

**SOLVED
PAPER**

**NEET (UG)
17th July 2022**

**Code
Q3**

Important Instructions :

1. The test is of **3 hours 20 minutes** duration and Test Booklet contains **200** multiple choice questions (four options with a single correct answer) from **Physics, Chemistry and Biology (Botany and Zoology)**. **50** questions in each subject are divided into two **Section (A and B)** as per details given below:
 - (a) **Section A** shall consist of **35 (Thirty-five)** Questions in each subject (Question Nos- 1 to 35, 51 to 85, 101 to 135 and 151 to 185). All questions are compulsory.
 - (b) **Section B** shall consist of **15 (Fifteen)** Questions in each subject (Question Nos- 36 to 50, 86 to 100, 136 to 150 and 80 to 200). In Section B, a candidate needs to **attempt any 10 (Ten)** questions out of **15 (Fifteen)** in each subject.

Candidates are advised to read all 15 questions in each subject of Section B before they start attempting the question paper. In the event of a candidate attempting more than ten questions, the first ten questions answered by the candidate shall be evaluated.
2. Each question carries **4** marks. For each correct response, the candidate will get **4** marks. For each incorrect response, one mark will be deducted from the total scores. **The maximum marks are 720.**
3. Use **Blue/Black Ball Point Pen only** for writing particulars on this page/markings responses on Answer Sheet.
4. Use of Electronic/Manual Calculator is prohibited.
5. **No part of the Test Booklet and Answer Sheet shall be detached under any circumstances.**
6. The candidates will write the Correct Test Booklet Code as given in the Test Booklet/Answer Sheet in the Attendance Sheet.
7. Compensatory time of one hour five minutes will be provided for the examination of three hours and 20 minutes duration, whether such candidate (having a physical limitation to write) uses the facility of scribe or not.

BOTANY

Section A

Q. 101. Which one of the following statements cannot be connected to Predation ?

- (1) It helps in maintaining species diversity in a community
- (2) It might lead to extinction of a species.
- (3) Both the interacting species are negatively impacted.
- (4) It is necessitated by nature to maintain the ecological balance.

Q. 102. Given below are two statements :

Statement I : Decomposition is a process in which the detritus is degraded into simpler substances by microbes.

Statement II : Decomposition is faster if the detritus is rich in lignin and chitin

In the light of the above statements, choose the correct answer from the options given below :

- (1) Both **Statement I** and **Statement II** are correct.
- (2) Both **Statement I** and **Statement II** are incorrect.
- (3) **Statement I** is correct but **Statement II** is incorrect.
- (4) **Statement I** is incorrect but **Statement II** is correct.

Q. 103. Read the following statements about the vascular bundles :

- (a) In rots, xylem and phloem in a vascular bundle are arranged in an alternate manner along the different radii.

- (b) Conjoint closed vascular bundles do not possess cambium.
- (c) In open vascular bundles, cambium is present in between xylem and phloem.
- (d) The vascular bundles of dicotyledonous stem possess endarch protoxylem.
- (e) In monocotyledonous root, usually there are more than six xylem bundles present.
- Choose the **correct answer** from the options given below :
- (1) (a), (b) and (d) Only
- (2) (b), (c), (d) and (e) Only
- (3) (a), (b), (c) and (d) Only
- (4) (a), (c), (d) and (e) Only
- Q. 104.** Which of the following is not observed during apoplastic pathway
- (1) Movement of water occurs through intercellular spaces and wall of the cells.
- (2) The movement does not involve crossing of cell membrane.
- (3) The movement is aided by cytoplasmic streaming.
- (4) Apoplast is continuous and does not provide any barrier to water movement.
- Q. 105.** Exoskeleton of arthropods is composed of :
- (1) Cutin (2) Cellulose
- (3) Chitin (4) Glucosamine
- Q. 106.** Read the following statements and choose the set of correct statements :
- (a) Euchromatin is loosely packed chromatin
- (b) Heterochromatin is transcriptionally active
- (c) Histone octamer is wrapped by negatively charged DNA in nucleosome.
- (d) Histones are rich in lysine and arginine.
- (e) A typical nucleosome contains 400 bp of DNA helix.
- Choose the **correct answer** from the options below:
- (1) (b), (d), (e) Only (2) (a), (c), (d) Only
- (3) (b), (e) Only (4) (a), (c), (e) Only
- Q. 107.** In odd trees the greater part of secondary xylem is dark brown and resistant to insect attack due to :
- (a) secretion of secondary metabolites and their deposition in the lumen of vessels
- (b) deposition of organic compounds like tannins and resins in the central layers of stem
- (c) deposition of suberin and aromatic substances in the outer layer of stem
- (d) deposition of tannins, gum, resin and aromatic substances in the peripheral layers of stem
- (e) presence of parenchyma cells, functionally active xylem elements and essential oils
- Choose the **correct answer** from the options given below :
- (1) (a) and (b) Only
- (2) (c) and (d) Only
- (3) (d) and (e) Only
- (4) (b) and (d) Only
- Q. 108.** The flowers are Zygomorphic in :
- (a) Mustard (b) Gulmohar
- (c) *Cassia* (d) *Datura*
- (e) Chilly
- Choose the **correct answer** from the options given below :
- (1) (a), (b), and (c) Only
- (2) (b), (c) Only
- (3) (d), (e) Only
- (4) (c), (d), (e) Only
- Q. 109.** Which one of the following statement is **not true** regarding gel electrophoresis technique?
- (1) The process of extraction of separated DNA strands from gel is called elution.
- (2) The separated DNA fragments are stained by using ethidium bromide.
- (3) The presence of chromogenic substrate gives blue coloured DNA bands on the gel.
- (4) Bright orange coloured bands of DNA can be observed in the gel when exposed to UV light.
- Q. 110.** Which one of the following plants does not show plasticity ?
- (1) Cotton (2) Coriander
- (3) Buttercup (4) Maize
- Q. 111.** Which of the following is **incorrectly** matched?
- (1) *Ectocarpus* - Fucoxanthin
- (2) *Ulothrix* - Mannitol
- (3) *Porphyra* - Floridean Starch
- (4) *Volvox* - Starch
- Q. 112.** Identify the **incorrect** statement related to Pollination :
- (1) Pollination by water is quite rare in flowering plants
- (2) Pollination by wind is more common amongst abiotic pollination
- (3) Flowers produce foul odours to attract flies and beetles to get pollinated

- (4) Moths and butterflies are the most dominant pollinating agents among insects
- Q. 113. What is the net gain of ATP when each molecule of glucose is converted to two molecules of pyruvic acid ?
 (1) Four (2) Six
 (3) Two (4) Eight
- Q. 114. Habitat loss and fragmentation, over exploitation, alien species invasion and co-extinction are causes for :
 (1) Population explosion
 (2) Competition
 (3) Biodiversity loss
 (4) Natality
- Q. 115. Which of the following is not true regarding the release of energy during ATP synthesis through chemiosmosis ? It involves :
 (1) Breakdown of proton gradient
 (2) Breakdown of electron gradient
 (3) Movement of protons across the membrane to the stroma
 (4) Reduction of NADP to NADPH₂ on the stroma side of the membrane
- Q. 116. Which one of the following never occurs during mitotic cell division ?
 (1) Spindle fibres attach to kinetochores of chromosomes
 (2) Movement of centrioles towards opposite poles
 (3) Pairing of homologous chromosomes
 (4) Coiling and condensation of the chromatids
- Q. 117. The appearance of recombination nodules on homologous chromosomes during meiosis characterizes :
 (1) Synaptonemal complex
 (2) Bivalent
 (3) Sites at which crossing over occurs
 (4) Terminalization
- Q. 118. XO type of sex determination can be found in :
 (1) *Drosophila* (2) Birds
 (3) Grasshoppers (4) Monkeys
- Q. 119. Production of Cucumber has increased manifold in recent years. Application of which of the following phytohormones has resulted in this increased yield as the hormone is known to produce female flowers in the plants :
 (1) ABA (2) Gibberellin
 (3) Ethylene (4) Cytokinin
- Q. 120. Given below are two statements :
Statement I : Mendel studied seven pairs of contrasting traits in pea plants and proposed the Laws of Inheritance
Statement II : Seven characters examined by Mendel in his experiment on pea plants were seed shape and colour, flower colour, pod shape and colour, flower position and stem height
 In the light of the above statements, choose the **correct answer** from the options given below :
 (1) Both **Statement I** and **Statement II** are correct
 (2) Both **Statement I** and **Statement II** are incorrect
 (3) **Statement I** is correct but **Statement II** is incorrect
 (4) **Statement I** is incorrect but **Statement II** is correct
- Q. 121. What amount of energy is released from glucose during lactic acid fermentation ?
 (1) Approximately 15%
 (2) More than 18%
 (3) About 10%
 (4) Less than 7%
- Q. 122. Identify the **correct set** of statements :
 (a) The leaflets are modified into pointed hard thorns in *Citrus* and *Bougainvillea*
 (b) Axillary buds form slender and spirally coiled tendrils in cucumber and pumpkin
 (c) Stem is flattened and fleshy in *Opuntia* and modified to perform the function of leaves
 (d) *Rhizophora* shows vertically upward growing roots that help to get oxygen for respiration
 (e) Subaerially growing stems in grasses and strawberry help in vegetative propagation
 Choose the **correct answer** from the options given below :
 (1) (b) and (c) Only
 (2) (a) and (d) Only
 (3) (b), (c) (d) and (e) Only
 (4) (a), (b), (d) and (e) Only

Q. 123. Hydrocolloid carrageen is obtained from :

- (1) Chlorophyceae and Phaeophyceae
- (2) Phaeophyceae and Rhodophyceae
- (3) Rhodophyceae only
- (4) Phaeophyceae only

Q. 124. The device which can remove particulate matter present in the exhaust from a thermal power plant is :

- (1) STP
- (2) Incinerator
- (3) Electrostatic Precipitator
- (4) Catalytic Converter

Q. 125. Given below are two statements :

Statement I :

Cleistogamous flowers are invariably autogamous

Statement II :

Cleistogamy is disadvantageous as there is no chance for cross pollination

In the light of the above statements, choose the **correct** answer from the options given below:

- (1) Both **Statement I** and **Statement II** are correct
- (2) Both **Statement I** and **Statement II** are incorrect
- (3) **Statement I** is correct but **Statement II** is incorrect
- (4) **Statement I** is incorrect but **Statement II** is correct

Q. 126. "Girdling Experiment" was performed by Plant Physiologists to identify the plant tissue through which :

- (1) water is transported
- (2) food is transported
- (3) for both water and food transportation
- (4) osmosis is observed

Q. 127. Which one of the following plants show vexillary aestivation and diadelphous stamens ?

- (1) *Colchicum autumnale*
- (2) *Pisum sativum*
- (3) *Allium cepa*
- (4) *Solanum nigrum*

Q. 128. Given below are two statements : one is labelled as **Assertion (A)** and the other is labelled as **Reason (R)**.

Assertion (A) : Polymerase chain reaction is used in DNA amplification

Reason (R) : The ampicillin resistant gene is used as a selectable marker to check transformation.

In the light of the above statements, choose the **correct answer** from the options given below :

- (1) Both **(A)** and **(R)** are correct but **(R)** is not 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 not correct
- (4) **(A)** is not correct but **(R)** is correct

Q. 129. The gaseous plant growth regulator is used in plants to :

- (1) speed up the malting process
- (2) promote root growth and root hair formation to increase the absorption surface
- (3) help overcome apical dominance
- (4) kill dicotyledonous weeds in the fields

Q. 130. DNA polymorphism forms the basis of :

- (1) Genetic mapping
- (2) DNA fingerprinting
- (3) Both genetic mapping and DNA fingerprinting
- (4) Translation

Q. 131. Given below are two statements :

Statement I : The primary CO_2 acceptor in C_4 plants is phosphoenolpyruvate and is found in the mesophyll cells

Statement II : Mesophyll cells of C_4 plants lack RuBisCo enzyme. In the light of the above statements, choose the **correct** answer from the options given below :

- (1) Both **Statement I** and **Statement II** are correct
- (2) Both **Statement I** and **Statement II** are incorrect
- (3) **Statement I** is correct but **Statement II** is incorrect
- (4) **Statement I** is incorrect but **Statement II** is correct

Q. 132. Which one of the following produces nitrogen fixing nodules on the roots of *Alnus* ?

- (1) *Rhizobium*
- (2) *Frankia*
- (3) *Rhodospirillum*
- (4) *Beijernickia*

Q. 133. Which of the following is not a method of *ex-situ* conservation ?

- (1) *In vitro* fertilization
- (2) National Parks
- (3) Micropropagation
- (4) Cryopreservation

Q. 134. The process of translation of mRNA to proteins begins as soon as :

- (1) The small subunit of ribosome encounters mRNA
- (2) The larger subunit of ribosome encounters mRNA
- (3) Both the subunits join together to bind with mRNA
- (4) The tRNA is activated and the larger subunit of ribosome encounters mRNA

Q. 135. Match List-I with List-II.

	List-I		List-II
(a)	Manganese	(i)	Activates the enzyme catalase
(b)	Magnesium	(ii)	Required for pollen germination
(c)	Boron	(iii)	Activates enzymes of respiration
(d)	Iron	(iv)	Functions in splitting of water during photosynthesis

Choose the **correct answer** from the options given below.

- (1) (a)-(iii), (b)-(iv), (c)-(i), (d)-(ii)
- (2) (a)-(iv), (b)-(iii), (c)-(ii), (d)-(i)
- (3) (a)-(iv), (b)-(i), (c)-(ii), (d)-(iii)
- (4) (a)-(iii), (b)-(i), (c)-(ii), (d)-(iv)

Section B

Q. 136. The entire fleet of buses in Delhi were converted to CNG from diesel. In reference to this, which one of the following statements is **false** ?

- (1) CNG burns more efficiently than diesel
- (2) The same diesel engine is used in CNG buses making the cost of conversion low
- (3) It is cheaper than diesel
- (4) It can not be adulterated like diesel

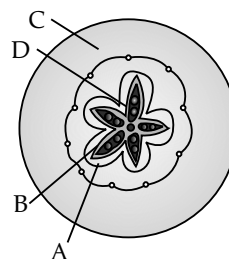
Q. 137. Given below are two statements : one is labelled as **Assertion (A)** and the other is labelled as **Reason (R)**.

Assertion (A) : Mendel's law of Independent assortment does not hold good for the genes that are located closely on the same chromosome.

Reason (R) : Closely located genes assort independently. In the light of the above statements, choose the **correct** answer from the options given below:

- (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 not correct
- (4) (A) is not correct but (R) is correct

Q. 138. Which part of the fruit, labelled in the given figure makes it a false fruit ?



- (1) A → Mesocarp
- (2) B → Endocarp
- (3) C → Thalamus
- (4) D → Seed

Q. 139. If a geneticist uses the blind approach for sequencing the whole genome of an organism, followed by assignment of function to different segments, the methodology adopted by him is called as :

- (1) Sequence annotation
- (2) Gene mapping
- (3) Expressed sequence tags
- (4) Bioinformatics

Q. 140. Which of the following occurs due to the presence of autosome linked dominant trait?

- (1) Sickle cell anaemia
- (2) Myotonic dystrophy
- (3) Haemophilia
- (4) Thalessemia

Q. 141. While explaining interspecific interaction of population, (+) sign is assigned for beneficial interaction, (–) sign is assigned for detrimental interaction and (0) for

neutral interaction. Which of the following interactions can be assigned (+) for one species and (-) for another species involved in the interaction ?

- (1) predation (2) Amensalism
(3) Commensalism (4) Competition

Q. 142. What is the role of large bundle sheath cells found around the vascular bundles in C_4 plants ?

- (1) To provide the site for photorespiratory pathway
(2) To increase the number of chloroplast for the operation of Calvin cycle
(3) To enable the plant to tolerate high temperature
(4) To protect the vascular tissue from high light intensity

Q. 143. Match the plant with the kind of life cycle it exhibits

	List-I		List-II
(a)	<i>Spirogyra</i>	(i)	Dominant diploid sporophyte vascular plant, with highly reduced male or female gametophyte
(b)	Fern	(ii)	Dominant haploid free-living gametophyte
(c)	<i>Funaria</i>	(iii)	Dominant diploid sporophyte alternating with reduced gametophyte called prothallus
(d)	<i>Cycas</i>	(iv)	Dominant haploid leafy gametophyte alternating with partially dependent multicellular sporophyte

Choose the **correct answer** from the options given below.

- (1) (a)-(iv), (b)-(i), (c)-(ii), (d)-(iii)
(2) (a)-(ii), (b)-(iii), (c)-(iv), (d)-(i)
(3) (a)-(iii), (b)-(iv), (c)-(i), (d)-(ii)
(4) (a)-(ii), (b)-(iv), (c)-(i), (d)-(iii)

Q. 144. Read the following statements on lipids and find out **correct** set on statements :

- (a) Lecithin found in the plasma membrane is a glycolipid
(b) Saturated fatty acids possess one or more $C=C$ bonds
(c) Gingly oil has lower melting point, hence remains as oil in winter

- (d) Lipids are generally insoluble in water but soluble in some organic solvents
(e) when fatty acids is esterified with glycerol, monoglycerides are formed

Choose the **correct answer** from the options given below :

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

Q. 145. Transposons can be used during which one of the following ?

- (1) Polymerase Chain Reaction
(2) Gene silencing
(3) Autoradiography
(4) Gene sequencing

Q. 146. Match List-I with List-II.

	List-I		List-II
(a)	Metacentric chromosome	(i)	Centromere situated close to the end forming one extremely short and one very long arms
(b)	Acrocentric chromosome	(ii)	Centromere at the terminal end
(c)	Sub-metacentric	(iii)	Centromere in the middle forming two equal arms of chromosomes
(d)	Telocentric chromosome	(iv)	Centromere slightly away from the middle forming one shorter arm and one longer arm

Choose the **correct answer** from the options given below.

- (1) (a)-(iii), (b)-(i), (c)-(iv), (d)-(ii)
(2) (a)-(i), (b)-(iii), (c)-(ii), (d)-(iv)
(3) (a)-(ii), (b)-(iii), (c)-(iv), (d)-(i)
(4) (a)-(i), (b)-(ii), (c)-(iii), (d)-(iv)

Q. 147. In the following palindromic base sequences of DNA, which one can be cut easily by particular restriction enzyme ?

- (1) 5' G A T A C T 3' ; 3' C T A T G A 5'
(2) 5' G A A T T C 3' ; 3' C T T A A G 5'
(3) 5' C T C A G T 3' ; 3' G A G T C A 5'
(4) 5' G T A T T C 3' ; 3' C A T A A G 5'

Q. 148. The anatomy of springwood shows some peculiar features. Identity the **correct** set of statements about springwood :

- (a) It is also called as the earlywood
- (b) In spring season cambium produces xylem elements with narrow vessels
- (c) It is lighter in colour
- (d) The springwood along with autumn wood shows alternate concentric rings forming annual rings
- (e) It has lower density

Choose the correct answer from the options given below :

- (1) (a), (b), (d) and (e) Only

- (2) (a), (c), (d) and (e) Only

- (3) (a), (b) and (d) Only

- (4) (c), (d) and (e) Only

Q. 149. Which one of the following will accelerate phosphorus cycle ?

- (1) Burning of fossil fuels

- (2) Volcanic activity

- (3) Weathering of rocks

- (4) Rain fall and storms

Q. 150. Addition of more solutes in a given will :

- (1) raise its water potential

- (2) lower its water potential

- (3) make its water potential zero

- (4) not affect the water potential at all

ZOOLOGY

Section A

Q. 151. Breeding crops with higher levels of vitamins and minerals or higher proteins and healthier fats is called :

- (1) Bio-magnification
- (2) Bio-remediation
- (3) Bio-fortification
- (4) Bio-accumulation

Q. 152. Regarding Meiosis, which of the statements is incorrect?

- (1) There are two stages in Meiosis, Meiosis-I and II
- (2) DNA replication occurs in S phase of Meiosis-II
- (3) Pairing of homologous chromosomes and recombination occurs in Meiosis-II
- (4) Four haploid cells are formed at the end of Meiosis-II

Q. 153. Given below are two statements :

Statement I : Fatty acids and glycerols cannot be absorbed into the blood.

Statement II : Specialized lymphatic capillaries called lacteals carry chylomicrons into lymphatic vessels and ultimately into the blood.

In the light of the above statements, choose the most appropriate answer from the options given below :

- (1) Both **Statement I** and **Statement II** are correct
- (2) Both **Statement I** and **Statement II** are incorrect

- (3) **Statement I** is correct but **Statement II** is incorrect

- (4) **Statement I** is incorrect but **Statement II** is correct

Q. 154. At which stage of life the oogenesis process is initiated ?

- (1) Puberty

- (2) Embryonic development stage

- (3) Birth

- (4) Adult

Q. 155. Detritivores breakdown detritus into smaller particles. This process is called :

- (1) Catabolism
- (2) Fragmentation

- (3) Humification
- (4) Decomposition

Q. 156. if '8' *Drosophila* in a laboratory population of '80' died during a week, the death rate in the population is individuals per *Drosophila* per week.

- (1) 0.1

- (2) 10

- (3) 1.0

- (4) zero

Q. 157. In which of the following animals, digestive tract has additional chambers like crop and gizzard ?

- (1) *Corvus*, *Columba*, *Chameleon*

- (2) *Bufo*, *Balaenoptera*, *Bangarus*

- (3) *Catla*, *Columba*, *Crocodilus*

- (4) *Pavo*, *Psittacula*, *Corvus*

Q. 158. Which of the following statements with respect to Endoplasmic Reticulum is incorrect ?

- (1) RER has ribosomes attached to ER

- (2) SER is devoid of ribosomes

- (3) In prokaryotes only RER are present

- (4) SER are the sites for lipid synthesis

Q. 159. Tegmina in cockroach, arises from :

- (1) Prothorax
- (2) Mesothorax
- (3) Metathorax
- (4) Prothorax and Mesothorax

Q. 160. Which of the following is not the function of conducting part of respiratory system ?

- (1) It clears inhaled air from foreign particles
- (2) Inhaled air is humidified
- (3) Temperature of inhaled air is brought to body temperature
- (4) Provides surface for diffusion of O₂ and CO₂

Q. 161. Under normal physiological conditions in human being every 100 mL of oxygenated blood can deliver mL of O₂ to the tissues.

- (1) 2 mL
- (2) 5 mL
- (3) 4 mL
- (4) 10 mL

Q. 162. Select the **incorrect statement** with reference to mitosis :

- (1) All the chromosomes lie at the equator at metaphase.
- (2) Spindle fibres attach to centromere of chromosomes.
- (3) Chromosomes decondense at telophase.
- (4) Splitting of centromere occurs at anaphase.

Q. 163. Which of the following is present between the adjacent bones of the vertebral column?

- (1) Intercalated discs
- (2) Cartilage
- (3) Areolar tissue
- (4) Smooth muscle

Q. 164. If the length of a DNA molecule is 1.1 metres, what will be the approximate number of base pairs ?

- (1) 3.3×10^9 bp
- (2) 6.6×10^9 bp
- (3) 3.3×10^6 bp
- (4) 6.6×10^6 bp

Q. 165. *In-situ* conservation refers to :

- (1) Protect and conserve the whole ecosystem
- (2) Conserve only high risk species
- (3) Conserve only endangered species
- (4) Conserve only extinct species

Q. 166. Which of the following statements are true for spermatogenesis but do not hold true for Oogenesis?

- (a) It results in the formation of haploid gametes
- (b) Differentiation of gamete occurs after the completion of meiosis
- (c) Meiosis occurs continuously in a mitotically dividing stem cell population

(d) It is controlled by the Luteinising hormone (LH) and Follicle Stimulating Hormone (FSH) secreted by the anterior pituitary

(e) It is initiated at puberty

Choose the most appropriate answer from the options given below.

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

Q. 167. Given below are two statements : One is labelled as Assertion (A) and the other is labelled as Reason (R).

Assertion (A) :

All vertebrates are chordates but all chordates are not vertebrates.

Reason (R) :

Notochord is replaced by vertebral column in the adult vertebrates.

In the light of the above statements, choose the most appropriate answer from the options given below :

- (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 not correct
- (4) (A) is not correct but (R) is correct

Q. 168. Given below are two statements :

Statement I : Mycoplasma can pass through less than 1 micron filter size.

Statements II : Mycoplasma are bacteria with cell wall. In the light of the above statements, choose the most appropriate answer from the options given below :

- (1) Both Statement I and Statement II are correct
- (2) Both Statement I and Statement II are incorrect
- (3) Statement I is correct but statement II is incorrect
- (4) Statement I is incorrect but Statement II is correct

Q. 169. Given below are two statements :

Statement I : Autoimmune disorder is a condition where body defense mechanism recognizes its own cells as foreign bodies.

Statement II : Rheumatoid arthritis is a condition where body does not attack self cells.

- In the light of the above statements, choose the most appropriate answer from the options given below :
- (1) Both Statement I and Statement II are correct
 - (2) Both Statement I and Statement II are incorrect
 - (3) Statement I is correct but Statement II is incorrect
 - (4) Statement I is incorrect but Statement II is correct
- Q. 170.** In gene therapy of Adenosine Deaminase (ADA) deficiency, the patient requires periodic infusion of genetically engineered lymphocytes because :
- (1) Retroviral vector is introduced into these lymphocytes.
 - (2) Gene isolated from marrow cells producing ADA is introduced into cells at embryonic stages
 - (3) Lymphocytes from patient's blood are grown in culture, outside the body.
 - (4) Genetically engineered lymphocytes are not immortal cells.
- Q. 171.** Which of the following is a correct match for disease and its symptoms ?
- (1) Arthritis—Inflamed joints
 - (2) Tetany—high Ca^{2+} level causing rapid spasms.
 - (3) Myasthenia gravis—Genetic disorder resulting in weakening and paralysis of skeletal muscle.
 - (4) Muscular dystrophy—An auto immune disorder causing progressive degeneration of skeletal muscle.
- Q. 172.** Given below are two statements :
- Statement I :**
The release of sperms into the seminiferous tubules is called spermiation.
- Statements II :**
Spermiogenesis is the process of formation of sperms from spermatogonia.
- In the light of the above statements, choose the most appropriate answer from the options given below :
- (1) Both Statement I and Statement II are correct
 - (2) Both Statement I and Statement II are incorrect
 - (3) Statement I is correct but statement II is incorrect
 - (4) Statement I is incorrect but Statement II is correct
- Q. 173.** Nitrogenous waste is excreted in the form of pellet or paste by :
- (1) *Ornithorhynchus*
 - (2) *Salamandra*
 - (3) *Hippocampus*
 - (4) *Pavo*
- Q. 174.** Identify the microorganism which is responsible for the production of an immunosuppressive molecule cyclosporin A:
- (1) *Trichoderma polysporum*
 - (2) *Clostridium butylicum*
 - (3) *Aspergillus niger*
 - (4) *Streptococcus cerevisiae*
- Q. 175.** Lippe's loop is a type of contraceptive used as :
- (1) Cervical barrier
 - (2) Vault barrier
 - (3) Non-medicated IUD
 - (4) Copper releasing IUD
- Q. 176.** A dehydration reaction links two glucose molecules to produce maltose. If the formula for glucose is $\text{C}_6\text{H}_{12}\text{O}_6$ then what is the formula for maltose ?
- (1) $\text{C}_{12}\text{H}_{20}\text{O}_{10}$
 - (2) $\text{C}_{12}\text{H}_{24}\text{O}_{12}$
 - (3) $\text{C}_{12}\text{H}_{22}\text{O}_{11}$
 - (4) $\text{C}_{12}\text{H}_{24}\text{O}_{11}$
- Q. 177.** Which of the following is not a connective tissue ?
- (1) Blood
 - (2) Adipose tissue
 - (3) Cartilage
 - (4) Neuroglia
- Q. 178.** Which of the following functions is not performed by secretions from salivary glands?
- (1) Control bacterial population in mouth
 - (2) Digestion of complex carbohydrates
 - (3) Lubrication of oral cavity
 - (4) Digestion of disaccharides
- Q. 179.** Given below are two statements :
- Statement I :** Restriction endonucleases recognise specific sequence to cut DNA known as palindromic nucleotide sequence.
- Statements II :** Restriction endonucleases cut the DNA strand a little away from the centre of the palindromic site.
- In the light of the above statements, choose the most appropriate answer from the options given below :
- (1) Both Statement I and Statement II are correct

- (2) Both Statement I and Statement II are incorrect
- (3) Statement I is correct but Statement II is incorrect
- (4) Statement I is incorrect but Statement II is correct
- Q. 180.** Natural selection where more individuals acquire specific character value other than the mean character value, leads to:
- (1) Stabilising change
- (2) Directional change
- (3) Disruptive change
- (4) Random change
- Q. 181.** Given below are two statements : one is labelled as Assertion (A) and the other is labelled as Reason (R).
- Assertion (A) :** Osteoporosis is characterised by decreased bone mass and increased chances of fractures.
- Reason (R) :** Common cause of Osteoporosis is increased levels of estrogen.
- In the light of the above statements, choose the most appropriate answer from the options given below :
- (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 not correct
- (4) (A) is not correct but (R) is correct
- Q. 182.** In the taxonomic categories which hierarchical arrangement in ascending order is correct in case of animals ?
- (1) Kingdom, Phylum, Class, Order, Family, Genus, Species
- (2) Kingdom, Class, Phylum, Family, Order, Genus, Species
- (3) Kingdom, Order, Class, Phylum, Family, Genus, Species
- (4) Kingdom, Order, Phylum, Class, Family, Genus, Species

Q. 183. In an *E. coli* strain *i* gene gets mutated and its product can not bind the inducer molecule. If growth medium is provided with lactose, what will be the outcome ?

- (1) Only *z* gene will get transcribed
- (2) *z, y, a* genes will be transcribed
- (3) *z, y, a* genes will not be translated
- (4) RNA polymerase will bind the promoter region

Q. 184. Identify the asexual reproductive structure associated with *Penicillium* :

- (1) Zoospores (2) Conidia
- (3) Gemmules (4) Buds

Q. 185. Given below are two statements :

Statement I :

The coagulum is formed of network of threads called thrombins.

Statement II :

Spleen is the graveyard of erythrocytes.

In the light of the above statements, choose the most appropriate answer from the options given below :

- (1) Both Statement I and Statement II are correct
- (2) Both Statement I and Statement II are incorrect
- (3) Statement I is correct but Statement II is incorrect
- (4) Statement I is incorrect but Statement II is correct

Section B

Q. 186. Match List-I with List-II.

List-I	List-II
(Biological Molecules)	(Biological functions)
(a) Glycogen	(i) Hormone
(b) Globulin	(ii) Biocatalyst
(c) Steroids	(iii) Antibody
(d) Thrombin	(iv) Storage product

Choose the correct answer from the options given below :

- (1) (a)-(iii), (b)-(ii), (c)-(iv), (d)-(i)
 (2) (a)-(iv), (b)-(ii), (c)-(i), (d)-(iii)
 (3) (a)-(ii), (b)-(iv), (c)-(iii), (d)-(i)
 (4) (a)-(iv), (b)-(iii), (c)-(i), (d)-(ii)

Q. 187. Match List-I with List-II.

List-I	List-II
(a) Bronchioles	(i) Dense Regular Connective Tissue
(b) Goblet cell	(ii) Loose Connective Tissue
(c) Tendons	(iii) Glandular Tissue
(d) Adipose Tissue	(iv) Ciliated Epithelium

Choose the correct answer from the options given below :

- (1) (a)-(iv), (b)-(iii), (c)-(i), (d)-(ii)
 (2) (a)-(i), (b)-(ii), (c)-(iii), (d)-(iv)
 (3) (a)-(ii), (b)-(i), (c)-(iv), (d)-(iii)
 (4) (a)-(iii), (b)-(iv), (c)-(ii), (d)-(i)

Q. 188. Which one of the following statements is correct ?

- (1) The atrio-ventricular node (AVN) generates an action potential to stimulate atrial contraction
 (2) The tricuspid and the bicuspid valves open due to the pressure exerted by the simultaneous contraction of the atria
 (3) Blood moves freely from atrium to the ventricle during joint diastole.
 (4) Increased ventricular pressure causes closing of the semilunar valves.

Q. 189. Which of the following are not the effect of Parathyroid hormone ?

- (a) Stimulates the process of bone resorption
 (b) Decreases Ca^{2+} level in blood
 (c) Reabsorption of Ca^{2+} by renal tubules
 (d) Decreases the absorption of Ca^{2+} from

digested food

(e) Increases metabolism of carbohydrates
 Choose the most appropriate answer from the options given below :

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

Q. 190. Which of the following is a correct statement?

- (1) Cyanobacteria are a group of autotrophic organisms classified under Kingdom Monera.
 (2) Bacteria are exclusively heterotrophic organisms.
 (3) Slime moulds are saprophytic organisms classified under Kingdom Monera.
 (4) Mycoplasma have DNA, Ribosome and cell wall

Q. 191. Select the incorrect statement with respect to acquired immunity.

- (1) Primary response is produced when our body encounters a pathogen for the first time.
 (2) Anamnestic response is elicited on subsequent encounters with the same pathogen.
 (3) Anamnestic response is due to memory of first encounter.
 (4) Acquired immunity is non-specific type of defence present at the time of birth.

Q. 192. Match List-I with List-II with respect to methods of Contraception and their respective actions.

List-I	List-II
(a) Diaphragms	(i) Inhibit ovulation and Implantation
(b) Contraceptive Pills	(ii) Increase phagocytosis of sperm within Uterus
(c) Intra Uterine Devices	(iii) Absence of Menstrual cycle

- and ovulation following parturition
- (d) Lactational Amenorrhoea (iv) They cover the cervix blocking the entry of sperms

Choose the correct answer from the options given below :

- (1) (a)-(iv), (b)-(i), (c)-(iii), (d)-(ii)
 (2) (a)-(iv), (b)-(i), (c)-(ii), (d)-(iii)
 (3) (a)-(ii), (b)-(iv), (c)-(i), (d)-(iii)
 (4) (a)-(iii), (b)-(ii), (c)-(i), (d)-(iv)

Q. 193. Statements related to human Insulin are given below. Which statement(s) is/are correct about genetically engineered Insulin?

- (a) Pro-hormone insulin contain extra stretch of C-peptide
 (b) A-peptide and B-peptide chains of insulin were produced separately in *E.coli.*, extracted and combined by creating disulphide bond between them.
 (c) Insulin used for treatment of Diabetes was extracted from Cattles and Pigs.
 (d) Pro-hormone Insulin needs to be processed for converting into a mature and functional hormone.
 (e) Some patients develop allergic reactions to the foreign insulin.

Choose the most appropriate answer from the options given below :

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

Q. 194. The recombination frequency between the genes a & c is 5%, b & c is 15%, b & d is 9%, a & b is 20%, c & d is 24% and a & d is 29%. What will be the sequence of these genes on a linear chromosome ?

- (1) a, d, b, c
 (2) d, b, a, c

- (3) a, b, c, d
 (4) a, c, b, d

Q. 195. Ten *E. coli* cells with ^{15}N -dsDNA are incubated in medium containing ^{14}N nucleotide. After 60 minutes, how many *E. coli* cells will have DNA totally free from ^{15}N ?

- (1) 20 cells
 (2) 40 cells
 (3) 60 cells
 (4) 80 cells

Q. 196. Which of the following is not a desirable feature of a cloning vector ?

- (1) Presence of origin of replication
 (2) Presence of a marker gene
 (3) Presence of single restriction enzyme site
 (4) Presence of two or more recognition sites

Q. 197. Select the incorrect statement regarding synapses :

- (1) The membranes of presynaptic and postsynaptic neurons are in close proximity in an electrical synapse.
 (2) Electrical current can flow directly from one neuron into the other across the electrical synapse.
 (3) Chemical synapses use neurotransmitters
 (4) Impulse transmission across a chemical synapse is always faster than that across an electrical synapse.

Q. 198. Which of the following statements is not true?

- (1) Analogous structures are a result of convergent evolution
 (2) Sweet potato and potato is an example of analogy
 (3) Homology indicates common ancestry
 (4) Flippers of penguins and dolphins are a pair of homologous organs

Q. 199. If a colour blind female marries a man whose mother was also colour blind, what are the chances of her progeny having colour

- (1) 25% (2) 50%
 (3) 75% (4) 100%

Q. 200. Given below are two statements :

Statements I :

In a scrubber the exhaust from the thermal plant is passed through the electric wires to charge the dust particles.

Statements II :

Particular matter (PM_{2.5}) cannot be removed by scrubber but can be removed by an electrostatic precipitator.

In the light of the above statements, choose

the most appropriate answer from the options given below :

- (1) Both **Statement I** and **Statement II** are correct
- (2) Both **Statement I** and **Statement II** are incorrect
- (3) **Statement I** is correct but **Statement II** is incorrect
- (4) **Statement I** is incorrect but **Statement II** is correct

Booklet Batch RollNumber

(A) 10+1 (S) 0 0 0 0 0 0 0 0 0 0

(B) 10-2 (V) 1 1 1 1 1 1 1 1 1 1

(C) 10-3 (A) 2 2 2 2 2 2 2 2 2 2

(D) Crash (C) 3 3 3 3 3 3 3 3 3 3

(E) 4 4 4 4 4 4 4 4 4 4

(F) Paper 5 5 5 5 5 5 5 5 5 5

(G) 6 6 6 6 6 6 6 6 6 6

(H) Paper 1 (1) 7 7 7 7 7 7 7 7 7 7

(I) Paper 2 (2) 8 8 8 8 8 8 8 8 8 8

(J) 9 9 9 9 9 9 9 9 9 9

Name

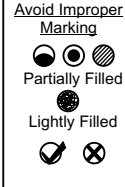
Test Date

Invigilator's Signature

Student's Signature

Certified that all the entries in this section have been properly filled by the student

The OMR Sheet will be computer checked. Fill the circles completely and dark enough for proper detection. Use ballpen (black or blue) for marking.



Test Center Code

0 0

1 1

2 2

3 3

4 4

5 5

6 6

7 7

8 8

9 9

101 (1) (2) (3) (4)

102 (1) (2) (3) (4)

103 (1) (2) (3) (4)

104 (1) (2) (3) (4)

105 (1) (2) (3) (4)

106 (1) (2) (3) (4)

107 (1) (2) (3) (4)

108 (1) (2) (3) (4)

109 (1) (2) (3) (4)

110 (1) (2) (3) (4)

111 (1) (2) (3) (4)

112 (1) (2) (3) (4)

113 (1) (2) (3) (4)

114 (1) (2) (3) (4)

115 (1) (2) (3) (4)

116 (1) (2) (3) (4)

117 (1) (2) (3) (4)

118 (1) (2) (3) (4)

119 (1) (2) (3) (4)

120 (1) (2) (3) (4)

121 (1) (2) (3) (4)

122 (1) (2) (3) (4)

123 (1) (2) (3) (4)

124 (1) (2) (3) (4)

125 (1) (2) (3) (4)

126 (1) (2) (3) (4)

127 (1) (2) (3) (4)

128 (1) (2) (3) (4)

129 (1) (2) (3) (4)

130 (1) (2) (3) (4)

131 (1) (2) (3) (4)

132 (1) (2) (3) (4)

133 (1) (2) (3) (4)

134 (1) (2) (3) (4)

135 (1) (2) (3) (4)

136 (1) (2) (3) (4)

137 (1) (2) (3) (4)

138 (1) (2) (3) (4)

139 (1) (2) (3) (4)

140 (1) (2) (3) (4)

141 (1) (2) (3) (4)

142 (1) (2) (3) (4)

143 (1) (2) (3) (4)

144 (1) (2) (3) (4)

145 (1) (2) (3) (4)

146 (1) (2) (3) (4)

147 (1) (2) (3) (4)

148 (1) (2) (3) (4)

149 (1) (2) (3) (4)

150 (1) (2) (3) (4)

151 (1) (2) (3) (4)

152 (1) (2) (3) (4)

153 (1) (2) (3) (4)

154 (1) (2) (3) (4)

155 (1) (2) (3) (4)

156 (1) (2) (3) (4)

157 (1) (2) (3) (4)

158 (1) (2) (3) (4)

159 (1) (2) (3) (4)

160 (1) (2) (3) (4)

161 (1) (2) (3) (4)

162 (1) (2) (3) (4)

163 (1) (2) (3) (4)

164 (1) (2) (3) (4)

165 (1) (2) (3) (4)

166 (1) (2) (3) (4)

167 (1) (2) (3) (4)

168 (1) (2) (3) (4)

169 (1) (2) (3) (4)

170 (1) (2) (3) (4)

171 (1) (2) (3) (4)

172 (1) (2) (3) (4)

173 (1) (2) (3) (4)

174 (1) (2) (3) (4)

175 (1) (2) (3) (4)

176 (1) (2) (3) (4)

177 (1) (2) (3) (4)

178 (1) (2) (3) (4)

179 (1) (2) (3) (4)

180 (1) (2) (3) (4)

181 (1) (2) (3) (4)

182 (1) (2) (3) (4)

183 (1) (2) (3) (4)

184 (1) (2) (3) (4)

185 (1) (2) (3) (4)

186 (1) (2) (3) (4)

187 (1) (2) (3) (4)

188 (1) (2) (3) (4)

189 (1) (2) (3) (4)

190 (1) (2) (3) (4)

191 (1) (2) (3) (4)

192 (1) (2) (3) (4)

193 (1) (2) (3) (4)

194 (1) (2) (3) (4)

195 (1) (2) (3) (4)

196 (1) (2) (3) (4)

197 (1) (2) (3) (4)

198 (1) (2) (3) (4)

199 (1) (2) (3) (4)

200 (1) (2) (3) (4)

Q. No.	Answer Key	Topic's Name	Chapter Name
		BOTANY (SECTION-A)	
101	3	Population and its Attributes	Organisms and populations
102	3	Ecosystem - Structure and Function, Productivity and Decomposition	Ecosystem
103	4	Anatomy of Dicotyledonous and Monocotyledonous plants	Anatomy of Flowering Plants
104	3	Long Distance Transport of Water and Transpiration	Transport in Plants
105	3	Phylum Annelida, Arthropoda, Mollusca, Echinodermata Mollusca, Echinodermata and Hemichordata	Animal Kingdom
106	2	The DNA, Search For Genetic Material RNA World	Molecular Basis of Inheritance
107	1	Secondary Growth	Anatomy of Flowering Plants
108	2	The Inflorescence and The Flower	Morphology of Flowering Plants
109	3	Principles of Biotechnology and Tools of Recombinant DNA Technology	Biotechnology : Principles & Processes
110	4	Differentiation, Dedifferentiation and Redifferentiation, Development and Plant Growth Regulators	Plant Growth and Development
111	2	Types of Classification and Algae	Plant Kingdom
112	4	Flower, Pre-Fertilisation : Structure and Events	Sexual Reproduction in Flowering Plants
113	4	Do Plants Breathe? Glycolysis	Respiration in Plants
114	3	Biodiversity Conservation	Biodiversity And Conservation
115	2	Use of ATP and NADPH	Photosynthesis in Higher Plants
116	3	Cell Cycle And Mitosis	Cell Cycle And Cell Division
117	3	Meiosis	Cell Cycle And Cell Division
118	3	Sex determination and Genetic Disorders	Principle of Inheritance and Variation
119	3	Differentiation, Dedifferentiation and Redifferentiation, Development and Plant Growth Regulators	Plant Growth and Development
120	1	Mendel's Laws of Inheritance and Chromosomal theory	Principle of Inheritance and Variation
121	4	Do Plants Breathe? Glycolysis	Respiration in Plants
122	3	Root, Stem and Leaf	Morphology of Flowering Plants
123	3	Types of Classification and Algae	Plant Kingdom
124	3	Pollution and its Types	Environmental Issues
125	1	Flower, Pre-Fertilisation : Structure and Events	Sexual Reproduction in Flowering Plants
126	2	Means of Transport and Plant-Water Relations	Transport in Plants
127	2	The Inflorescence and The Flower	Morphology of Flowering Plants
128	2	Process of Recombinant DNA Technology	Biotechnology : Principles & Processes
129	2	Plant Growth Regulators	Plant Growth and Development
130	3	Genetic Code, Translation Gene Expression And DNA Fingerprinting	Molecular Basis of Inheritance
131	1	Pigments involved in Photosynthesis, Light Reaction and The Electron Transport	Photosynthesis in Higher Plants
132	2	Mechanism of Absorption of Elements, Translocation of Solutes and Soil as Reservoir of Essential Elements	Mineral Nutrition
133	2	Biodiversity Conservation	Biodiversity And Conservation
134	1	Genetic Code, Translation Gene Expression And DNA Fingerprinting	Molecular Basis of Inheritance
135	2	Plant Growth Regulators	Plant Growth and Development

Q. No.	Answer Key	Topic's Name	Chapter Name
		BOTANY (SECTION-B)	
136	2	Pollution and its Types	Environmental Issues
137	3	Mendel's Laws of Inheritance and Chromosomal theory	Principle of Inheritance and Variation
138	3	The Fruit, The Seed and The Families	Morphology of Flowering Plants
139	1	Genetic Code, Translation Gene Expression And DNA Fingerprinting	Molecular Basis of Inheritance
140	2	Sex determination and Genetic Disorders	Principle of Inheritance and Variation
141	1	Population and its Attributes	Organisms and populations
142	2	Pigments involved in Photosynthesis, Light Reaction and The Electron Transport	Photosynthesis in Higher Plants
143	2	Gymnosperms, Angiosperms and Plant Life Cycles	Plant Kingdom
144	3	Proteins, Polysaccharides, Nucleic Acids	Biomolecules
145	2	The DNA, Search For Genetic Material RNA World	Molecular Basis of Inheritance
146	1	Cell Cycle	Cell Cycle And Cell Division
147	2	Principles of Biotechnology and Tools of Recombinant DNA Technology	Biotechnology : Principles & Processes
148	2	Anatomy of Dicotyledonous and Monocotyledonous plants	Anatomy of Flowering Plants
149	3	Ecological Succession and Nutrient Cycling	Ecosystem
150	2	Means of Transport and Plant-Water Relations	Transport in Plants
		Zoology (SECTION-A)	
151	3	Plant Breeding for Improved Food Quality	Strategies for enhancement in food production
152	2	Meiosis	Cell cycle and cell division
153	1	Absorption of Digested Products	Digestion and absorption
154	2	Oogenesis	Human reproduction
155	2	Decomposition	Ecosystem
156	1	Populations	Organisms and populations
157	4	Anatomy	Structural organisation in animals
158	3	The Endoplasmic Reticulum (ER)	Cell: the unit of life
159	2	Anatomy	Structural organisation in animals
160	4	Human Respiratory System	Breathing and exchange of gases
161	2	Transport of Oxygen	Breathing and exchange of gases
162	2	Metaphase	Cell cycle and cell division
163	2	Joints	Locomotion and movement
164	1	The DNA	Molecular basis of inheritance
165	1	How do we conserve Biodiversity?	Biodiversity and conservation
166	4	Oogenesis	Human reproduction
167	1	Phylum – Chordata	Animal kingdom
168	3	Eubacteria	Biological classification
169	3	Auto Immunity	Human health and disease
170	4	Gene Therapy	Biotechnology and its applications

Q. No.	Answer Key	Topic's Name	Chapter Name
171	1	Disorders Of Muscular And Skeletal System	Locomotion And Movement
172	3	The Male Reproductive System	Human Reproduction
173	4	Introduction To Excretion	Excretory Products And Their Elimination
174	1	Chemicals, Enzymes And Other Bioactive Molecules	Microbes In Human Welfare
175	3	Population Stabilisation And Birth Control	Reproductive Health
176	3	Nature Of Bond Linking Monomers In A Polymer	Biomolecules
177	4	Connective Tissue	Structural Organisation In Animals
178	4	Digestive Glands	Digestion And Absorption
179	1	Restriction Enzymes	Biotechnology : Principles And Processes
180	2	Hardy-Weinberg Principle	Evolution
181	3	Disorders Of Muscular And Skeletal System	Locomotion And Movement
182	1	Taxonomic Categories	The Living World
183	3	Lac Operon Model	Molecular Basis Of Inheritance
184	2	Asexual Reproduction	Reproduction In Organisms
185	4	Coagulation Of Blood	Body Fluids And Circulation
		Zoology (Section-B)	
186	4	Biological Functions Of Biomolecules	Biomolecules
187	1	Animal Tissues	Structural Organisation In Animals
188	3	Human Circulatory System	Body Fluids And Circulation
189	2	Parathyroid Gland	Chemical Coordination And Integration
190	1	Kingdom Monera	Biological Classification
191	4	Acquired Immunity	Human Health And Disease
192	2	Population Stabilisation And Birth Control	Reproductive Health
193	2	Genetically Engineered Insulin	Biotechnology And Its Applications
194	4	Linkage And Recombination	Principles Of Inheritance And Variation
195	3	The Experimental Proof	Molecular Basis Of Inheritance
196	4	Cloning Vectors	Biotechnology : Principles And Processes
197	4	Transmission Of Impulses	Neural Control And Coordination
198	4	What Are The Evidences For Evolution?	Evolution
199	4	Mendelian Disorders	Principles Of Inheritance And Variation
200	2	Air Pollution And Its Control	Environmental Issues

NEET (UG)

July 2022 Paper

ANSWERS WITH EXPLANATION

BOTANY

Section A

101. **Option (3) is correct.**
Explanation: In predation, only a single species is negatively impacted.
102. **Option (3) is correct.**
Explanation: The process of degradation of detritus into simpler substances by the action of microbes is called decomposition. Decomposition rate is faster if the detritus is rich in nitrogen and water-soluble substances such as sugars, but not lignin and chitin.
103. **Option (4) is correct.**
Explanation: In monocotyledonous roots, xylem and phloem together constitute a vascular bundle. In monocots, the vascular bundles are collateral, conjoint and closed type.
104. **Option (3) is correct.**
Explanation: During apoplastic pathway, with the help of the intervening cells, water is transported from the root hair to the xylem. This movement beyond the cortex is blocked by the casparian strip of endodermal cells.
105. **Option (3) is correct.**
Explanation: All arthropods for e.g., lobsters, crabs, spiders, mites etc., consists a hard exoskeleton which is made up of a protein, chitin. This hard protective layer of arthropods give support for the attachment of arthropod's muscles.
106. **Option (2) is correct.**
Explanation: Euchromatin is loosely packed and enriched in genes, hence it is responsible for the active transcription. A typical nucleosome contains about 200 base pairs (bp) of the DNA helix. Heterochromatin is highly condensed and is transcriptionally silent.
107. **Option (1) is correct.**
Explanation: In old trees, the greater part of secondary xylem is dark brown and resistant to insect attack due to the deposition of secondary metabolites and organic compounds like tannins and resins in the central or innermost layer of the stem.
108. **Option (2) is correct.**
Explanation: The flowers of the plants such as bean, pea, *Cassia* and Gulmohar belonging to the family Fabaceae are zygomorphic i.e., having floral parts unequal in size or form.
109. **Option (3) is correct.**
Explanation: Gel electrophoresis is a technique of separation of DNA strands according to their size under the effect of an electric field across the gel. Bright orange coloured bands of DNA can be observed in the gel when exposed to UV light.
110. **Option (4) is correct.**
Explanation: Plasticity is an ability of an organism to change its phenotype in response to environmental condition. It is a characteristic feature in some plants such as cotton, coriander, buttercup, etc., which enables them to adapt to rapid environmental changes.
111. **Option (2) is correct.**
Explanation: Algae such as *Ulothrix* and *Volvox* belongs to the family chlorophyceae (green algae) and their reserved food material is in the form of starch.
112. **Option (4) is correct.**
Explanation: Most dominant pollinating agents among the animals, particularly among the insects are the "bees".
113. **Option (4) is correct.**
Explanation: In the process of glycolysis, four molecules of ATP and two molecules of NADPH are also formed, each produces 3 molecules of ATP which means total 6 ATP molecules are produced. Out of these 10ATP molecules, 2ATP molecules are initially utilised, one during the conversion of glucose to glucose 6-phosphate and the one during the conversion of fructose-6-phosphate to fructose 1, 6 bisphosphate. So, the net gain of ATP is eight molecules.

114. **Option (3) is correct.**

Explanation: The major causes of biodiversity loss are Habitat loss and Fragmentation, over-exploitation, Alien species invasion and co-extinction as explained in Rivet-popper hypothesis by Paul Ehrlich.

115. **Option (2) is correct.**

Explanation: The movement of ions across a semipermeable membrane bound structure, down their electrochemical gradient is known as chemiosmosis. ATP is produced through chemiosmosis, which is the main molecule used by the cell as energy. Electron carriers like NADH and FADH donate electrons to the electron transport chain which cause conformational changes in the shapes of the protein molecules.

116. **Option (3) is correct.**

Explanation: Pairing of homologous chromosomes occurs during the prophase stage of Meiosis.

117. **Option (3) is correct.**

Explanation: Crossing over occurs during the pachytene stage of meiosis in which exchange of chromosomal material between maternal and paternal homologous chromosomes occur. Recombination nodules are multicomponent proteinaceous ellipsoids found associated with the synaptonemal complex during prophase-I of meiosis.

118. **Option (3) is correct.**

Explanation: XO type of sex determination is found in Grasshoppers, and some insects where females are homogametic and produce only single type of chromosome i.e., (XX). Males have only one X-chromosome (XO).

119. **Option (3) is correct.**

Explanation: Ethylene is a phytohormone responsible for inducing and promoting female flower development in cucumber.

120. **Option (1) is correct.**

Explanation: Mendel studied seven pairs of contrasting characters which include pea shape, pea colour, pod shape, pod colour, flower colour, plant size and position of flowers.

121. **Option (4) is correct.**

Explanation: Less than 7% of the energy is released from glucose during lactic acid fermentation. Not all of it is stored as ATP.

122. **Option (3) is correct.**

Explanation: In citrus and *Bougainvillea*, the thorns are developed from modified stem. Leaves are modified into many structures and the pointed structures are known as spines.

123. **Option (3) is correct.**

Explanation: Red algae belongs to the class Rhodophyceae in which they contain a red colour pigment - r-phycoerythrin in their body. Hydrocolloid carrageen can be obtained from Rhodophyceae only.

124. **Option (3) is correct.**

Explanation: Electrostatic precipitator is the device used for removing particulate matter present in the exhaust from a thermal power plant.

125. **Option (1) is correct.**

Explanation: Cleistogamy is a type of automatic self pollination of certain plants that can be seen especially in peanuts, peas etc. The advantage of such pollination is that, the flower is not dependent on pollinators but there is no chance for cross-pollination.

126. **Option (2) is correct.**

Explanation: The transportation of food material occurs with the help of plant tissue was identified by plant physiologists in "Girdling experiment". It showed that phloem is responsible for the translocation of food as it is present outside the xylem.

127. **Option (2) is correct.**

Explanation: Vexillary aestivation is the characteristic of the family Fabaceae. Hence, *Pisum sativum* shows vexillary aestivation. Stamens are said to be diadelphous when united into two bundles. As china rose has monadelphous stamens, pea plants have diadelphous stamens.

128. **Option (2) is correct.**

Explanation: Both the statements are correct but they do not show cause and effect.

129. **Option (2) is correct.**

Explanation: Ethylene is a simple, gaseous plant growth regulator which is responsible for inducing ripening in fruits and ageing tissues. It promote root growth and root hair formation to increase the absorption surface.

130. **Option (3) is correct.**

Explanation: Polymorphism is the presence of two or more variant forms of a specific DNA

sequence occurring in different individuals or populations. It forms the basis of both genetic mapping and DNA fingerprinting.

131. **Option (1) is correct.**

Explanation: Phosphoenolpyruvate, found in the mesophyll cells is the primary CO₂ acceptor in C₄ plants. In C₄ plants, mesophyll cells lack RuBisCo-enzyme.

132. **Option (2) is correct.**

Explanation: *Frankia* produces nitrogen fixing nodules on the roots of *Alnus*.

133. **Option (2) is correct.**

Explanation: *Ex-situ* conservation is the conservation of species outside their natural habitat where they can be given special care and attention. For e.g., Botanical gardens, Zoos, Aquariums, Cryopreservation etc. Natural parks and wildlife sanctuaries are the *in-situ* conservation methods.

134. **Option (1) is correct.**

Explanation: As soon as the small sub-unit of ribosome encounters mRNA, the process of translation (mRNA to proteins) begins.

135. **Option (2) is correct.**

Explanation: (a) Manganese—Function in splitting of water during photosynthesis.
(b) Magnesium—Activates enzymes of respiration.
(c) Boron—Required for pollen germination.
(d) Iron—Activates the enzyme catalase.

Section B

136. **Option (2) is correct.**

Explanation: The engine in the CNG buses functions the same way as a gasoline engine. Natural gas is stored in a fuel tank, mostly at the back of the vehicle. The same diesel engine used in CNG buses is not tested as it makes the cost of conversion expensive.

137. **Option (3) is correct.**

Explanation: Genes that are located on different chromosomes assort independently. By determining the recombination frequencies, we can determine if the gene is assorting independently or not.

138. **Option (3) is correct.**

Explanation: In the given figure, i.e., T. S. of apple fruit, the part labelled 'C' is thalamus, which is a false fruit.

139. **Option (1) is correct.**

Explanation: Sequence annotation is the process of identifying the boundaries between genes and other features in a DNA sequence. This methodology is adopted by the geneticist for sequencing the whole genome of an organism.

140. **Option (2) is correct.**

Explanation: Myotonic dystrophy is the most common form of muscular dystrophy that begins at adulthood, characterised by progressive muscle weakness. It is caused due to the genetic changes and is inherited in an autosomal dominant manner.

141. **Option (1) is correct.**

Explanation: The interaction in which one organism consumes the body or parts of another organism is known as predation. For e.g., House cats killing mice, birds and other small insects.

142. **Option (2) is correct.**

Explanation: The large bundle sheath cells found around the vascular bundles in C₄ plants help to increase the number of chloroplast for the operation of Calvin cycle.

143. **Option (2) is correct.**

Explanation: (a) *Spirogyra*—Dominant haploid free-living gametophyte.
(b) Fern—dominant diploid sporophyte alternating with reduced gametophyte called prothallus.

(c) *Funaria*—Dominant haploid leafy gametophyte alternating with partially dependent multicellular sporophyte.

(d) *Cycas*—Dominant diploid sporophyte vascular plant with highly reduced male or female gametophyte.

144. **Option (3) is correct.**

Explanation: Lecithin is naturally found in body tissues. It is a phospholipid, a yellowish-brown fatty substance which contains glycerol, two fatty acids, phosphate group and choline. Saturated fatty acids have single bonds only. Unsaturated fatty acids can have one or more double bonds.

145. **Option (2) is correct.**

Explanation: Transposons can be used during Gene silencing methods. They are a group of mobile genetic elements and can jump into different places of the genome, hence called jumping genes also.

146. **Option (1) is correct.**

Explanation: (a) **Metacentric chromosome**—Centromere in the middle forming two equal arms of chromosomes.

(b) **Telocentric chromosome**—Centromere situated close to the end forming one extremely short and one very long arm.

(c) **Sub-metacentric chromosome**—Centromere slightly away from the middle forming one shorter arm and one longer arm.

(d) **Telocentric chromosome**—Centromere at the terminal end.

147. **Option (2) is correct.**

Explanation: 5' G A A T T C 3'
3' C T T A A G 5'

In this palindromic sequence, EcoRI recognises and cuts at the restriction site and produces sticky ends.

148. **Option (2) is correct.**

Explanation: Cambium is very active during spring season and produces a large number of xylem elements which have vessels with wider cavities.

149. **Option (3) is correct.**

Explanation: Weathering of rocks accelerates the phosphorus cycle.

150. **Option (2) is correct.**

Explanation: Addition of more solutes in a given solution will lower its water potential and makes the solution saturated.

ZOOLOGY

Section A

151. **Option (3) is correct.**

Explanation: Bio-fortification is a process of breeding, in which nutritional quality of crop is enhanced with higher levels of vitamins and minerals or higher proteins and healthier fats.

152. **Option (2) is correct.**

Explanation: DNA replication occurs before meiosis I in S-phase of interphase, so, the statement II is incorrect. As DNA replication occurs only once during meiosis.

153. **Option (1) is correct.**

Explanation: Being insoluble in water, fatty acids and glycerols cannot be absorbed into the blood.

Lacteals are specialised lymphatic capillaries, which carry all dietary lipids or chylomicrons into lymphatic vessels and ultimately into the blood.

154. **Option (2) is correct.**

Explanation: Millions of gamete mother cells (oogonia) are formed within each fetal ovary and this process of oogenesis occurs during embryonic development stage.

155. **Option (2) is correct.**

Explanation: The process of breakdown of detritus into smaller particles by detritivores is known as Fragmentation.

156. **Option (1) is correct.**

Explanation: Death rate is expressed as the number of deaths in a given area during a

given time per 1000 individuals. It can be calculated as death of individuals to that of total number of individual in a population.

So, Death rate of individuals per week

$$= \frac{8}{80} = 0.1.$$

157. **Option (4) is correct.**

Explanation: Crop and gizzard are additional chambers in digestive tract of birds. *Pavo* (Peacock), *Psittacula* (Parakeets), *Corvus* (Crow), all are birds, and possess crop and gizzard.

158. **Option (3) is correct.**

Explanation: Prokaryotes lack membrane bound organelles. So, in prokaryotes both RER and SER are absent. They do not have any kind of endoplasmic reticulum.

159. **Option (2) is correct.**

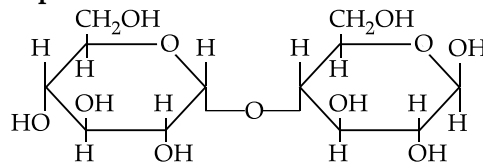
Explanation: Forewings of cockroach are called tegmina, they are emerged from mesothorax, while hind wings are emerged from metathorax.

160. **Option (4) is correct.**

Explanation: Atmospheric air, passes through nose → pharynx → larynx → trachea → bronchi → bronchioles, this system starting from nose to bronchioles, constitute conducting part of respiratory system, it filters, humidify and maintain the temperature of the gases entered the conducting system.

161. **Option (2) is correct.**

- Explanation:** Oxygen get bound to haemoglobin in the lung surface and get dissociated at the tissues. Every 100 mL of oxygenated blood can deliver around 5 mL of O_2 to the tissue under normal physiological conditions.
162. **Option (2) is correct.**
Explanation: During mitosis, spindle fibres attach to kinetochore of chromosome. Kinetochores are the protein, present around the centromere.
163. **Option (2) is correct.**
Explanation: White fibrous cartilage is present between the adjacent bones of vertebral column, which allows only a limited movement.
164. **Option (1) is correct.**
Explanation: The total length of double helix DNA = total number of base pairs \times distance between two base pairs.
 The length between two base pair is = 0.34 nm = 0.34×10^{-9} m
 The length of given DNA molecule is = 1.1m.
 $1.1 = \text{total number of base pairs} \times 0.34 \times 10^{-9}$ m
 Total number of base pairs = $\frac{1.1}{0.34 \times 10^{-9}} = 3.23 \times 10^9$
 $3.23 \times 10^9 = \sim 3.3 \times 10^9$.
165. **Option (1) is correct.**
Explanation: *In-situ* means insite conservation, it is the protection and conservation of whole ecosystem in its natural habitat.
166. **Option (4) is correct.**
Explanation: Oogenesis occur at early embryonic stage, while spermatogenesis occurs at the stage of puberty.
 Both spermatogenesis and oogenesis, results in the formation of haploid gametes.
167. **Option (1) is correct.**
Explanation: During embryonic development, members of vertebrata posses notochord, but the notochord is replaced by a cartilaginous or bony vertebral column in adult. Thus, all vertebrates are chordates but all chordates are not vertebrates.
168. **Option (3) is correct.**
Explanation: Mycoplasma are microscopic, they can penetrate 0.2 μm filter. They are categorised as bacteria, which lack cell wall.
169. **Option (3) is correct.**
Explanation: Rheumatoid arthritis is an autoimmune disease. In this disease, body's defence mechanism recognises its own cells as foreign bodies, and start attacking self cells.
170. **Option (4) is correct.**
Explanation: Patient suffering from adenosine deaminase deficiency require periodic infusion of genetically engineered lymphocytes because genetically engineered lymphocytes are not immortal.
171. **Option (1) is correct.**
Explanation:
Tetany—low level of Ca^{2+} causing rapid spasm.
Myasthenia gravis—Autoimmune disorder resulting in weakening and paralysis of skeletal muscle.
Muscular dystrophy—A genetic disorder causing degeneration of skeletal muscle.
172. **Option (3) is correct.**
Explanation: Spermiation is release of sperms into seminiferous tubules. The process of transformation of spermatids into spermatozoa is called spermiogenesis.
173. **Option (4) is correct.**
Explanation: Reptiles, birds, lands snails and insects excrete nitrogenous waste as uric acid in the form of pellet or paste with a minimum loss of water. *Pavo* is a bird among the other options, which excretes in the form of pellet or paste.
174. **Option (1) is correct.**
Explanation: *Trichoderma polysporum* is a fungus, which is responsible for the production of an immunosuppressive agent cyclosporin A.
175. **Option (3) is correct.**
Explanation: IUDs (Intrauterine devices) are method of birth control, inserted by doctors in uterus of females through vagina. Lippe's loop is an example of non-medicated IUD.
176. **Option (3) is correct.**
Explanation:



Maltose

177. **Option (4) is correct.**

Explanation: Neuroglia are not a connective tissue, they are neural cells, which provide support to neurons.

178. **Option (4) is correct.**

Explanation: Secretions of salivary glands lubricate oral cavity, and salivary enzymes performs partial digestion of complex carbohydrates, controls bacterial population in mouth, but do not perform the function of digestion of disaccharides.

179. **Option (1) is correct.**

Explanation: Restriction endonucleases recognises a specific palindromic nucleotide sequence in DNA. These endonucleases cut the DNA strand a little away from the centre of palindromic site.

180. **Option (2) is correct.**

Explanation: Natural selection can lead to stabilisation if more individuals acquire mean character value, and if more individual acquire value other than the mean character value, it leads to directional change.

181. **Option (3) is correct.**

Explanation: Osteoporosis is an age-related disorder, which is characterised by decrease bone mass and increased chances of fractures. Decreased level of estrogen is the most common cause of osteoporosis.

182. **Option (1) is correct.**

Explanation: "Kingdom, Phylum, class, order, Family, Genus, species." is correct ascending order of hierarchical arrangement of taxonomic categories.

183. **Option (3) is correct.**

Explanation: If the *i* gene of *E. coli* strain get mutated and its product can not bind the inducer molecule or lactose, then *i* gene will code for repressor, and due to mutation *z*, *y*, a gene will not be translated.

184. **Option (2) is correct.**

Explanation: Zoospores are asexual reproductive structure in algae. Gemmules are found in sponges.

Buds are asexual reproductive structure in *Hydra*.

185. **Option (4) is correct.**

Explanation: RBCs after completing their life span, which is of 120 days get destroyed in spleen. The coagulum or clot is formed of network of threads called fibrins.

Section B

186. **Option (4) is correct.**

Explanation: Glycogen is a storage product in animals. Globulins are proteins that can function as antibody. Many hormones are steroid in nature. Thrombin is an enzyme, that act as biocatalyst.

187. **Option (1) is correct.**

Explanation: Ciliated epithelium lines nasal cavity, bronchioles, etc.

Mucosal epithelium has goblet cells, which secrete mucus, and are glandular tissue.

Tendons are dense regular connective tissue.

Adipose tissue is a type of loose connective tissue, located mainly beneath the skin.

188. **Option (3) is correct.**

Explanation:

- Sino-atrial node (SAN) generates an action potential to stimulate atrial contraction.
- If atrial pressure is more than ventricular pressure, then it leads to closure of semilunar valves.

189. **Option (2) is correct.**

Explanation:

- Parathyroid hormone raises the level of calcium in the blood.
- It also influence calcium absorption from digested food.
- Thyroid hormones control metabolism of carbohydrate.

190. **Option (1) is correct.**

Explanation: Bacteria can be autotrophic or heterotrophic. Slime moulds are classified under kingdom Protista. Mycoplasma lack cell wall.

191. **Option (4) is correct.**

Explanation: Acquired immunity is pathogen specific, not present at the time of birth.

192. **Option (2) is correct.**

Explanation: Diaphragms cover the cervix blocking the entry of sperms.

Contraceptive pills inhibit ovulation and implantation. Intrauterine devices increases phagocytosis of sperm within Uterus. Lactational amenorrhoea is a period of absence of menstrual cycle and ovulation following parturition.

193. **Option (2) is correct.**

Explanation: Pro-insulin does not contain extra stretch of C-peptide.

Genetically engineered insulin was not extracted from cattles and pigs, but it was artificially manufactured using *E.coli*.

194. **Option (4) is correct.**

Explanation: Recombination frequency is directly proportional to the distance between genes, So,

Let,

$$a \ \& \ d = (X)$$

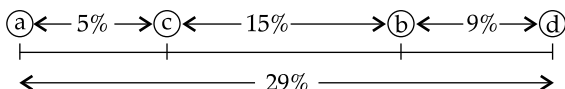
$$a \ \& \ c = (Y)$$

$$c \ \& \ b = (Z)$$

$$b \ \& \ d = (A)$$

$$(X) = (Y) + (Z) + (A)$$

$$29 = 5 + 15 + 9$$



Hence, a, c, b, d is correct sequence.

195. **Option (3) is correct.**

Explanation: A new hybrid $^{15}\text{N} - ^{14}\text{N}$ is formed after 20 minutes. After 40 minutes equal hybrids of high density DNA and low density DNA will be formed.

After 60 minutes, all the DNA strands will be containing ^{14}N nucleotide.

196. **Option (4) is correct.**

Explanation: Presence of two or more recognition sites, will complicate gene cloning, hence, it is not a desirable feature of cloning vector.

197. **Option (4) is correct.**

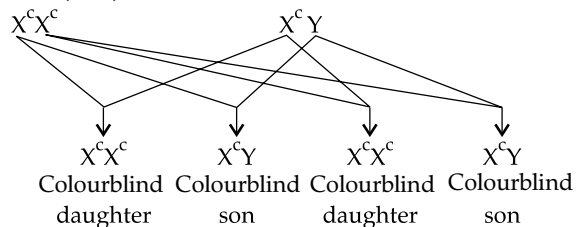
Explanation: Impulse transmission across electrical synapse is always faster than that of chemical synapse.

198. **Option (4) is correct.**

Explanation: Flippers of penguins and dolphins are a pair of analogous organs, as they perform same function but have different origin.

199. **Option (4) is correct.**

Explanation: If a colourblind female (X^cX^c) marries a man whose mother was also colour blind. Then, the male will be colourblind (X^cY)



100% Colourblind progeny.

200. **Option (2) is correct.**

Explanation: In a scrubber the exhaust is passed through a spray of water or lime. Particulate matter (PM-2.5) cannot be removed by precipitator.