

BOTANY

SECTION-A

101. In tissue culture experiments, leaf mesophyll cells are put in a culture medium to form callus. This phenomenon may be called as

- (1) Development
- (2) Senescence
- (3) Differentiation
- (4) Dedifferentiation

Answer (4)

Sol. In tissue culture experiments, leaf mesophyll cells are put in a culture medium to form callus. This phenomenon may be called as dedifferentiation.

Dedifferentiation is a phenomenon by which the living differentiated plant cells, that by now have lost the capacity to divide can regain the capacity of division under certain conditions.

102. In the equation $GPP - R = NPP$

GPP is Gross Primary Productivity

NPP is Net Primary Productivity

R here is _____.

- (1) Respiratory loss
- (2) Reproductive allocation
- (3) Photosynthetically active radiation
- (4) Respiratory quotient

Answer (1)

Sol. A considerable amount of GPP is utilised by plants in respiration. Gross primary productivity minus respiration losses (R), is the net primary productivity.

So $R = \text{Respiratory loss}$

103. Given below are two statements :

Statement I : The forces generated transpiration can lift a xylem-sized column of water over 130 meters height.

Statement II : Transpiration cools leaf surfaces sometimes 10 to 15 degrees evaporative cooling.

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

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

Answer (3)

Sol. Statement I is correct as measurements reveal that the forces generated by transpiration can create pressures sufficient to lift a xylem sized column of water up to 130 meters high.

Statement II is also correct as transpiration cools leaf surfaces, sometimes 10 to 15 degrees, by evaporative cooling.

104. In angiosperm, the haploid, diploid and triploid structures of a fertilized embryo sac sequentially are :

- (1) Synergids, Zygote and Primary endosperm nucleus
- (2) Synergids, antipodals and Polar nuclei
- (3) Synergids, Primary endosperm nucleus and zygote
- (4) Antipodals, synergids, and primary endosperm nucleus

Answer (1)

Sol. Synergids are the cells of gametophyte and hence these are haploid Zygote is formed by fusion of two gametes and thus it is diploid.

Primary endosperm nucleus is formed by the fusion of diploid secondary nucleus with a male gamete. Therefore, it is triploid.

105. Given below are two statements :

Statement I : Endarch and exarch are the terms often used for describing the position of secondary xylem in the plant body.

Statement II : Exarch condition is the most common feature of the root system.

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

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

Answer (2)

Sol. Endarch and exarch are the terms often used for describing the position of primary xylem in the plant body.

Primary xylem is of two types protoxylem and metaxylem. On the basis of relative position of protoxylem and metaxylem in the organ the arrangement of primary xylem can be endarch or exarch.

Exarch type of primary xylem is seen in roots. Therefore, Statement I is false and Statement II is true.

106. How many ATP and NADPH₂ are required for the synthesis of one molecule of Glucose during Calvin cycle?

- (1) 12 ATP and 16 NADPH₂
- (2) 18 ATP and 16 NADPH₂
- (3) 12 ATP and 12 NADPH₂
- (4) 18 ATP and 12 NADPH₂

Answer (4)

Sol. For every CO₂ molecule entering the Calvin cycle, 3 molecules of ATP and 2 of NADPH₂ are required.

To make one molecule of glucose, 6 turns of the cycle are required. Thus, ATP and NADPH₂ molecules required for synthesis of one molecule of glucose during Calvin cycle will be

$$\rightarrow 6 \times \begin{bmatrix} 3\text{ATP} \\ 2\text{NADPH}_2 \end{bmatrix} = 18\text{ATP and } 12\text{NADPH}_2$$

107. Spraying of which of the following phytohormone on juvenile conifers helps hastening the maturity period, that leads early seed production?

- (1) Zeatin
- (2) Absciscic Acid
- (3) Indole-3-butyric Acid
- (4) Gibberellic Acid

Answer (4)

Sol. Spraying juvenile conifers with gibberellins (GAs) hastens the maturity period, thus leading to early seed production.

108. Among eukaryotes, replication of DNA takes place in :

- | | |
|-----------------|-----------------|
| (1) G_1 phase | (2) G_2 phase |
| (3) M phase | (4) S phase |

Answer (4)

Sol. Replication of DNA takes place in S-phase of cell cycle in eukaryotes.

109. Identify the **correct** statements:

- A. Detrivores perform fragmentation.
- B. The humus is further degraded by some microbes during mineralization.
- C. Water soluble inorganic nutrients go down into the soil and get precipitated by a process called leaching.
- D. The detritus food chain begins with living organisms.
- E. Earthworms break down detritus into smaller particles by a process called catabolism.

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

- | | |
|------------------|------------------|
| (1) C, D, E only | (2) D, E, A only |
| (3) A, B, C only | (4) B, C, D only |

Answer (3)

Sol. The detritus food chain begins with detritus that is dead organic matter. Earthworms breakdown detritus in to smaller particles by a process called fragmentation. The saprotrophic bacteria and fungi breakdown detritus into simpler inorganic substances by a process called catabolism.

110. Identify the pair of heterosporous pteridophytes among the following :

- (1) *Psilotum* and *Salvinia*
- (2) *Equisetum* and *Salvinia*
- (3) *Lycopodium* and *Selaginella*
- (4) *Selaginella* and *Salvinia*

Answer (4)

Sol. *Selaginella* and *Salvinia* are heterosporous pteridophytes. They produces two different kind of spores. *Psilotum*, *Lycopodium* and *Equisetum* are homosporous pteridophytes.

111. Given below are two statements : One is labelled as **Assertion A** and the other is labelled as **Reason R** :

Assertion A : ATP is used at two steps in glycolysis.

Reason R : First ATP is used in converting glucose into glucose-6-phosphate and second ATP is used in conversion of fructose-6-phosphate into fructose-1, 6-diphosphate.

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

- (1) **A** is true but **R** is false.
- (2) **A** is false but **R** is true.
- (3) Both **A** and **R** are true and **R** is the correct explanation of **A**.
- (4) Both **A** and **R** are true but **R** is NOT the correct explanation of **A**.

Answer (3)

Sol. ATP in glycolysis is used at two steps of conversion that are

Glucose $\rightarrow$ Glucose-6-phosphate

Fructose-6-phosphate $\rightarrow$ Fructose-1, 6-bisphosphate

The reason of the utilisation of ATP is for phosphorylation the substrates.

112. Among 'The Evil Quartet', which one is considered the most important cause driving extinction of species?
- (1) Alien species invasions
 - (2) Co-extinctions
 - (3) Habitat loss and fragmentation
 - (4) Over exploitation for economic gain

Answer (3)

Sol. Habitat loss and fragmentation is the most important cause driving animals and plants to extinction.

113. Unequivocal proof that DNA is the genetic material was first proposed by
- (1) Avery, Macleoid and McCarthy
 - (2) Wilkins and Franklin
 - (3) Frederick Griffith
 - (4) Alfred Hershey and Martha Chase

Answer (4)

Sol. The unequivocal proof that DNA is the genetic material came from the experiment of Alfred Hershey and Martha Chase with bacteriophage.

Avery, Macleoid and McCarty gave the biochemical characterisation of Transforming Principle.

The transformation experiments by using *Pneumococcus* was conducted by Frederick Griffith.

Wilkins and Franklin produced X-ray diffraction data of DNA.

114. The thickness of ozone in a column of air in the atmosphere is measured in terms of :
- (1) Decameter
 - (2) Kilobase
 - (3) Dobson units
 - (4) Decibels

Answer (3)

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

115. Which micronutrient is required for splitting of water molecule during photosynthesis?
- (1) Magnesium
 - (2) Copper
 - (3) Manganese
 - (4) Molybdenum

Answer (3)

Sol. Manganese plays a major role in the splitting of water to liberate oxygen during photosynthesis.

Copper is essential for the overall metabolism in plants.

Molybdenum is included in nitrogen metabolism.

Magnesium activates several enzymes involved in photosynthesis and respiration.

116. Family Fabaceae differs from Solanaceae and Liliaceae. With respect to the stamens, pick out the characteristics specific to family Fabaceae but not found in Solanaceae or Liliaceae.
- (1) Monoadelphous and Monotheous anthers
 - (2) Epiphyllous and Ditheous anthers
 - (3) Diadelphous and Ditheous anthers
 - (4) Polyadelphous and epipetalous stamens

Answer (3)

Sol. Fabaceae → Diadelphous and ditheous anther.

Solanaceae → Polyandrous, epipetalous and ditheous anther.

Liliaceae → Polyandrous, epiphyllous and ditheous anther.

117. Given below are two statements : One labelled as **Assertion A** and the other labelled as **Reason R**:

Assertion A : The first stage of gametophyte in the life cycle of moss is protonema stage.

Reason R : Protonema develops directly from spores produced in capsule.

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

- (1) **A** is correct but **R** is not correct
- (2) **A** is not correct but **R** is correct
- (3) Both **A** and **R** are correct and **R** is the correct explanation of **A**
- (4) Both **A** and **R** are correct but **R** is NOT the correct explanation of **A**

Answer (3)

Sol. The predominant stage of the life cycle of a moss is the gametophyte which consists of two stages. The first stage is the protonema stage, which develops directly from a spore. Capsule of the sporophyte contains spore which gives rise to protonema. Thus, reason correctly explains the assertion.

118. Expressed Sequence Tags (ESTs) refers to

- (1) All genes whether expressed or unexpressed.
- (2) Certain important expressed genes.
- (3) All genes that are expressed as RNA.
- (4) All genes that are expressed as proteins.

Answer (3)

Sol. All the genes that are expressed as RNA are referred to as Expressed Sequence Tags (ESTs).

119. Frequency of recombination between gene pairs on same chromosome as a measure of the distance between genes to map their position on chromosome, was used for the first time by

- (1) Alfred Sturtevant
- (2) Henking
- (3) Thomas Hunt Morgan
- (4) Sutton and Boveri

Answer (1)

Sol. Alfred Sturtevant used the frequency of recombination between gene pairs on the same chromosome as a measure of the distance between genes and 'mapped' their position on the chromosome.

Sutton and Boveri proposed chromosomal theory of inheritance.

Henking discovered X-chromosome.

Thomas Hunt Morgan proved chromosomal theory of inheritance and proposed the concept of linkage.

120. Large, colourful, fragrant flowers with nectar are seen in

- (1) Bat pollinated plants
- (2) Wind pollinated plants
- (3) Insect pollinated plants
- (4) Bird pollinated plants

Answer (3)

Sol. Large, colourful, fragrant flowers with nectar attract biotic pollinators (insects), thus, they are seen in insect pollinated plants.

121. Movement and accumulation of ions across a membrane against their concentration gradient can be explained by

- (1) Passive Transport
- (2) Active Transport
- (3) Osmosis
- (4) Facilitated Diffusion

Answer (2)

Sol. Movement and accumulation of ions across a membrane against their concentration gradient can be explained by active transport. It uses energy(ATP) to transport molecules from lower concentration to a higher concentration.

122. Upon exposure to UV radiation, DNA stained with ethidium bromide will show

- (1) Bright yellow colour
- (2) Bright orange colour
- (3) Bright red colour
- (4) Bright blue colour

Answer (2)

Sol. Option (2) is the correct answer because in recombinant DNA technology the separated DNA fragments can be visualised only after staining the DNA with a substance known as ethidium bromide followed by exposure to UV radiation. You can see bright orange coloured bands of DNA in an ethidium bromide stained gel exposed to UV light.

123. Given below are two statements : One is labelled as **Assertion A** and the other is labelled as **Reason R** :

Assertion A : Late wood has fewer xylary elements with narrow vessels.

Reason R : Cambium is less active in winters.

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

- (1) **A** is true but **R** is false
- (2) **A** is false but **R** is true
- (3) Both **A** and **R** are true and **R** is the correct explanation of **A**
- (4) Both **A** and **R** are true but **R** is NOT the correct explanation of **A**

Answer (3)

Sol. In winter, the cambium is less active and forms fewer xylary elements that have narrow vessels, and this wood is called autumn wood or late wood.

124. Axile placentation is observed in

- (1) Tomato, Dianthus and Pea
- (2) China rose, Petunia and Lemon
- (3) Mustard, Cucumber and Primrose
- (4) China rose, Beans and Lupin

Answer (2)

Sol. Axile placentation is the type of placentation where placenta is axial and ovules are attached to it in a multilocular ovary. China rose, Tomato, *Petunia* and Lemon show axile placentation.

Dianthus and *Primrose* show free central placentation.

Pea, Lupin and Beans show marginal placentation.

Cucumber and mustard show parietal placentation.

125. The phenomenon of pleiotropism refers to

- (1) A single gene affecting multiple phenotypic expression
- (2) More than two genes affecting a single character
- (3) Presence of several alleles of a single gene controlling a single crossover
- (4) Presence of two alleles, each of the two genes controlling a single trait

Answer (1)

Sol. When a single gene affects multiple phenotypic expression, the gene is called pleiotropic gene and the phenomenon is called pleiotropism.

126. During the purification process for recombinant DNA technology, addition of chilled ethanol precipitates out

- | | |
|--------------|---------------------|
| (1) Histones | (2) Polysaccharides |
| (3) RNA | (4) DNA |

Answer (4)

Sol. Option (4) is the correct answer as, during isolation of the genetic material, purified DNA ultimately precipitates out after the addition of chilled ethanol.

Option (1) is not the answer as, proteins can be removed by treatment with proteases.

Option (3) is not the answer as RNA can be removed by treatment with ribonuclease.

127. Which hormone promotes internode/petiole elongation in deep water rice?

- (1) Ethylene
- (2) 2, 4-D
- (3) GA_3
- (4) Kinetin

Answer (1)

Sol. Ethylene promotes rapid internode/petiole elongation in deep water rice plants.

128. The process of appearance of recombination nodules occurs at which sub stage of prophase I in meiosis?

- (1) Diplotene
- (2) Diakinesis
- (3) Zygotene
- (4) Pachytene

Answer (4)

Sol. The process of recombination occurs at Pachytene stage of prophase I. This stage is characterised by the appearance of recombination nodules.

129. What is the role of RNA polymerase III in the process of transcription in Eukaryotes?

- (1) Transcription of precursor of mRNA
- (2) Transcription of only snRNAs
- (3) Transcription of rRNAs (28S, 18S and 5.8S)
- (4) Transcription of tRNA, 5S rRNA and snRNA

Answer (4)

Sol. In eukaryotes there are three major types of RNA polymerases.

RNA polymerase I transcribes : 5.8S, 18S, 28S rRNAs

RNA polymerase II transcribes : hnRNAs (precursor of mRNA)

RNA polymerase III transcribes : tRNAs, scRNA, 5S rRNA and snRNA

130. What is the function of tassels in the corn cob?

- (1) To disperse pollen grains
- (2) To protect seeds
- (3) To attract insects
- (4) To trap pollen grains

Answer (4)

Sol. Tassels in the corn cob represents stigma and style which wave in the wind to trap pollen grains.

131. In gene gun method used to introduce alien DNA into host cells, microparticles of _____ metal are used.

- | | |
|----------------------|------------|
| (1) Tungsten or gold | (2) Silver |
| (3) Copper | (4) Zinc |

Answer (1)

Sol. Option (1) is the correct answer because in gene gun method, microparticles of tungsten or gold are used. Gold or tungsten are inert in nature so they do not alter the chemical composition of cells.

132. Cellulose does not form blue colour with Iodine because
- (1) It does not contain complex helices and hence cannot hold iodine molecules
 - (2) It breaks down when iodine reacts with it
 - (3) It is a disaccharide
 - (4) It is a helical molecule

Answer (1)

Sol. Option (1) is the correct answer because cellulose does not contain complex helices and hence cannot hold iodine molecules.

133. Which of the following stages of meiosis involves division of centromere?
- (1) Anaphase II
 - (2) Telophase
 - (3) Metaphase I
 - (4) Metaphase II

Answer (1)

Sol. Splitting of centromere occurs during anaphase of mitosis or anaphase II of meiosis.

During Metaphase I and II, chromosomes align at the equator.

During telophase, chromosomes reach the respective poles.

134. The reaction centre in PS II has an absorption maxima at
- (1) 660 nm
 - (2) 780 nm
 - (3) 680 nm
 - (4) 700 nm

Answer (3)

Sol. In PS-I, the reaction centre chlorophyll *a* has an absorption peak at 700 nm, while in PS-II, reaction centre has an absorption maxima at 680 nm.

135. The historic Convention on Biological Diversity, 'The Earth Summit' was held in Rio de Janeiro in the year
- (1) 1986
 - (2) 2002
 - (3) 1985
 - (4) 1992

Answer (4)

Sol. The historic convention on Biological Diversity, "The Earth Summit" was held in Rio de Janeiro in the year 1992. It called upon all nations to take appropriate measures for conservation of biodiversity and sustainable utilisation of its benefits.

SECTION-B

136. Match List I with List II :

List I

- A. M Phase
- B. G_2 Phase
- C. Quiescent stage
- D. G_1 Phase

List II

- I. Proteins are synthesized
- II. Inactive phase
- III. Interval between mitosis and initiation of DNA replication
- IV. Equational division

Choose the correct answer from the options given below :

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

Answer (1)

Sol. M phase or mitosis is the phase where the actual cell division occurs. Mitosis is also called equational division.

During G₂ phase DNA synthesis stops but cell synthesizes RNA, proteins, etc. for next phase. Quiescent stage is inactive phase in which non-dividing cells enter.

G₁ phase is the interval between mitosis and initiation of DNA replication.

Therefore, option (1) is correct.

137. Given below are two statements:

Statement I : Gause's 'Competitive Exclusion Principle' states that two closely related species competing for the same resources cannot co-exist indefinitely and competitively inferior one will be eliminated eventually.

Statement II : In general, carnivores are more adversely affected by competition than herbivores.

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

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

Answer (1)

Sol. Gause's 'Competitive Exclusion Principle' states that two closely related species competing for the same resources cannot co-exist indefinitely and the competitively inferior one will be eliminated eventually. Thus, statement I is correct.

Statement II is incorrect as in general, herbivores and plants appear to be more adversely affected by competition than carnivores.

138. How many different proteins does the ribosome consist of?

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

Answer (3)

Sol. The ribosome consists of structural rRNAs and about 80 different

139. Match **List I** with **List II** :

- | List I | List II |
|------------------------------|--------------------------------|
| A. Oxidative decarboxylation | I. Citrate synthase |
| B. Glycolysis | II. Pyruvate dehydrogenase |
| C. Oxidative phosphorylation | III. Electron transport system |
| D. Tricarboxylic acid cycle | IV. EMP pathway |

Choose the correct answer from the options given below :

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

Answer (2)

Sol. Pyruvate, which is formed by the glycolytic catabolism of carbohydrates in the cytosol, after it enters mitochondrial matrix undergoes oxidative decarboxylation by a complex set of reactions catalyzed by pyruvate dehydrogenase.

The scheme of glycolysis was given by Gustav Embden, Otto Meyrhopf and J. Parnas, and is often referred to as the EMP pathway.

In electron transport system, the energy of oxidation-reduction is utilized for the production of proton gradient required for phosphorylation, thus, this process is also called oxidative phosphorylation.

The TCA (tricarboxylic acid cycle) starts with the condensation of acetyl group with oxaloacetic acid (OAA) and water to yield citric acid. The reaction is catalysed by the enzyme citrate synthase. Thus, option (2) is correct.

140. Which of the following statements are correct about Klinefelter's Syndrome?
- This disorder was first described by Langdon Down (1866).
 - Such an individual has overall masculine development. However, the feminine development is also expressed.
 - The affected individual is short statured.
 - Physical, psychomotor and mental development is retarded.
 - Such individuals are sterile.

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

- B and E only
- A and E only
- A and B only
- C and D only

Answer (1)

Sol. Klinefelter's syndrome is caused due to the presence of an additional copy of X-chromosome resulting into a karyotype of 47, XXY. Such an individual has overall masculine development, however, the feminine development is also expressed. Such individuals are sterile. Thus, statement B and E are correct regarding Klinefelter's syndrome.

Statement A, C and D are incorrect w.r.t. Klinefelter's syndrome as they are associated with Down's syndrome.

141. Malonate inhibits the growth of pathogenic bacteria by inhibiting the activity of

- | | |
|----------------------------|-------------------|
| (1) Lipase | (2) Dinitrogenase |
| (3) Succinic dehydrogenase | (4) Amylase |

Answer (3)

Sol. Option (3) is correct answer of this question because malonate is a competitive inhibitor of enzyme succinate dehydrogenase.

Inhibition of succinic dehydrogenase by malonate occurs due to close resemblance of malonate with substrate succinate in structure. Competitive inhibitors are often used in the control of bacterial pathogens.

142. Which of the following combinations is required for chemiosmosis?
- Proton pump, electron gradient, ATP synthase
 - Proton pump, electron gradient, NADP synthase
 - Membrane, proton pump, proton gradient, ATP synthase
 - Membrane, proton pump, proton gradient, NADP synthase

Answer (3)

Sol. Chemiosmosis is the process of ATP synthesis. It requires a membrane, a proton pump, a proton gradient and ATP synthase.

143. Match **List I** with **List II** :

- | List I | List II |
|--------------------|---|
| A. Cohesion | I. More attraction in liquid phase |
| B. Adhesion | II. Mutual attraction among water molecules |
| C. Surface tension | III. Water loss in liquid phase |
| D. Guttation | IV. Attraction towards polar surfaces |

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

- A – III, B – I, C – IV, D – II
- A – II, B – I, C – IV, D – III
- A – II, B – IV, C – I, D – III
- A – IV, B – III, C – II, D – I

Answer (3)

Sol. Cohesion represents mutual attraction between water molecules. Adhesion represents attraction of water molecules to polar surfaces. Surface tension represents water molecules are attracted to each other in the liquid phase more than to water in the gas phase. Guttation represent loss of water in liquid phase.

Thus, option (3) is correct.

144. Match **List I** with **List II**:

List I	List II
A. Iron	I. Synthesis of auxin
B. Zinc	II. Component of nitrate reductase
C. Boron	III. Activator of catalase
D. Molybdenum	IV. Cell elongation and differentiation

Choose the correct answer from the options given below:

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

Answer (1)

Sol. Iron activates catalase enzyme.

Zinc is needed in the synthesis of auxin.

Boron is required for cell elongation and cell differentiation.

Molybdenum is component of nitrogenase and nitrate reductase enzyme.

Therefore, option (1) is correct.

145. Main steps in the formation of Recombinant DNA are given below. Arrange these steps in a correct sequence.

- A. Insertion of recombinant DNA into the host cell
- B. Cutting of DNA at specific location by restriction enzyme
- C. Isolation of desired DNA fragment
- D. Amplification of gene of interest using PCR

Choose the correct answer from the options given below :

- (1) C, B, D, A
- (2) B, D, A, C
- (3) B, C, D, A
- (4) C, A, B, D

Answer (3)

Sol.

The correct answer is option (3) because recombinant DNA technology involves several steps in specific sequence such as isolation of DNA, fragmentation of DNA by restriction endonucleases, isolation of desired DNA fragment, ligation of the DNA fragment into a vector, transferring the recombinant DNA into the host, culturing the host cells in a medium at large scale and extraction of the desired product.

146. Match List I with List II :

List I (Interaction)	List II (Species A and B)
A. Mutualism	I. $+(A), 0(B)$
B. Commensalism	II. $-(A), 0(B)$
C. Amensalism	III. $+(A), -(B)$
D. Parasitism	IV. $+(A), +(B)$

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

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

Answer (4)

Sol. (+, +) Mutualism : In this interaction, both the interacting species are benefitted.

(+, 0) Commensalism : Only one species is benefitted and the other species remains unharmed.

(-, 0) Amensalism : Neither species is benefitted. One remains unharmed and the other is harmed.

(+, -) Parasitism : One species is benefitted and other is negatively effected.

147. Given below are two statements : One is labelled as **Assertion A** and the other is labelled as **Reason R** :

Assertion A : A flower is defined as modified shoot wherein the shoot apical meristem changes to floral meristem.

Reason R : Internode of the shoot gets condensed to produce different floral appendages laterally at successive node instead of leaves.

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

- (1) **A** is true but **R** is false
- (2) **A** is false but **R** is true
- (3) Both **A** and **R** are true and **R** is the correct explanation of **A**
- (4) Both **A** and **R** are true but **R** is NOT the correct explanation of **A**

Answer (3)

Sol. A flower is a modified shoot wherein the shoot apical meristem changes to floral meristem.

Internodes do not elongate and the axis gets condensed. The apex produces different kinds of floral appendages laterally at the successive nodes instead of leaves.

Therefore, both **A** and **R** are true and **R** is correct explanation of **A**.

148. Which one of the following statements is **NOT** correct?

- (1) Water hyacinth grows abundantly in eutrophic water bodies and leads to an imbalance in the ecosystem dynamics of the water body
- (2) The amount of some toxic substances of industrial waste water increases in the organisms at successive trophic levels
- (3) The micro-organisms involved in biodegradation of organic matter in a sewage polluted water body consume a lot of oxygen causing the death of aquatic organisms
- (4) Algal blooms caused by excess of organic matter in water improve water quality and promote fisheries

Answer (4)

Sol. Algal bloom imparts a distinct colour to the water bodies. It causes deterioration of the water quantity and fish mortality.

149. Identify the **correct** statements:

- A. Lenticels are the lens-shaped openings permitting the exchange of gases.
- B. Bark formed early in the season is called hard bark.
- C. Bark is a technical term that refers to all tissues exterior to vascular cambium.
- D. Bark refers to periderm and secondary phloem.
- E. Phellogen is single-layered in thickness.

Choose the correct answer from the options given below:

- (1) A, B and D only
- (2) B and C only
- (3) B, C and E only
- (4) A and D only

Answer (4)

Sol. Lenticels are lens shaped opening permitting exchange of gases between the outer atmosphere and internal tissue of the stem.

Bark that is formed early in the season is called early or soft bark. Towards the end of the season late or hard bark is formed.

Bark is non-technical term that refer to all tissues exterior to vascular cambium.

Bark refers to a number of tissue types, viz periderm and secondary phloem.

Phellogen is couple of layers thick

Therefore, only statement A and D are correct.

150. Given below are two statements : One labelled as **Assertion A** and the other labelled as **Reason R** :

Assertion A : In gymnosperms the pollen grains are released from the microsporangium and carried by air currents.

Reason R : Air currents carry the pollen grains to the mouth of the archegonia where the male gametes are discharged and pollen tube is not formed.

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

- (1) **A** is true but **R** is false
- (2) **A** is false but **R** is true
- (3) Both **A** and **R** are true and **R** is the correct explanation of **A**
- (4) Both **A** and **R** are true but **R** is NOT the current explanation of **A**

Answer (1)

Sol. Assertion is correct but reason is false as in gymnosperms the pollen grains are released from the microsporangium and they are carried in air currents. They come in contact with the opening of the ovules borne on megasporophylls. The *pollen tube* carrying the male gametes grows towards archegonia in the ovules and discharge their contents near the mouth of the archegonia.