found in dicots.

147) Ans: **C)** The statement 1 is false but statement 2 is true
Sol: In gymnosperms, xylem lacks true vessels and wood fibres. It consists of tracheids which are arranged in uniform radial rows and xylem parenchyma only. The phloem contains sieve tubes and parenchyma cells. There are no companion cells.

148) Ans: **C)** They are Bipedal and have feathers

149) Ans: **A)** Autotrophs
Sol: Plants are autotrophs because they can synthesize their own food material is presence of light.

150) Ans: **B)** heart
Sol: 'Bundle of His' is a part of heart of human. A

bundle of nodal fibres, atrioventricular bundle (AV bundle), continues from the atrioventricular node (AVN) and passes through the atrioventricular septa. It emerges on the top of the interventricular septum and immediately divides into a right and left bundle, which give rise to minute fibres throughout the ventricular musculature of the respective sides known as Purkinje fibres and these fibres along with right and left bundles are known as Bundle of His.

151) Ans: **B)** Fruticose
Sol: Fruticose or filamentous lichens are branched and shruby but with small base, e.g., Cladonia, Usnea.

152) Ans: **B)** diversity between communities
Sol: Beta diversity (β -index diversity between community diversity) appears in a range of communities because of replacement of species with the change of community/habitat because of presence of different micro-habitats, niches and difference in environmental conditions.

153) Ans: **A)** Polysaccharides of glucose

154) Ans: **C)** Parbhani Kranti

155) Ans: **B)** opening of gastrocoel
Sol: Blastopore is the opening by which the cavity of the gastrula (gastrocoel), communicates with the exterior. It is formed as a result of invagination of endoderm during embryonic development. During maturation of some animals it evolves into the anus or the mouth; in others it is conveyed over and contributes to the canal joining the primitive gut with the cavity of the neural tube.

156) Ans: **D)** Protein in duodenum in an alkaline medium

157) Ans: **C)** Polydipsia and polyuria
Sol: Antidiuretic hormone (ADH) deficiency leads to the syndrome of diabetes insipidus: inability to concentrate the urine, leading to polyuria (production of large amounts of clear urine) which is responsible for dehydration and in compensation-extreme thirst and constant need to drink (polydipsia).

158) Ans: **D)** Transpiration in leaves
Sol: The evaporative loss of water by plants through the stomata in the leaves is known as transpiration. As water evaporates through the stomata, it results in pulling of water into the leaf from the xylem. Also because of lower concentration of water vapour in the compared to the substomatal cavity and intercellular spaces, water diffuses into the surrounding air. This creates a transpirational pull which results in water absorption passively from below to the top of the plant like rope.

159) Ans: **D)** DDT is lipo soluble
Sol: DDT residues are rapidly passed through food chain causing biomagnification as DDT is lipo soluble. Biomagnification is caused by non-degradable pollutant like DDT. Heavy metals and persistent pesticides e.g., organochlorine or chlorinated hydrocarbons like DDT enter into food chain and increase in amount per unit weight of organism with the rise in trophic level because they are lip soluble.

160) Ans: **B)** A = r, B = p, C = s, D = q

161) Ans: **C)** Ligase
Sol: Ligase enzymes catalyse the formation of covalent bonds using the energy released by the cleavage of ATP. Ligases are important in the synthesis and repair of many biological molecules, including DNA ligase. It is used in genetic engineering to insert foreign DNA into cloning vectors.

162) Ans: **D)** Does all the above works

163) Ans: **C)** Ovary wall

164) Ans: **D)** bacteria
Sol: Spliceosomes helps in removal of introns. They will not occur in prokaryotes as prokaryotes do not have introns and thus, processing does not require splicing of mRNA.

165) Ans: **C)** growth of pollen tube in the stigma
Sol: In some plants, pollen grains are shed at 2-celled condition (a vegetative cell and a generative cell.) In such plants, the generative cell divided and forms the two male gametes in the process of the growth of pollen tube in the stigma. In plants which shed pollen in the three-celled condition, pollen tubes carry the two male gametes from the beginning.

166) Ans: **A)** Adhesion
Sol: Walls of tracheids and vessels of xylem are made up of lignin and cellulose and possess strong affinity for water (adhesion).

167) Ans: **C)** Both Statement 1 and Statement 2 are false
Sol: Symbiotic bacteria are those which live in mutually beneficial association with other organisms, E. coli bacteria lives as a symbiont in human intestine. It obtain food from intestine but checks the growth of putrefying bacteria and produces large quantities of vitamin B and K. Rhizobium is another common symbiotic bacteria. It obtain shelter and food from the legume and performs nitrogen fixation inside the nodules.

168) Ans: **C)** A = Membrana granulosa
B = Theca interna
C = Ovum
D = Cumulus oophorus
E = Anturm
F = Theca externa

169) Ans: **B)** Bamboo
Sol: Monocarpic plants eg. bamboo are the plants that flower only once in their life and after flowering, they produce fruits and die. All annual (e.g. wheat, rice) and biennial (e.g. carrot, radish) plants and a few perennial plants are monocarpic. A few monocarpic plants exhibit unusual flowering phenomenon e.g. certain bamboo species (Bambusa tulda) flower only once in their life time, generally after 50-100 years, produce large number of fruits and die.

170) Ans: **C)** Initiates the conversion of glycogen to glucose
Sol: Initiates the conversion of glycogen to glucose is not the function of insulin. Insulin is a protein hormone, secreted in pancreas by the beta cells of the islets of Langerhans that is important for regulating the amount of glucose in the blood. Insulin converts glucose into glycogen in the liver and muscles. Deficiency of insulin is responsible for causes diabetes mellitus.

171) Ans: **B)** Cerebellum
Sol: Purkinje cells are related to cerebellum. They are the large flask shaped cells present in the middle layer of the cerebellum. The Purkinje cells rank among the most complex of all neurons. These are multipolar neurons having large bodies from which arise several dendrons with highly branched dendrites, which form a flat fan extending towards the surface of the cerebellum.

172) Ans: **A)** Identical conspicuous segmentation in body, muscles and nervous system

173) Ans: **C)** Active transport
Sol: Re-absorption of glucose from the glomerular filrate in the kidney tubule is carried out by an active transport.

174) Ans: **D)** Proventriculus
Sol: Proventriculus is not a sensory structures in cockroach. Antennae perceive touch as they have tectile sensillae and smell as they have olfactory sensillae. Eyes are organs of sight. Anal cerci bear auditory sensillae or the sensillae for hearing. Maxillary palps have gustatory (taste receipting) and olfactory (smell receipting) sensillae. So all of these are sense organs.
Proventriculus is gizzard. It is thick walled and has six teeth which are used for grinding of food.

175) Ans: **D)** Hyposecretion of thyroid in childhood (Thyroxin)
Sol: Hyposecretion of thyroxine during the growth years or birth is known as childhood hypothyroidism or cretinism. Two important symptoms are dwarfism and mental retardation also.

176) Ans: **A)** Amphibians
Sol: Threatened species are liable to become extinct if not allowed to realise its full biotic potential by providing protection from exotic species, human exploitation and other activities. As per IUCN red list, during the last two decades, the maximum increases in the number of threatened species is among amphibians.

177) Ans: **D)** Alveoli

178) Ans: **B)** CO_2 combines with PEP
Sol: One of the basic features of C_4 plants is that CO_2 is trapped by a CO_2 acceptor, phosphoenol pyruvic acid present in the (PEP) chloroplasts of mesophyll cells of these leaves which leads to the formation of a 4-C compound oxaloactic acid.

179) Ans: **D)** An unpaired triplet of bases in an exposed position of tRNA

180) Ans: **D)** Pure water or hypotonic solution
Sol: If the plasmolysed cell (flaccid cell) is placed in hypo tonic solution, then endosmosis takes place, which makes the cell again turgid and this is known as deplasmolysis.

181) Ans: **D)** Mucosa
Sol: Mucosa layer lining the lumen of the human alimentary canal. The wall of alimentary canal comprises of four basic layers. From the outer surface inwards to the lumen, the layers are -visceral peritoneium (serosa), muscularis (muscular coat), submucosa and mucosa (mucous membrane). Mucosa is the innermost layer lining the lumen of the alimentary canal and it is so named due to it secretes mucus to lubricate the inner lining of the gut. It is further composed of three layers- muscularis mucosa, lamina propria and epithelium.

182) Ans: **C)** Anguilla sp
Sol: Anguilla sp is a catadromous fish. Many fishes, like birds, perform seasonal migration. Movement from fresh water to salt-water (sea) for spawning is known as catadromous migration. The best example of catadromous migration is furnished by two common species of eels, Anguilla rostrata of European freshwater rivers and Anguilla vulgaris of America.

183) Ans: **B)** Endosperm of castor

184) Ans: **A)** Integrated Forest Management

185) Ans: **D)** Florigen
Sol: In the process of flowering, florigen hypothetical hormone is applied that is gibberellin in nature.

186) Ans: **A)** synovial
Sol: Synovial joints are characterized by the presence of a fluid filled synovial cavity between the articulating surface of the two bones. This arrangement allows considerable movement and these joints help in locomotion and many other

movements. Ball and socket joint (between humerus and pectoral girdle), hinge joint (knee joint), pivot joint (between atlas and axis), gliding joint (between the carpals) and saddle joint (between carpal and metacarpal of thumb) are some examples.

187) Ans: **A)** endodermis
Sol: Endodermis is single layered structure which separates cortex from stele. The cells of endodermis are barrel-shaped without intercellur spaces, living and containing starch. The radial and tangential walls of endodermal cells form possess thickenings of lignin, suberin and cutin in the form of strips or bands, which are known as casparian bands or Casparian strips.

188) Ans: **A)** Green plants can synthesize food
Sol: Green plants are known as producer because they can synthesize food material in presence of light (Autotrophs).

189) Ans: **C)** Phosphorylase
Sol: Transfer of phosphate group from ATP to a carbohydrate is kown as phosphorylation and is carried out in the presence of phosphorylase enzymes. E.g., glucose (a carbohydrate) is phosphorylated to glucose -6-phosphate by ATP in the presence of enzyme hexokinase or glucokinase and Mg^{2+}.

190) Ans: **C)** Excess by CO_2 and H^+ ions
Sol: Human have a significant ability to maintain and moderate the respiratory rhythm to as per the demands of the body tissues. A specialized centre present in the medulla region of the brain known as respiratory rhythm centre is primarily responsible for this regulation. A chemosensitive area is situated adjacent to the rhythm centre which is highly sensitive to CO_2 and hydrogen.

191) Ans: **A)** Dicots
Sol: In dicots tap roots and in monocots adventitious roots is present

192) Ans: **A)** Proteins

193) Ans: **D)** A simple sugar

194) Ans: **B)** Opening of flowers

195) Ans: **B)** in the absence of effective vaccine social awareness is the only method to check the spread

196) Ans: **B)** Tertiary consumers
Sol: Heavy metals and persistent pesticides like organochlorine or chlorinated hydrocarbons like DDT travel into food chain and increase in amount per unit weight of organisms with the rise in trophic level because of their accumulation in fat. As the tertiary consumer is the highest trophic level mentioned in the question so it will contain the maximum pollution. The phenomenon is known as biomagnificaiton.

197) Ans: **C)** Diocoel
Sol: Ventricle III is called as diocoel is a small cavity of diencephalon.

198) Ans: **B)** Dicots only
Sol: Fascicular cambium separates the xylem and phloem in dicots only. In dicotyledonous stems, a thin strip of primary meristem is present in between the xylem and phloem, which is termed as fascicular cambium and the cambium cells are rectangular and thin walled. Cambium is one layered.

199) Ans: **B)** Both the statement 1 and statement 2 are true but the statement 2 is not a correct explanation of the statement 1
Sol: Cattle leech of Hirudinaria feeds on blood of cattle and leech. Thus, they are sanguivorous. The animal pocesses a nature anticoagulant hirudin that prevent the food from clotting within the body. However, hemolysis or bursting of blood cells occurs in them.

200) Ans: **A)** Bulbourethral glands
Sol: The greater vestibular glands (= Bartholin's glands) are paired glands, situated one on each side of the vaginal orifice (opening) and these glands are homolgous to the bulbourethal (Cowper's) glands of male and secrete viscid fluid that supplements lubrication during sexual intercourse.