

BOTANY

SECTION-A

101. Which of the following is **not** a method of *ex situ* conservation?

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

Answer (1)

Sol. *In-situ* conservation means on site conservation i.e. when we conserve and protect the whole ecosystem, its biodiversity at all levels is protected.

National parks are type of *in-situ* conservation.

Whereas, micropropagation, cryopreservation and *in-vitro* fertilisation are methods of *ex-situ* conservation.

102. Given below are two statements :

Statement I :

The primary CO₂ acceptor in C₄ plants is phosphoenolpyruvate and is found in the mesophyll cells.

Statement II :

Mesophyll cells of C₄ 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 incorrect
(2) **Statement I** is correct but **Statement II** is incorrect
(3) **Statement I** is incorrect but **Statement II** is correct
(4) Both **Statement I** and **Statement II** are correct

Answer (4)

Sol. The primary CO₂ acceptor is a 3-carbon molecule, phosphoenol pyruvate (PEP) and is present in the mesophyll cells.

Mesophyll cells of C₄ plants lack RuBisCO enzyme.

103. Read the following statements about the vascular bundles :

- (a) In roots, 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) (b), (c), (d) and (e) Only (2) (a), (b), (c) and (d) Only
(3) (a), (c), (d) and (e) Only (4) (a), (b) and (d) Only

Answer (NA) No option is correct

Sol. All the statements are correct regarding vascular bundles but none of the options with such combination is given.

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

Answer (4)

Sol. Gregor J. Mendel, conducted hybridisation experiments on garden peas and selected 14 true breeding pea plant varieties (seven contrasting traits). Contrasting traits studied were smooth or wrinkled seeds, yellow or green seeds, inflated or constricted pods, green or yellow pods, tall or dwarf plants, violet or white flowers and axial or terminal flower positions.

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

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

Answer (2)

Sol. One of the species in predation gains benefit on the expense of the other. Predators help in maintaining species diversity in a community, by reducing the intensity of competition among competing prey species. If a predator is too efficient and overexploits its prey, then the prey might become extinct.

106. DNA polymorphism forms the basis of :

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

Answer (2)

Sol. Polymorphism in DNA sequence is the basis of genetic mapping of human genome as well as of DNA fingerprinting.

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

Answer (4)

Sol. Cleistogamous flowers does not open at all. In such flowers autogamy occurs. Lack of cross pollination is a disadvantage of cleistogamy.

108. In old 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) (c) and (d) Only
- (2) (d) and (e) Only
- (3) (b) and (d) Only
- (4) (a) and (b) Only

Answer (4)

Sol. In old trees, the greater part of secondary xylem is dark brown due to deposition of organic compounds like tannins, resins, oils, gums, aromatic substances and essential oils in the central or innermost layers of the stem. These substances make it hard, durable and resistant to the attacks of micro-organisms and insects.

109. What is the net gain of ATP when each molecule of glucose is converted to two molecules of pyruvic acid?
- (1) Six
 - (2) Two
 - (3) Eight
 - (4) Four

Answer (2)

Sol. During glycolysis, total 4 ATPs are produced from one glucose molecule with a net gain of 2 ATPs.

110. Which one of the following never occurs during mitotic cell division?
- (1) Movement of centrioles towards opposite poles
 - (2) Pairing of homologous chromosomes
 - (3) Coiling and condensation of the chromatids
 - (4) Spindle fibres attach to kinetochores of chromosomes

Answer (2)

Sol. Pairing of homologous chromosomes occurs during prophase I of meiosis.

Coiling and condensation of chromatids, spindle fibres attachment to the kinetochores and movement of centrioles towards opposite poles occur in both mitosis and meiosis.

111. 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) Gibberellin
 - (2) Ethylene
 - (3) Cytokinin
 - (4) ABA

Answer (2)

Sol. Ethylene increases the number of female flowers and fruits in certain plants such as cucumber. Gibberellins are used to increase the size of fruits in some plants.

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

Answer (1)

Sol. Manganese plays a major role in the splitting of water to liberate oxygen during photosynthesis.
 Magnesium activates several enzymes involved in photosynthesis and respiration.
 Boron is involved in pollen germination. Iron activates the catalase and some other enzymes.

113. 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) (b), (c) Only (2) (d), (e) Only
 (3) (c), (d), (e) Only (4) (a), (b), (c) Only

Answer (1)

Sol. When a flower can be divided into two similar halves only in one particular vertical plane, it is zygomorphic for e.g. pea, gulmohar, bean, *Cassia*. Mustard, *Datura* and Chilly show actinomorphic flowers.

114. Which of the following is **incorrectly** matched?

- (1) *Ulothrix* – Mannitol (2) *Porphyra* – Floridian Starch
 (3) *Volvox* – Starch (4) *Ectocarpus* – Fucoxanthin

Answer (1)

Sol. *Ulothrix* is a member of Chlorophyceae (green algae), with reserve food material, starch.
 Mannitol is stored food material of Phaeophyceae (brown algae).

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

Answer (2)

Sol. Decomposition is the process by which decomposers breakdown complex organic matter into inorganic substances.

The rate of decomposition is controlled by chemical composition of detritus and climatic factors. Decomposition is slower if detritus is rich in lignin and chitin and quicker, if detritus is rich in nitrogen and water soluble substances like sugars.

116. The appearance of recombination nodules on homologous chromosomes during meiosis characterizes :

- (1) Bivalent (2) Sites at which crossing over occurs
(3) Terminalization (4) Synaptonemal complex

Answer (2)

Sol. Pachytene stage of meiosis is characterised by the appearance of recombination nodules, the sites at which crossing over occurs between non sister chromatids of homologous chromosomes.

117. Which one of the following plants does **not** show plasticity?

- (1) Coriander (2) Buttercup
(3) Maize (4) Cotton

Answer (3)

Sol. Plants follow different pathways in response to environment or phases of life to form different kinds of structures. This ability is called plasticity e.g. heterophylly in cotton, coriander and larkspur. In such plants, leaves of juvenile plant are different in a shape from those in mature plants.

Maize does not show plasticity.

118. 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 given below :

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

Answer (1)

Sol. Heterochromatin is transcriptionally inactive. A typical nucleosome contains 200 bp of DNA helix.

Euchromatin is the loosely packed chromatin region.

The negatively charged DNA is wrapped around the positively charged histone octamer to form a structure called nucleosome. Histones are rich in basic amino acid residues lysine and arginine.

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

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

Answer (2)

Sol. Electrostatic precipitator can remove over 99% particulate matter present in the exhaust from a thermal power plant. Catalytic converters are fitted into automobiles for reducing emission of poisonous gases. STPs are associated with sewage treatment.

120. The process of translation of mRNA to proteins begins as soon as :
- (1) The larger subunit of ribosome encounters mRNA
 - (2) Both the subunits join together to bind with mRNA
 - (3) The tRNA is activated and the larger subunit of ribosome encounters mRNA
 - (4) The small subunit of ribosome encounters mRNA

Answer (4)

Sol. When the small subunit of ribosome encounters an mRNA, the process of translation of the mRNA to protein begins. This process is followed by the binding of bigger/larger subunit.

t-RNA is activated by the addition of amino acid prior to the attachment of ribosome, in the first phase.

121. Identify the **incorrect** statement related to Pollination :
- (1) Pollination by wind is more common amongst abiotic pollination
 - (2) Flowers produce foul odours to attract flies and beetles to get pollinated
 - (3) Moths and butterflies are the most dominant pollinating agents among insects
 - (4) Pollination by water is quite rare in flowering plants

Answer (3)

Sol. Among the animals, insects, particularly bees are the dominant biotic pollinating agents.

122. The gaseous plant growth regulator is used in plants to :
- (1) promote root growth and root hair formation to increase the absorption surface
 - (2) help overcome apical dominance
 - (3) kill dicotyledonous weeds in the fields
 - (4) speed up the malting process

Answer (1)

Sol. Ethylene is a gaseous plant hormone. It induces development of adventitious roots on various types of cutting. It promotes the development of lateral roots and growth of root hairs. Cytokinin helps to overcome the apical dominance.

Auxin is used to kill dicot weeds. Gibberellin speeds up the malting process

123. Which one of the following produces nitrogen fixing nodules on the roots of *Alnus*?
- (1) *Frankia*
 - (2) *Rhodospirillum*
 - (3) *Beijerinckia*
 - (4) *Rhizobium*

Answer (1)

Sol. The microbe, *Frankia*, produces nitrogen fixing nodules on the roots of non-leguminous plants (e.g. *Alnus*)

124. What amount of energy is released from glucose during lactic acid fermentation?
- (1) More than 18%
 - (2) About 10%
 - (3) Less than 7%
 - (4) Approximately 15%

Answer (3)

Sol. Less than seven percent of the energy in glucose is released during lactic acid fermentation and not all of it is trapped as high energy bonds of ATP.

125. Habitat loss and fragmentation, over exploitation, alien species invasion and co-extinction are causes for:
- (1) Competition
 - (2) Biodiversity loss
 - (3) Natality
 - (4) Population explosion

Answer (2)

Sol. Habitat loss and fragmentation, over exploitation, alien species invasion and co-extinction are causes for biodiversity loss.

126. 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) **(A)** is correct but **(R)** is not correct
- (3) **(A)** is not correct but **(R)** is correct
- (4) Both **(A)** and **(R)** are correct and **(R)** is the correct explanation of **(A)**

Answer (1)

Sol. Option (1) is the correct answer because both the statements are correct but the given reason is not the correct explanation. Polymerase chain reaction is used in DNA amplification.

Ampicillin resistance gene is a selectable marker that helps to check transformation by selection of transformants.

127. 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) (a) and (d) Only
- (2) (b), (c), (d) and (e) Only
- (3) (a), (b), (d) and (e) Only
- (4) (b) and (c) Only

Answer (2)

Sol. Axillary buds of stems get modified into woody, straight and pointed thorns. Thorns are found in many plants such as *Citrus* and *Bougainvillea*.

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

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

Answer (1)

Sol. The girdling experiment shows that phloem is the tissue responsible for translocation of food; and that transport takes place in one direction *i.e.* towards the root.

129. Which one of the following statement is **not true** regarding gel electrophoresis technique?
- (1) The separated DNA fragments are stained by using ethidium bromide.
 - (2) The presence of chromogenic substrate gives blue coloured DNA bands on the gel.
 - (3) Bright orange coloured bands of DNA can be observed in the gel when exposed to UV light.
 - (4) The process of extraction of separated DNA strands from gel is called elution.

Answer (2)

Sol. Option (2) is the incorrect statement, as bright colored bands of DNA can be observed in the gel when EtBr (Ethidium bromide) treated DNA is exposed to UV light.

130. XO type of sex determination can be found in :
- (1) Birds
 - (2) Grasshoppers
 - (3) Monkeys
 - (4) *Drosophila*

Answer (2)

Sol. Grasshopper is an example of XO type of sex determination in which the males have only one X-chromosome besides the autosomes, whereas females have a pair of X-chromosomes.

131. Exoskeleton of arthropods is composed of :
- (1) Cellulose
 - (2) Chitin
 - (3) Glucosamine
 - (4) Cutin

Answer (2)

Sol. Option (2) is the correct answer as chitin forms the exoskeleton in arthropods and is found in fungal cell wall. N-acetyl glucosamine is the monomeric unit. Cellulose is a polysaccharide. Cutin is a derived lipid.

132. Hydrocolloid carrageen is obtained from:
- (1) Phaeophyceae and Rhodophyceae
 - (2) Rhodophyceae only
 - (3) Phaeophyceae only
 - (4) Chlorophyceae and Phaeophyceae

Answer (2)

Sol. Hydrocolloids are water holding substances for eg. carrageen obtained from red algae (Rhodophyceae).

133. Which one of the following is **not** true regarding the release of energy during ATP synthesis through chemiosmosis? It involves:
- (1) Breakdown of electron gradient
 - (2) Movement of protons across the membrane to the stroma
 - (3) Reduction of NADP to NADPH₂ on the stroma side of the membrane
 - (4) Breakdown of proton gradient

Answer (1)

Sol. Chemiosmosis requires a membrane, a proton pump, a proton gradient and ATP synthase. Energy is used to pump protons across a membrane to create a gradient or a high concentration of protons within the thylakoid lumen.

The NADP reductase enzyme is located on the stroma side of the membrane. Along with the electrons that come from the acceptor of electrons of PS I, protons are necessary for reduction of NADP⁺ to NADPH + H⁺.

The process does not involve breaking of electron gradient.

134. Which of the following is **not** observed during apoplastic pathway?
- (1) The movement does not involve crossing of cell membrane
 - (2) The movement is aided by cytoplasmic streaming
 - (3) Apoplast is continuous and does not provide any barrier to water movement
 - (4) Movement of water occurs through intercellular spaces and wall of the cells

Answer (2)

Sol. The symplastic system is system of interconnected protoplasts. Neighbouring cells are connected through cytoplasmic strands that extend through plasmodesmata. The water travels through cell cytoplasm and plasmodesmata, hence the movement is relatively slower. Symplastic movement is aided by cytoplasmic streaming.

135. Which one of the following plants shows vexillary aestivation and diadelphous stamens?

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

Answer (1)

Sol.

- Vexillary aestivation and diadelphous stamens are the characteristic features of family Fabaceae.
- *Pisum sativum* (garden pea) belongs to family Fabaceae.
- *Allium cepa* (onion) and *Colchicum autumnale* (colchicine) belong to family Liliaceae.
- *Solanum nigrum* belongs to Solanaceae.

SECTION-B

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

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

Answer (1)

Sol. Option (1) is the correct answer as the source of the complementary RNA for RNAi could be mobile genetic elements (transposons) that replicate via an RNA intermediate.

Option (2) is incorrect as autoradiography usually follows hybridisation.

Option (4) is incorrect because polymerase chain reaction is used to make copies of the DNA sample and does not need transposons.

Option (3) is incorrect because transposons are not required during gene sequencing.

137. Which of the following occurs due to the presence of autosomal dominant trait?

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

Answer (1)

Sol. Haemophilia is a X-linked recessive disorder. Thalassemia is an autosomal recessive disorder. Sickle cell anaemia is an autosomal recessive disorder.

Myotonic dystrophy is an autosomal dominant disorder *i.e.* it occurs due to the presence of autosomal linked dominant trait.

138. 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) Amensalism
- (2) Commensalism
- (3) Competition
- (4) Predation

Answer (4)

Sol. In predation, one species is benefitted where as the other is harmed. It is (+ –) type of population interaction.

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

- | | |
|----------------------------|----------------------------|
| (1) 5'GAATTC3'; 3'CTTAAG5' | (2) 5'CTCAGT3'; 3'GAGTCA5' |
| (3) 5'GTATTC3'; 3'CATAAG5' | (4) 5'GATACT3'; 3'CTATGA5' |

Answer (1)

Sol. Option (1) is the correct answer as a palindromic DNA sequence is a DNA sequence of base pairs that reads same on the two strands when orientation of reading is kept the same. Out of the four options, option (1) is the only palindromic sequence.

5'GAATTC3'
3'CTTAAG5'

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

Answer (1)

Sol. CNG is cheaper than petrol and it burns more efficiently unlike petrol or diesel. It also cannot be adulterated like diesel and petrol. The same diesel engine cannot be used in CNG buses for making the cost conversion low.

141. 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) Gene mapping | (2) Expressed sequence tags |
| (3) Bioinformatics | (4) Sequence annotation |

Answer (4)

Sol. Sequencing the whole set of genome that contained all the coding and non-coding sequences and later assigning different regions in the sequence with functions is called sequence annotation.

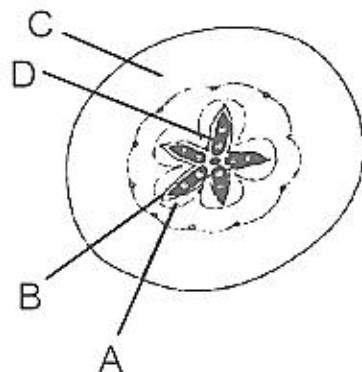
142. Addition of more solutes in a given solution will :

- | | |
|---|-----------------------------------|
| (1) lower its water potential | (2) make its water potential zero |
| (3) not affect the water potential at all | (4) raise its water potential |

Answer (1)

Sol. If some solute is dissolved in pure water, the solution has lower free water and the concentration of water decreases, reducing its water potential. The magnitude of this lowering due to dissolution of a solute is called solute potential.

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



(1) B → Endocarp

(2) C → Thalamus

(3) D → Seed

(4) A → Mesocarp

Answer (2)

Sol. The given figure is of a false fruit. False fruit develops from other floral parts and thalamus along with the development of ovary wall.

144. 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 but (R) is not the correct explanation of (A)

(2) (A) is correct but (R) is not correct

(3) (A) is not correct but (R) is correct

(4) Both (A) and (R) are correct and (R) is the correct explanation of (A)

Answer (2)

Sol. Closely located genes do not show independent assortment. Mendel's law of independent assortment holds good for those genes which are located on different chromosomes.

145. Read the following statements on lipids and find out correct set of 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 acid is esterified with glycerol, monoglycerides are formed

Choose the correct answer from the option given below:

(1) (a), (d) and (e) only

(2) (c), (d) and (e) only

(3) (a), (b) and (d) only

(4) (a), (b) and (c) only

Answer (2)

Sol. Option (2) is the correct answer because statements (c), (d) and (e) are correct as oils have lower melting point and hence remain oil in winters. Lipids are generally insoluble in water but soluble in some organic solvents.

Option (3), (4) and (1) are incorrect because statements (a) and (b) are incorrect. Lecithin is a type of phospholipid found in plasma membrane. Saturated fatty acids are without double bond.

146. What is the role of large bundle sheath cells found around the vascular bundles in C₄ plants?

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

Answer (1)

Sol. The large cells around the vascular bundles of C₄ plants form bundle sheath. These cells have large number of chloroplasts to perform calvin cycle.

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

Answer (1)

Sol. *Spirogyra* is an alga. It shows haplontic life-cycle.

Fern is pteridophyte. The dominant phase of life-cycle is diploid sporophyte. Its gametophyte is called prothallus.

Funaria is a bryophyte. Its gametophyte is a leafy stage.

Cycas is a gymnosperm. The main plant body in gymnosperm is sporophyte. They have highly reduced gametophyte stage.

148. Which one of the following will accelerate phosphorus cycle?

- (1) Volcanic activity
- (2) Weathering of rocks
- (3) Rain fall and storms
- (4) Burning of fossil fuels

Answer (2)

Sol. Phosphorus cycle is a sedimentary cycle. Reservoir pool of phosphorus in ecosystem is the earth's crust or lithosphere. Weathering of rocks accelerate phosphorus cycle.

149. The anatomy of springwood shows some peculiar features. Identify 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 autumnwood shows alternate concentric rings forming annual rings
- (e) It has lower density

Choose the correct answer from the options given below :

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

Answer (1)

Sol. Spring wood is also called early wood. It is lighter in colour and has a lower density. The vessels are produced with the wider lumens to transport more water to meet the requirement by increased transpiring surface in spring season.

The spring and autumn wood appear as alternate concentric rings of light and dark colour forming annual rings.

150. 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)	Submetacentric	(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)-(i), (b)-(iii), (c)-(ii), (d)-(iv)
- (2) (a)-(ii), (b)-(iii), (c)-(iv), (d)-(i)
- (3) (a)-(i), (b)-(ii), (c)-(iii), (d)-(iv)
- (4) (a)-(iii), (b)-(i), (c)-(iv), (d)-(ii)

Answer (4)

Sol. In metacentric chromosome, centromere is in the middle of the chromosomes. Acrocentric chromosome has centromere close to the end of the chromosome. In submetacentric chromosome, centromere is slightly away from the middle of the chromosome. Telocentric chromosome has terminal centromere.