

(BOTANY)

SECTION - A

- 101.** Five kingdom system of classification suggested by RH Whittaker is not based on
- (1) Presence or absence of a well- defined nucleus
 - (2) Mode of reproduction
 - (3) Mode of nutrition
 - (4) Complexity of body organisation
- 102.** According to five kingdom classification, bacteria belong to
- (1) Protista
 - (2) Monera
 - (3) Plantae
 - (4) Archaea
- 103.** Two kingdoms constantly featured in all biological classification are
- (1) Plantae and Animalia
 - (2) Monera and Animalia
 - (3) Protista and Animalia
 - (4) Protista and Plantae
- 104.** Which of the following statements about methanogens is not correct?
- (1) They can be used to produce biogas
 - (2) They are found in the rumen of cattle and their excreta
 - (3) They grow aerobically and breakdown cellulose rich food
 - (4) They produce methane gas
- 105.** Which statement is correct?
- (1) *Mycoplasma* is smallest and wall less living organism
 - (2) Influenza and herpes caused by virus having DNA and RNA
 - (3) *Nostoc* and *Anabaena* are important decomposer
 - (4) Methanogen are methane producing bacteria in wheat crop
- 106.** Which of the following bacteria reduces nitrate in soil into nitrogen?
- (1) *Nitrobacter*
 - (2) *Nitrococcus*
 - (3) *Thiobacillus*
 - (4) *Nitrosomonas*
- 107.** Oxygen is not produced during photosynthesis by
- (1) *Cycas*
 - (2) *Nostoc*
 - (3) Green sulphur bacteria
 - (4) *Chara*

- 108.** Read the following statements regarding bacteria.
- I.** Bacteria exchange their genetic material through conjugation which involves cell to cell contact.
 - II.** Transduction in *Salmonella* is reported by Tatum and Lederberg in 1952.
 - III.** Citrus canker disease is caused by bacterium *Xanthomonas citri*.
 - IV.** Hans Christian Gram staining method is based on cell wall composition of bacteria.
- Choose the correct option with true statements.
- (1) I and III
 - (2) I, III and IV
 - (3) I, II and III
 - (4) II and IV
- 109.** All monerans
- (1) Contain DNA and RNA
 - (2) Demonstrate a long circular strand of DNA, not enclosed in a nuclear membrane
 - (3) Are bacteria
 - (4) All of the above
- 110.** Select the incorrect statement.
- (1) Bacterial cell wall is made up of peptidoglycan
 - (2) Pili and fimbriae are mainly involved in motility of bacterial cells
 - (3) Cyanobacteria lack flagellated cells
 - (4) *Mycoplasma* is a wall less microorganism
- 111.** *Trichoderma erythrium* which gives colour to red sea is a
- (1) Green alga
 - (2) Blue-green alga
 - (3) Red alga
 - (4) Brown alga
- 112.** Pigments containing membranous extensions in some cyanobacteria are
- (1) Heterocysts
 - (2) Basal bodies
 - (3) Pneumatophores
 - (4) Chromatophores
- 113.** Plasmid are mostly found in
- (1) Virus
 - (2) Bacteria
 - (3) Fungi
 - (4) Viroid
- 114.** Bacteria that fix CO₂ by using chemical energy as source, are
- (1) Photoautotrophs
 - (2) Photoheterotrophs
 - (3) Chemoautotrophs
 - (4) Chemoheterotrophs
- 115.** Which of the following does not belong to kingdom-Monera?
- (1) *Mycoplasma*
 - (2) Archaeobacteria
 - (3) Slime mould
 - (4) Eubacteria

116. Which of the following is the site of respiration in bacteria?

- (1) Episome (2) Ribosome
(3) Mesosome (4) Microsome

117. Pigment present in cyanobacteria is the

- (1) *r*-phyococyanin (2) *r*-phycoerythrin
(3) *c*-phyococyanin (4) Anthocyanin

118. Match the column I and II.

Column I		Column II	
A.	Chrysophyte	i.	<i>Gonyaulax</i>
B.	Dinoflagellate	ii.	<i>Euglena</i>
C.	Euglenoids	iii.	Diatom
D.	Slime moulds	iv.	<i>Plasmodium</i>

- A B C D
(1) i iii ii iv
(2) i iv i iii
(3) iii i iv ii
(4) iii i ii iv

119. Which motile-stage of protozoans is helpful in feeding?

- (1) Pseudopodium (2) Cilia
(3) Flagella (4) Tentacles

120. Chrysophytes, euglenoids, dinoflagellates and Slime moulds are included in the kingdom

- (1) Protista (2) Fungi
(3) Animalia (4) Monera

121. Select the incorrect statement.

- (1) The walls of diatoms are easily destructible
(2) 'Diatomaceous earth' is formed by the cell walls of diatoms
(3) Diatoms are chief producers in the oceans
(4) Diatoms are microscopic and float passively in water.

122. The disease caused by *Trypanosoma* is

- (1) Yellow fever
(2) Sleeping sickness
(3) Kala azar
(4) Hey fever

123. Osmoregulation in *Paramecium* is performed by

- (1) Contractile vacuole
(2) Trichocysts
(3) Cytopyge
(4) Cytostome

124. Which of the following combinations of characters is for slime moulds?

- (1) Parasitic, Plasmodium with true walls, spores dispersed by air currents
(2) Saprophytic, Plasmodium without walls, spores dispersed by water
(3) Parasitic, Plasmodium without walls, spores dispersed by water
(4) Saprophytic, Plasmodium without walls, spores dispersed by air currents

125. Protista includes

- (1) Unicellular eukaryotes
(2) Multicellular prokaryotes
(3) Unicellular prokaryotes
(4) All of the above

126. **Assertion (A):** The pigments of euglenoids are identical to those present in higher plants

Reason (R): *Euglena* cannot be classified on the basis of two kingdom system.

- (1) Both A and R are correct and R is the correct explanation of A.
(2) Both A and R are correct, but R is not the correct explanation of A.
(3) A is correct, but R is incorrect.
(4) Both A and R are incorrect.

127. Cells in G_0 phase

- (1) Enter the cell cycle
(2) Suspend the cell cycle
(3) Terminate the cell cycle
(4) Exit the cell cycle

128. Average duration of cell cycle of a human cell is

- (1) 12 h (2) 16 h
(3) 20 h (4) 24 h

129. In S-phase of the cell cycle,

- (1) Amount of DNA doubles in each cell
(2) Amount of DNA remains same in each cell
(3) Chromosome number is increased
(4) Amount of DNA is reduced to half in each cell

130. In which phase, proteins for spindle fibre are synthesised?

- (1) G_1 -phase (2) G_2 -phase
(3) S-phase (4) Anaphase

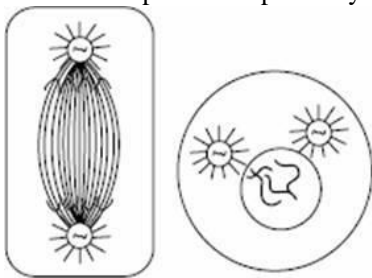
131. During the G_1 -phase of cell division

- (1) RNA and proteins are synthesised
(2) DNA and proteins are synthesised
(3) Cell prepares for M-phase
(4) Cell undergoes duplication

- 132.** Most cytogenic activities occur during
 (1) Interphase (2) Telophase
 (3) Prophase (4) Anaphase
- 133.** Which of the following options gives the correct sequences of events during mitosis?
 (1) Condensation → Nuclear membrane disassembly → Crossing over → Segregation → Telophase
 (2) Condensation → Nuclear membrane disassembly → Arrangement at equator → Centromere division → Segregation → Telophase
 (3) Condensation → Crossing over → Nuclear membrane disassembly → Segregation → Telophase
 (4) Condensation → Arrangement at equator → Centromere division → Segregation → Telophase
- 134.** Select the correct statement related to mitosis.
 (1) Amount of DNA in the parent cell is first halved and then distributed into two daughter cells.
 (2) Amount of DNA in the parent cell is first doubled and then distributed into two daughter cells
 (3) Amount of DNA in the parent cell is first halved and then distributed into four daughter cells
 (4) Amount of DNA in the parent cell is first doubled and then distributed into four daughter cells
- 135.** Which of the following is the best state to observe the shape, size and number of chromosomes in a cell?
 (1) Interphase (2) Prophase
 (3) Metaphase (4) Telophase

SECTION - B

- 136.** Which stages of cell division do the following figures A and B represent respectively?



A

B

- (1) Metaphase Telophase
 (2) Telophase Metaphase
 (3) Late anaphase Prophase
 (4) Prophase Anaphase

- 137.** Which of the following character is related with telophase?
 (1) Formation of nuclear membrane
 (2) Disappearance of nucleolus
 (3) Condensation of chromosomes
 (4) Formation of four daughter nuclei
- 138.** Small disc-shaped structure at the surface of the centromeres that appear during metaphase are
 (1) Kinetochore (2) Metaphase plate
 (3) Spindle fibres (4) Chromatid
- 139.** In animal cells, cytokinesis involves
 (1) The separation of sister chromatids
 (2) The contraction of the contractile ring of microfilament
 (3) Depolymerisation of kinetochore microtubules
 (4) A protein kinase that phosphorylates other enzymes
- 140.** Crossing over takes place between which chromatids and in which stage of the cell cycle?
 (1) Non-sister chromatids of non-homologous chromosomes at zygotene stage of prophase-I
 (2) Non-sister chromatids of homologous chromosomes at pachytene state of prophase-I
 (3) Non-sister chromatids of homologous chromosomes at zygotene state of prophase-I
 (4) Non-sister chromatids of non-homologous chromosomes at pachytene state of prophase-I

- 141.** Match the stages of meiosis in Column I to their characteristic features in Column II and select the correct option using the codes given below.

Column I		Column II	
A.	Diakinesis	i.	Crossing over takes place
B.	Pachytene	ii.	Terminalisation of chiasmata
C.	Zygotene	iii.	Chromosomes align at equatorial plate
D.	Metaphase	iv.	Pairing of homologous chromosomes

- A B C D**
 (1) i ii iii iv
 (2) ii iv i iii
 (3) iv iii i ii
 (4) ii i iv iii

- 142. Assertion (A):** Meiotic division occurs in reproductive cells.
Reason (R): Synapsis occurs during zygotene of meiosis.
- (1) Both A and R are true and R is the correct explanation of A.
 - (2) Both A and R are true but R is not the correct explanation of A.
 - (3) A is true but R is false.
 - (4) A and R are false.
- 143.** Identify the correct matched pair.
- (1) Exchange of segments of chromatids-Zygotene
 - (2) Terminalisation of chiasmata-Diakinesis
 - (3) Appearance of chiasmata-Leptotene
 - (4) Synapsis of homologous chromosomes-Diplotene
- 144.** A bivalent consists of
- (1) Two chromatids and one centromere
 - (2) Two chromatids and two centromeres
 - (3) Four chromatids and two centromeres
 - (4) Four chromatids and four centromeres
- 145.** Characteristic of meiosis is
- (1) Two nuclear and two chromosomal divisions
 - (2) Two nuclear and one chromosomal division
 - (3) One nuclear and two chromosomal divisions
 - (4) One nuclear and one chromosomal division
- 146.** Meiosis can be observed in
- (1) Tapetal cells (2) Megaspores
 - (3) Micropores (4) Spore mother cells

- 147.** Significance of meiosis lies in
- (1) Reduction of chromosome number to one half
 - (2) Maintaining consistency of chromosome number during sexual reproduction
 - (3) Production of genetic variability
 - (4) All of the above
- 148.** Arrange the following events of meiosis in the correct sequence.
- I.** Terminalisation
 - II.** Crossing over
 - III.** Synapsis
 - IV.** Disjunction of genomes
- (1) IV → III → II → I
 - (2) III → II → I → IV
 - (3) II → I → → IV → III
 - (4) I → IV → III → II
- 149.** At which phase of meiosis, both the cells each with separated sister chromatids move towards opposite poles?
- (1) Metaphase-I (2) Metaphase-II
 - (3) Anaphase-I (4) Anaphase-II
- 150.** During which stage of prophase-I genetic recombination of parental characters takes place?
- (1) Zygotene
 - (2) Pachytene
 - (3) Diplotene
 - (4) Diakinesis

(ZOOLOGY)

SECTION - A

- 151.** Muscle tissue cells are contractile, which means they
- (1) are responsible for the production and secretion of enzymes.
 - (2) are specialised in contraction and relaxation.
 - (3) help in the movement of involuntary organs only.
 - (4) all of the above
- 152.** Which of the following statement(s) regarding cell junctions is/are correct?
- (1) Tight junctions help to stop substances from leaking across a tissue.
 - (2) Adhering junctions perform cementing to keep neighbouring cells together.
 - (3) Gap junctions facilitate the cells to communicate with each other by connecting the cytoplasm of adjoining cells, for rapid transfer of ions, small molecules and sometimes big molecules.
 - (4) All of the above

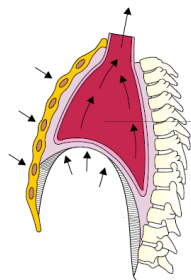
- 153.** Goblet cells secrete
- (1) Mucus
 - (2) Enzymes
 - (3) HCl
 - (4) Hormones
- 154.** Pavement epithelium is an alternate name for
- (1) Squamous epithelium
 - (2) Cuboidal epithelium
 - (3) Ciliated epithelium
 - (4) Compound epithelium
- 155.** General function of gland is to
- (1) protect the body.
 - (2) control the function of epithelial tissues.
 - (3) produce and secrete specialised compounds to control and maintain different body functions.
 - (4) help to maintain blood pressure and nerve actions.

156. The supportive skeletal structures in the human external ears and in the nose tip are examples of
- (1) Ligament
 - (2) Areolar tissue
 - (3) Bone
 - (4) Cartilage

157. Brush bordered columnar epithelial tissue is located in
- (1) Fallopian tube
 - (2) Oesophagus
 - (3) Trachea
 - (4) Small intestine

158. Trachea is a straight tube extending up to the mid-thoracic cavity, which divides at the level of
- (1) 2nd cervical vertebra
 - (2) 5th cervical vertebra
 - (3) 5th thoracic vertebra
 - (4) 5th lumbar vertebra

159. Given below is the diagrammatic representation, explaining mechanism of breathing.



Choose the correct option w.r.t. given diagram.

- (1) Diaphragm, becomes dome shaped due to contraction of its muscles and decreases the volume of thoracic cavity
 - (2) Volume of thoracic cavity decreases due to contraction of external intercostals muscles
 - (3) Diaphragm is relaxed and arched upwards which decreases the volume of thoracic cavity
 - (4) Contraction of external intercostals muscles shifts the ribs inwards and downwards
160. The volume of air breathed in and out during normal breathing is called
- (1) Vital capacity
 - (2) Inspiratory reserve volume
 - (3) Expiratory reserve volume
 - (4) Tidal volume
161. Which of the following structures is the actual gaseous exchange surface in the mammalian respiratory system?
- (1) Bronchus
 - (2) Alveolus
 - (3) Bronchiole
 - (4) Trachea

162. Neuroglia are
- (1) Excitable cells of neural tissue.
 - (2) Supporting and non-excitable cells of neural tissue.
 - (3) Two to three times in volume of neural tissue.
 - (4) Protective and excitable cells of neural tissue.

163. The respiratory organs vary in different animals due to their :
- (1) Nutrition
 - (2) Habitat and level of organisation
 - (3) Excretion
 - (4) Reproduction

164. Outer pleural membrane is in close contact with
- (1) Surface of lungs
 - (2) Thoracic lining
 - (3) Both (1) & (2)
 - (4) Alveoli

165. All the following factors favour the formation of oxyhaemoglobin except
- (1) High pO_2
 - (2) Low pCO_2
 - (3) High H^+ ion concentration
 - (4) Lower body temperature.

166. Which of the given factor favours the dissociation of CO_2 from carbamino haemoglobin?
- (1) high pCO_2 , low pO_2 – In tissue
 - (2) low pCO_2 , high pO_2 – In alveoli
 - (3) Low pCO_2 , high pO_2 – In tissue
 - (4) High pO_2 , high pCO_2 – In alveoli

167. Read the assertion (A) and reason (R) and choose the correct option

Assertion (A) – An increase in pulmonary volume causes inspiration.

Reason(R) – An increase in pulmonary volume increases the intra-pulmonary pressure to more than atmospheric pressure.

- (1) Both A and R are correct, and R is the correct explanation for A
- (2) Both A and R are correct, and R is not the correct explanation for A
- (3) A is correct, and R is incorrect
- (4) Both A and R are incorrect

168. A healthy man can inspire or expire approx _____ millilitre of air per minute.
- (1) 1100 – 1200
 - (2) 6000 – 8000
 - (3) 2500 – 3000
 - (4) 1000 – 1100

- 169.** The maximum volume of air a person can breathe in after a forced expiration is _____.
 (1) Expiratory capacity
 (2) Inspiratory capacity
 (3) Vital capacity
 (4) Total lung capacity
- 170.** How many maximum molecules of oxygen can be carried by each haemoglobin?
 (1) 4 (2) 5
 (3) 8 (4) 6
- 171.** Haemoglobin-oxygen dissociation curve is-
 (1) Hyperbolic
 (2) Sigmoid
 (3) Straight
 (4) Constant
- 172.** Which of the following are the respiratory organs of insects?
 (1) Tracheae
 (2) Gills
 (3) Cuticle
 (4) Lungs
- 173.** Which of the following statements is incorrect about transport of gases?
 (1) About 97 percent of O₂ is transported by RBCs in the blood
 (2) 3 percent of O₂ is carried in dissolved state in the plasma
 (3) 20-25 percent of CO₂ is transported by RBCs in the form of carbaminohaemoglobin
 (4) 70 percent carbon dioxide is carried in dissolved state in plasma
- 174.** Which of the following type of tissue is being described by the given statements?
 (i) They are named because of their special function of linking and supporting other tissues/organs of the body.
 (ii) They include cartilage, bone, adipose tissue and blood.
 (iii) They provide strength, elasticity and flexibility to the tissue.
 (iv) They also secrete modified polysaccharides, which accumulate between cells and fibres and act as matrix.
 (1) Epithelial tissue
 (2) Connective tissue
 (3) Muscle tissue
 (4) Neural tissue

- 175.** What is the partial pressure of oxygen in the blood flowing through pulmonary artery?
 (1) 100mm Hg
 (2) 40mm Hg
 (3) 55mm Hg
 (4) 95mm Hg
- 176.** Choose the correct sequence of the passage of air in the body
 (1) External nostrils → nasal chamber → pharynx → larynx → trachea → bronchi → bronchioles → alveoli
 (2) Nasal chamber → external nostril → larynx → pharynx → trachea → bronchioles → bronchi → alveoli
 (3) Nasal chamber → external nostril → larynx → pharynx → trachea → bronchi → bronchioles → alveoli
 (4) Nasal chamber → external nostril → larynx → trachea → pharynx → bronchioles → bronchi → alveoli

- 177.** Match the column I (respiratory organ) with column II (examples) and choose the correct option.

Column I		Column II	
(A)	Gills	I	Terrestrial animals
(B)	Lungs	II	Insects
(C)	Tracheal tubes	III	Flatworms
(D)	Body surfaces	IV	Aquatic arthropods

- (1) A-I, B-II, C-III, D-IV
 (2) A-II, B-I, C-IV, D-III
 (3) A-IV, B-I, C-II, D-III
 (4) A-III, B-IV, C-II, D-III
- 178.** The cells of connective tissue which produce histamine are
 (1) Fibroblasts
 (2) Macrophages
 (3) Mast cells
 (4) Plasma cells
- 179.** A thin-elastic cartilaginous flap which prevents the entry of food into the larynx is known as
 (1) Glottis
 (2) Wind pipe
 (3) Epiglottis
 (4) Bronchiole

180. Asthma is due to:

- A. Inflammation in nostrils
 - B. Inflammation in trachea
 - C. Inflammation in bronchi
 - D. Inflammation in bronchioles
- (1) A, B (2) Only C
(3) C, D (4) Only D

181. Match the column I with column II and choose the correct options.

Column I		Column II	
(A)	Sphincter of oddi	I	Chylomicrons
(B)	Chief cell	II	Intestinal juice
(C)	Succus entericus	III	Common hepato-pancreatic duct
(D)	Lacteals	IV	Pepsinogen

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

182. Where is the respiratory rhythm centre present that has significant ability to maintain the respiratory rhythm to suit the demands of the body tissues?

- (1) Cerebrum
- (2) Medulla
- (3) Pons varoli
- (4) Cerebellum

183. Choose the incorrect option.

- (1) Carbonic anhydrase is present in both RBCs and small quantity in plasma too.
- (2) Only 3% of O_2 is transported by RBCs in the blood.
- (3) Diffusion membrane is made up of 3 layers
- (4) Both (1) & (3)

184. Why does the amount of CO_2 that can diffuse through the diffusion membrane per unit difference in partial pressure is much higher than O_2 ?

- (1) Solubility of O_2 is much higher than CO_2
- (2) Solubility of O_2 is approximately similar to CO_2
- (3) Solubility of CO_2 is much higher than O_2
- (4) Both (1) & (3)

185. Identify figures-I and II.

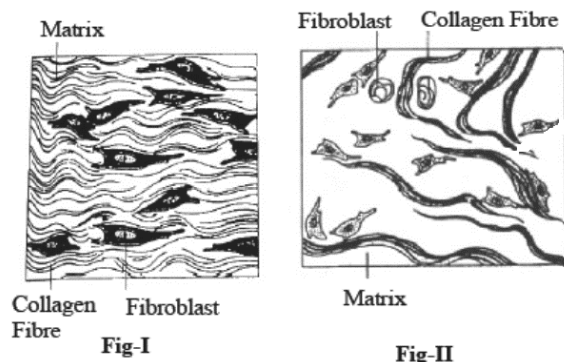


	Figure I	Figure II
(1)	Dense regular connective tissue	Dense irregular connective tissue
(2)	Loose irregular connective tissue	Loose regular connective tissue
(3)	Adipose tissue	Specialized connective tissue
(4)	Connective tissue proper	Areolar tissue

SECTION - B

186. Which of the following statement is incorrect regarding cuboidal epithelium?

- (1) It is an epithelial tissue.
- (2) It is composed of a single layer of cube-like cells.
- (3) They are found in the walls of blood vessels and air sacs of lungs.
- (4) Secretion and absorption are the main functions of these tissue

187. Larynx is a _____

- (I) Cartilaginous box
 - (II) Bony box
 - (III) Sound box
- (1) I, II
(2) II, III
(3) I, II, III
(4) I, III

188. Match the terms given in column-I with their feature given in column-II and choose the correct option.

Column-I (Terms)	Columns II (Features)
A. Exocrine gland	I. They help to stop substances from leaking across a tissue
B. Endocrine gland	II. Hormones are secreted directly into the fluid bathing the gland
C. Tight junctions	III. They perform cementing to keep neighbouring cells together.
D. Adhering junctions	IV. Secrete mucus, saliva, earwax, oil, milk, digestive enzymes and other cell products

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

189. Pneumotaxic centre can moderate the functions of the respiratory rhythm centre. It is present in

- (1) Medulla
 (2) Cerebrum
 (3) Pons
 (4) Cerebellum

190. **Assertion:** The passage starting with the external nostrils upto the terminal bronchiole constitute the respiratory part.

Reason: The respiratory part transport the air to the alveoli, clears it from the foreign material, humidified and brings the air to body temperature.

- (1) If both Assertion & Reason are true and the reason is the correct explanation of the assertion
 (2) If both Assertion & Reason are true but the reason is not the correct explanation of the assertion
 (3) If Assertion is true statement but Reason is false
 (4) If both Assertion and Reason are false statements

191. Organisms utilise oxygen for the breakdown of simple molecule like glucose, amino acids, etc to produce energy. This shows _____

- (1) Amphibolic reaction
 (2) Anabolic reaction
 (3) Catabolic reaction
 (4) None of the above

192. Thoracic chamber is formed

- (a) Dorsally by vertebral column
 (b) Ventrally by sternum
 (c) Laterally by ribs
 (d) Lower side by diaphragm

- (1) a, c only (2) a, b, c only
 (3) b, c, d only (4) a, b, c, d

193. Nissl's granules are present in which part of a neuron?

- (1) Cyton
 (2) Synaptic knobs
 (3) Axon
 (4) Nerve endings

194. Carbon dioxide is carried in the blood, mainly as

- (1) Sodium bicarbonate
 (2) Potassium bicarbonate
 (3) Carbamino-haemoglobin
 (4) Dissolved gas in plasma

195. Lungs possess _____

- (1) Trachea, primary, secondary and tertiary bronchi, alveoli
 (2) Trachea, branching of bronchi, bronchioles, alveoli
 (3) The branching network of bronchi, bronchioles, and alveoli
 (4) All of the above

196. Smooth muscles are

- (1) Involuntary, fusiform, non-striated
 (2) Voluntary, multinucleate, cylindrical
 (3) Involuntary, cylindrical, striated
 (4) Voluntary, spindle-shaped, uninucleate

197. Which of the following statement is correct?

- (1) Relaxation of inter-coastal muscles raised up ribs and sternum
 (2) Inspiration takes place when intra-pulmonary pressure is more than atmospheric pressure
 (3) The process of breathing is carried out due to the pressure gradient, that is generated with the help of diaphragm, external and internal intercostals muscles.
 (4) An increase in pulmonary volume, increases the intra-pulmonary pressure as compared to atmospheric pressure.

198. On an average a healthy human breathes _____.

- (1) 5-6 times/minute
 (2) 25-30 times/minute
 (3) 72 times/minute
 (4) 12-16 times/minute

- 199.** Lungs do not collapse even after forceful expiration because of:
- (1) Residual volume
 - (2) Tidal volume
 - (3) Expiratory reserve volume
 - (4) All of the above

- 200.** Which of the following pair is correctly matched?
- (1) $IC = TV + ERV$
 - (2) $EC = TV + IRV$
 - (3) $FRC = ERV + RV$
 - (4) $VC = TV + RV$

(BOTANY)

SECTION - A

- 101. (1)**
RH Whittaker's classification is not based on the presence or absence of a well-defined nucleus. He gave the five kingdom classification system and used following criteria for delimiting kingdoms
- Complexity of cell structure
 - Complexity of body structure
 - Mode of nutrition
 - Ecological lifestyle including mode of reproduction
 - Phylogenetic relationships
- 102. (2)**
Bacteria are prokaryotes and according to five kingdom system of classification, all bacteria are included in the kingdom Monera.
- 103. (1)**
Two kingdom Plantae and Animalia are constantly featured in all the biological classifications.
- 104. (3)**
Statement (3) is incorrect. Correct information about the statement is as follows
Certain bacteria, which grow anaerobically on cellulosic material, produce large amount of methane along with CO₂ and H₂. These bacteria are collectively called methanogens and one such example is *Methanobacterium*.
Rest of the statements are correct.
- 105. (1)**
Statement (1) is correct. Rest of the statements are incorrect. Correct form of the statements are as follows
Influenza and Herpes caused by virus having RNA and DNA.
Nostoc and *Anabaena* are examples of free-living nitrogen fixers.
Methanogens are methane producing bacteria found in marshy areas and paddy field not in wheat crops.
- 106. (3)**
Thiobacillus reduces nitrate present in soil into nitrogen. The process is called denitrification.
- 107. (3)**
Green sulphur bacteria are anaerobic bacteria. They do not use water as a source of reducing power. Instead, hydrogen and sulphide ions are obtained from hydrogen sulphide which act as the electron donors.
- 108. (2)**
All statements are true except II. The correct form is as follows.
Transduction is process of transfer of DNA by bacteriophage virus in bacteria. It was first reported in the *Salmonella* by Zinder and Lederberg in 1952.
- 109. (4)**
All the given statements about monerans are correct.
- 110. (2)**
Statement in option (2) is incorrect.
The correct form is as follows
Fimbriae or pili are fine hair-like appendages used by bacteria for attachment rather than motility. Pili are longer than fimbriae and are present only in one or two number(s) per cell.
Rest are correct statements.
- 111. (2)**
Trichoderma erythrium, a member of group cyanobacteria, i.e. blue-green algae, which is responsible for providing red colour to red sea.
- 112. (4)**
Chromatophores are the pigment containing membranous extensions in some cyanobacteria. These pigments mainly include chlorophyll-a, in some species carotenoids, phycobilins and phycoerythrin.
- 113. (2)**
Plasmid is the extrachromosomal genetic element present in bacterial cells. It consists of DNA that can exist and replicate independently of the bacterial chromosome.
- 114. (3)**
Bacteria that fix CO₂ by using chemical energy released by biological oxidation of certain inorganic substances for the synthesis of food, e.g. *Nitrosomonas*, *Nitrosococcus*, etc.
- 115. (3)**
Slime mould does not belong to the kingdom Monera. They belong to the kingdom Protista. They have the characteristics of both moulds and Protozoa.
- 116. (3)**
Mesosome is the site of respiration in bacteria. These are foldings of the plasma membrane inside the cytoplasm in certain bacteria. These have enzymes, which are needed for respiration.

- 117. (3)**
Pigments like *c*-phycocyanin, *c*-phycoerythrin, chlorophyll-*a*, β -carotene and myxoxanthin are present in cyanobacteria or blue-green algae.
- 118. (4)**
The correct matches are as follows
Chrysophytes include diatoms and golden algae (dermids) *Gonyaulax* are red dinoflagellates. *Euglena* is a euglenoid. It is the connecting link between plant and animal kingdom. *Plasmodium* is an aggregation formed by slim moulds under suitable conditions.
- 119. (1)**
Pseudopodium helps protozoans in feeding. It is a temporary cytoplasm-filled projection of the eukaryotic cell membrane. It can be used for motility or for ingesting nutrients or other particulate matter.
- 120. (1)**
All single-celled eukaryotic organisms like chrysophytes (diatoms and desmids), euglenoids (*Euglena*), dinoflagellates and slim moulds are included in the kingdom Protista.
- 121. (1)**
Statement (1) is incorrect. The correct explanation is as follows
Diatoms are single-celled plant-like protists that produce intricately structured cell wall made up of nano-silica (SiCO_2). Thus, the walls are indestructible. All other statements are correct.
- 122. (2)**
Trypanosoma gambiense causes sleeping sickness or gambian fever. It is a fatal infection of the nervous and lymphatic systems that is endemic in certain parts of Africa.
The vector of the flagellate is tse-tse fly, *Glossina*.
- 123. (1)**
Osmoregulation in *Paramecium* is a function of contractile vacuole.
Paramecium contains two contractile vacuoles, which have fixed positions near the body ends in the ectoplasm of aboral side.
- 124. (4)**
The option (4) represents correct characters for slime moulds. Slime moulds are saprophytic protists because they engulf dead and decaying organic material.
- 125. (1)**
Protista includes unicellular eukaryotes, e.g. *Amoeba*.
- 126. (2)**
Both A and R are correct statements but R is not the correct explanation for A. *Euglena* is a green coloured, single-celled organism, which moves like animals.
- 127. (4)**
 G_0 phase is the stage in which the cells exit the cell cycle. It is the quiescent phase in which the cells do not divide. It is the permanent state for some cells. e.g. neurons.
- 128. (4)**
Normal human cell in a culture, divides once in approximately 24 h. The G_1 -phase might last for about 11 h, S-phase for about 8 h, G_2 for about 4 h and M-phase for about 1 h. Other cells however, can divide much more rapidly, e.g. bacteria.
- 129. (1)**
In S phase of cell cycle the amount of DNA doubles in each cell.
- 130. (2)**
In G_2 -phase of the cell cycle, proteins required for spindle formation are synthesised. It prepares the cell to undergo mitotic division.
- 131. (1)**
During the G_1 phase of cell division, RNA and proteins are synthesised along with large number of nucleotides, amino acids for histones synthesis and energy rich compounds.
This is the longest phase of interphase in which, cell is metabolically active and grows continuously nucleus, however, grows only to a small extent.
- 132. (1)**
Interphase is the period between the end of one cell division to the beginning of next cell division. It is the phase where most of the cytogenic activities takes place.
- 133. (2)**
Option (2) shows the correct sequence of events. The process of mitosis starts with the condensation of chromosomal material, which takes place at an early prophase stage. During late prophase nuclear membrane disintegrates and then the chromosomes get arranged at equator in the metaphase stage.

134. (2)

The statement in option (2) is correct. Mitosis is a type of division in which the chromosomes replicate themselves and get equally distributed into two daughter cells, i.e. the amount of DNA gets doubled first and then gets distributed into two daughter cells.

135. (3)

The best stage to observe the shape, size and number of chromosomes in a cell is metaphase.

136. (3)

Option (3) is correct. Figure A represents late anaphase. It is characterised by the following events

- (i) Centromeres split and chromatids separate.
- (ii) Chromatids move to the opposite poles.

Figure B represents prophase, which is characterised by

- (i) Centriole separation and their movement towards the opposite pole of the cell.
- (ii) Condensation of chromosomal material to form compact mitotic chromosomes.

137. (1)

During telophase, the chromatids reach the poles of the cell, uncoil and lengthen to form chromatin again. The spindle fibres disintegrate and centriole replicate. Nucleoli and nuclear envelope reappear and hence, two daughter nuclei are formed, one at each pole.

138. (1)

Kinetochore are small disc-shaped structures at the surface of centromere. These serve as the site of attachment of spindle fibres to the chromosomes moving towards the centre of the cell at equatorial plate.

139. (2)

In animal cells, cytokinesis involves the invagination of cell membrane and the contraction and development of the contractile ring of microfilaments, which lead to the cleavage of the cell into two daughter cells each having a daughter nucleus by cell furrow method.

140. (2)

Crossing over takes place between non-sister chromatids of homologous chromosomes occurs at the points called recombination nodules in pachytene stage of prophase-I of cell cycle.

141. (4)

The correctly matched pairs of stages of meiosis and their characteristics are as follows

Diakinesis	:	Terminalisation of chiasmata
Pachytene	:	Crossing over takes place
Zyotene	:	Pairing of homologous chromosomes
Metaphase	:	Chromosomes align at equatorial plate

142. (2)

R is not the correct explanation of A. Meiotic division is a reductional division. It occurs in reproductive cells and maintains the fixed number of chromosomes in sexually reproducing organisms.

143. (2)

The terminalisation of chiasmata is correctly matched with diakinesis.

Other pairs are incorrectly matched. The correct information regarding the incorrect information regarding the incorrect pairs is as follows

The exchange of segments of chromatids (crossing over) occurs in pachytene.

144. (3)

A bivalent is composed of four chromatids and two centromeres. Each bivalent is formed of one paternal and one maternal chromosome.

145. (2)

In meiosis, nucleus undergoes two divisions in which first is reductional and second is equational, while chromosomes divide only once in anaphase-II.

146. (4)

Meiosis can be observed in spore mother cells ($2n$) because, meiosis shows reductional division in which chromosome number is reduced to half, i.e. become haploid (n). On the other hand, tapetal cells, megaspores and microspores and haploid cells.

147. (4)

Meiosis is a reductional division during which the chromosome number is reduced to half and maintains consistency. It takes place in sex cells only crossing over during meiosis is responsible for producing genetic variability.

148. (2)

The correct sequence is III, II, I, IV.

Synapsis occurs during zygotene, crossing over during pachytene, terminalisation during diakinesis and disjunction during anaphase-I.

149. (4)

Separation of sister chromatids and their movement to the opposite pole occur during anaphase-II. While in anaphase-I, the sister chromatids remain attached to their centromere and move together towards the poles.

150. (2)

Pachytene is the stage that immediately follows the zygotene. In this stage, the pair of homologous chromosomes become twisted spirally around each other and undergo crossing over. Thus, genetic recombination of parental characters takes place.

(ZOOLOGY)

151. (2)

Muscle tissue plays the vital role of providing movement and heat generation to the organs of the body. Muscle cells are specialized for contractility and electrical conductivity.

152. (4)

A cell junction (or intercellular bridge) is a type of structure that exists within the tissue of some multicellular organisms, such as animals. Cell junctions consist of multiprotein complexes that provide contact between neighbouring cells or between a cell and the extracellular matrix. There are three major types of cell junctions: adherens junctions, desmosomes and hemidesmosomes (anchoring junctions); gap junctions (communicating junctions); tight junctions (occluding junctions).

153. (1)

154. (1)

155. (3)

Gland is an organ in the human or animal body which secretes particular chemical substances for use in the body or for discharge into the surroundings.

156. (4)

Cartilage is a type of connective tissue which is present in human external ears, the nose tip, ribcage joints, etc.

157. (4)

158. (3)

Trachea is a straight tube extending up to the mid-thoracic cavity, which divides at the level of 5th thoracic vertebra into a right and left primary bronchi.

159. (3)

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160. (4)

Tidal volume (TV) is the volume of air inspired or expired during a normal breathing.

161. (2)

Alveoli are the exchange surfaces in mammalian lungs. All the other structures listed are dead space used to transport air to and from the alveoli.

162. (2)

Neurons form the structural and functional unit of nervous tissue. They are excitable cells. While the neuroglial cells constitute the rest of the neural system that protect and support neurons and are non-excitabile

163. (2)

164. (2)

Outer membrane is in close contact with the thoracic lining whereas the inner pleural membrane is in contact with the lung surface.

165. (3)

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166. (2)

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167. (3)

An increase in pulmonary volume decreases the intra-pulmonary pressure to less than the atmospheric pressure, which forces the air from

outside to move into the lungs, this is the process of inspiration

168. (2)

Volume of air expired or inspired during a normal respiration is known as tidal volume. Which is approx. 500 milliliter. And a healthy person can inspire or expire approx. 6000 – 8000 millilitre of air per minute.

169. (3)

The maximum volume of air a person can breathe in after a forced expiration is vital capacity

170. (1)

Each haemoglobin can carry maximum 4 molecules of oxygen. Oxygen bind with haemoglobin in a reversible manner to form oxyhaemoglobin.

171. (2)

A sigmoid curve is obtained when percentage saturation of haemoglobin with O_2 is plotted against the pO_2 . This curve is called the O_2 dissociation curve and is highly useful in studying the effect of factors like pCO_2 , H^+ concentration, etc., on binding of O_2 with haemoglobin.

172. (1)

173. (4)

174. (2)

Connective tissue is a group of tissues in the body that maintains the form of the body and its organs and provides cohesion and internal support. The connective tissues include several types of fibrous tissue that vary only in their density and cellularity, as well as the more specialized and recognizable variants-bone, ligaments, tendons, cartilage, and adipose (fat) tissue.

175. (2)

NCERT Table 17.1

176. (1)

The correct sequence of the passage of air in the human body is –

External nostrils → nasal chamber → pharynx → larynx → trachea → bronchi → bronchioles → alveoli.

177. (3)

- Gills – Aquatic arthropods
- Tracheal tubes – Insects
- Lungs – Terrestrial animals
- Body surfaces – Flatworms

178. (3)

179. (3)

A thin-elastic cartilaginous flap which prevents the entry of food into the larynx is known as Epiglottis

180. (3)

Asthma is a difficulty in breathing causing wheezing due to inflammation of bronchi and bronchioles.

181. (2)

- Sphincter of Oddi guards the opening of hepato pancreatic duct in duodenum.
- Chief cell/ peptic cell secrete pepsinogen and prorennin.
- Intestinal juice is also called as succus entericus.
- Lacteals are the lymph vessel of small intestine.

182. (2)

183. (2)

About 97% of oxygen is transported by RBCs in the blood.

184. (3)

Since solubility of CO_2 is much higher than O_2 , amount of CO_2 that can diffuse through the diffusion membrane per unit difference in partial pressure is much higher than O_2 .

185. (1)

The figure I & II represent dense regular and dense irregular connective tissue respectively. In the dense regular connective tissues, the collagen fibres are present in rows between many parallel bundles of fibres. Tendons and ligaments are example of this tissue. Dense irregular connective tissue has fibroblasts and many fibres (mostly collagen) that are oriented differently. This tissue is present in the skin.

- 186. (3)**
Cuboidal epithelium are commonly found in ducts of glands and tubular parts of nephrons in kidneys.
- 187. (4)**
Larynx is a cartilaginous box, which helps in sound production and hence known as sound box
- 188. (1)**
- Exocrine glands are duct gland which secrete mucus saliva etc.
 - Endocrine glands are ductless gland which secrete hormone.
 - Tight junction helps to stop substances from leaking across a tissue.
 - Adhering junction perform cementing to keep neighbouring cells together.
- 189. (3)**
- 190. (4)**
The part starting with the external nostrils up to the terminal bronchioles constitute the conducting part whereas the alveoli and their ducts form the respiratory or exchange part of the respiratory system. The conducting part transports the atmospheric air to the alveoli, clears it from foreign particles, humidifies and also brings the air to body temperature. Exchange part is the site of actual diffusion of O₂ and CO₂ between blood and atmospheric air
- 191. (3)**
Reactions in which energy is produced by breaking down molecules are catabolic reactions.
- 192. (4)**
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- 193. (1)**
- 194. (1)**
Nearly 20 – 25 percent of CO₂ is transported by RBCs whereas 70 percent of it is carried as bicarbonate. About 7 percent of CO₂ is carried in a dissolved state through plasma.
- 195. (3)**
Lung possess the branching network of bronchi, bronchioles, and alveoli.
- 196. (1)**
0
- 197. (3)**
The process of breathing is carried out due to the pressure gradient, that is generated with the help of diaphragm, external and internal inter costals muscles
- 198. (4)**
On an average a healthy person breathes 12-16 times/minute.
- 199. (1)**
Residual volume is the volume of air remaining in the lungs after forceful expiration.
- 200. (3)**
 $IC = TV + IRV$
 $EC = TV + ERV$
 $FRC = ERV + RV$