BIOLOGY

91. Match **List-I** with **List-II**.

	List-I		List-II
A.	Progesterone	I.	Pars intermedia
B.	Relaxin	II.	Ovary
C.	Melanocyte stimulating hormone	III.	Adrenal Medulla
D.	Catecholamines	IV.	Corpus luteum

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

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

(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 (4)

Sol. The correct answer is [A-IV, B-II, C-I, D-III]

- Progesterone – A steroidal hormone which is secreted by the corpus luteum
- Relaxin – A proteinaceous hormone which is secreted by the ovaries in the later stage of pregnancy
- Melanocyte stimulating hormone – A proteinaceous hormone released by the pars intermedia
- Catecholamines – An amino-acid derived hormone released from the adrenal medulla during emergency conditions

92. The blue and white selectable markers have been developed which differentiate recombinant colonies from non-recombinant colonies on the basis of their ability to produce colour in the presence of a chromogenic substrate.

Given below are two statements about this method:

Statement I : The blue coloured colonies have DNA insert in the plasmid and they are identified as recombinant colonies.

Statement II : The colonies without blue colour have DNA insert in the plasmid and are identified as recombinant colonies.

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 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 (3)

Sol. Statement I is incorrect but statement II is correct as a recombinant DNA is inserted within the coding sequence of an enzyme, β-galactosidase. This results into inactivation of the gene for synthesis of this enzyme. Thus, presence of insert results into insertional inactivation of the β-galactosidase gene and the colonies do not produce any colour and identified as recombinant colonies. Whereas non-recombinant transformants will produce blue colour in presence of chromogenic substrate.

93. Given below are two statements : One is labelled as **Assertion (A)** and other is labelled as **Reason (R)**.

Assertion (A) : Cells of the tapetum possess dense cytoplasm and generally have more than one nucleus.

Reason (R) : Presence of more than one nucleus in the tapetum increases the efficiency of nourishing the developing microspore mother cells.

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

(1) Both **A** and **R** are true but **R** is **NOT** the correct explanation of **A**

(2) **A** is true but **R** is false

(3) **A** is false but **R** is true

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

Answer (2)

Sol. Cell of the tapetum possess dense cytoplasm and generally have more than one nucleus because the presence of more than one nucleus in the tapetal cells increases the efficiency of nourishing the develpoing pollen grains.

94. Match **List-I** with **List-II**.

	List-I		**List-II**
A.	Pteridophyte	I.	*Salvia*
B.	Bryophyte	II.	*Ginkgo*
C.	Angiosperm	III.	*Polytrichum*
D.	Gymnosperm	IV.	*Salvinia*

Choose the option with all **correct** matches.

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

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

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

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

Answer (1)

Sol. Pteridophyte - *Salvinia*

Bryophyte - *Polytrichum*

Angiosperm - *Salvia*

Gymnosperm - *Ginkgo*

95. Match **List-I** with **List-II.**

	List-I		**List-II**
A.	Heart	I.	Erythropoietin
B.	Kidney	II.	Aldosterone
C.	Gastro-intestinal tract	III.	Atrial natriuretic factor
D.	Adrenal Cortex	IV.	Secretin

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

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

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

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

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

Answer (3)

Sol.

Organ Name	-	**Hormone Secreted**
Heart	-	Atrial natriuretic factor
Kidney	-	Erythropoietin
Gastro-intestinal tract	-	Secretin
Adrenal cortex	-	Aldosterone

96. Who proposed that the genetic code for amino acids should be made up of three nucleotides?

(1) Francis Crick (2) Jacque Monod

(3) Franklin Stahl (4) George Gamow

Answer (4)

Sol. George Gamow, a physicist proposed that genetic code for amino acids should be made up of three nucleotides.

97. Which of the following is the unit of productivity of an Ecosystem?

(1) KCal m^{-2} (2) KCal m^{-3}

(3) (KCal m^{-2})yr^{-1} (4) gm^{-2}

Answer (3)

Sol. The rate of biomass production is called productivity. It is expressed in terms of $gm^{-2}yr^{-1}$ or (KCal m^{-2})yr^{-1} to compare the productivity of different ecosystems.

98. Which of the following is an example of a zygomorphic flower?

(1) Datura (2) Pea

(3) Chilli (4) Petunia

Answer (2)

Sol. Zygomorphic flowers can be divided into two equal halves by only a single vertical plane and shows bilateral symmetry.

Pea possess zygomorphic flowers.

Chilli, Petunia and Datura possess actinomorphic flowers.

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

	List I		**List II**
A.	The Evil Quartet	I.	Cryopreservation
B.	Ex situ conservation	II.	Alien species invasion
C.	*Lantana camara*	III.	Causes of biodiversity losses
D.	Dodo	IV.	Extinction

Choose the option with all correct matches.

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

Answer (1)

Sol. The Evil Quartet – Causes of biodiversity losses
Ex situ conservation – Cryopreservation
Lantana camara – Alien species invasion
Dodo – Extinction

100. Given below are two statements:

Statement I: In ecosystem, there is unidirectional flow of energy of sun from producers to consumers.

Statement II: Ecosystems are exempted from 2nd law of thermodynamics.

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 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. Sun is the only source of energy for all ecosystems on Earth, except for deep sea-hydro-thermal ecosystem.

The energy flow is unidirectional from the sun to producers and then to consumers.

Ecosystems are not exempted from the second law of thermodynamics. They need a constant supply of energy to synthesise the molecules they require to counteract the universal tendency towards increasing disorderliness.

101. The protein portion of an enzyme is called:

(1) Coenzyme
(2) Apoenzyme
(3) Prosthetic group
(4) Cofactor

Answer (2)

Sol. There are number of cases in which non-protein constituents called co-factors are bound to the enzyme to make the enzyme catalytically active.

In these instances, the protein portion of the enzymes is called the apoenzyme.

Three kinds of co-factors are identified prosthetic groups, co-enzymes and metal ions. Prosthetic groups are organic compounds and they are tightly bound with apoenzyme. Co-enzymes are also organic compounds but their association with apoenzyme is only transient.

102. Twins are born to a family that lives next door to you. The twins are a boy and a girl. Which of the following must be true?

(1) They are fraternal twins.

(2) They were conceived through in vitro fertilization.

(3) They have 75% identical genetic content.

(4) They are monozygotic twins.

Answer (1)

Sol. Fraternal twins or dizygotic twins are 2 separate fertilized eggs, they usually develop 2 separate amniotic sacs, placentas and supporting structures.

If twins are a boy and a girl, this indicates they are fraternal twins.

103. After maturation, in primary lymphoid organs, the lymphocytes migrate for interaction with antigens to secondary lymphoid organ(s) / tissue(s) like

A. thymus

B. bone marrow

C. spleen

D. lymph nodes

E. Peyer's patches

Choose the *correct* answer from the options given below

(1) A, B, C only

(2) E, A, B only

(3) C, D, E only

(4) B, C, D only

Answer (3)

Sol. The primary lymphoid organs are bone marrow and thymus where immature lymphocytes differentiate into antigen-sensitive lymphocytes.

After maturation, the lymphocytes migrate into secondary lymphoid organs like spleen, lymph nodes, Peyer's patches of small intestine and appendix.

These secondary lymphoid organ provide the sites for interaction of lymphocytes with the antigen.

104. In frog, the Renal portal system is a special venous connection that acts to link :

(1) Liver and kidney

(2) Kidney and intestine

(3) Kidney and lower part of body

(4) Liver and intestine

Answer (3)

Sol. In frogs, special venous connection between liver and intestine as well as the kidney and lower parts of the body are present in frogs. The former is called hepatic portal system and the latter is called renal portal system.

105. Which of the following enzyme(s) are **NOT** essential for gene cloning?

A. Restriction enzymes

B. DNA ligase

C. DNA mutase

D. DNA recombinase

E. DNA polymerase

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

(1) A and B only

(2) D and E only

(3) B and C only

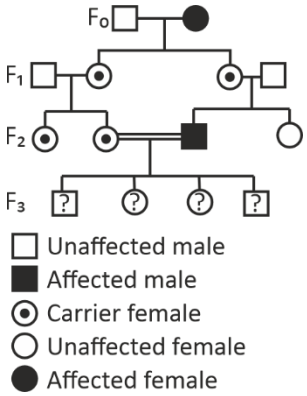
(4) C and D only

Answer (4)

Sol. Gene cloning is a process where a specific gene or DNA sequence is isolated and replicated, creating multiple identical copies.

In gene cloning, restriction enzymes, DNA ligase and DNA polymerase are primarily used.

106. With the help of given pedigree, find out the probability for the birth of a child having no disease and being a carrier (has the disease mutation in one allele of the gene) in F_3 generation.



(1) 1/2

(2) 1/8

(3) Zero

(4) 1/4

Answer (4)

Sol. As in the F_1 generation the carrier female and non-affected (normal, not carrier) had affected male child that means the genetic disorder is sex-linked recessive.

The consanguineous mating between female (X^cX) and male (X^cY)

♀ \ ♂	X^c	Y
X^c	X^cX^c	X^cY
X	X^cX	XY

Out of 4 child only one is carrier i.e. $\frac{1}{4}$.

107. Which one of the following is the characteristic feature of gymnosperms?

(1) Seeds are naked

(2) Seeds are absent

(3) Gymnosperms have flowers for reproduction

(4) Seeds are enclosed in fruits

Answer (1)

Sol. The gymnosperms (*Gymnos* : naked, *sperma* seed) are plants in which the ovules are not enclosed by an ovary wall and remains exposed, both before and after fertilization. The seeds that develop post-fertilization, are not covered, *i.e.*, naked.

108. The first menstruation is called :

(1) Menarche

(2) Diapause

(3) Ovulation

(4) Menopause

Answer (1)

Sol. The first menstruation begins at puberty and is called menarche.

- Ovulation is the process that deals with the release of secondary oocyte from the mature Graafian follicle.
- In human beings, menstrual cycles ceases around 50 years of age; that is termed as menopause.
- Diapause is a state of dormancy or developmental arrest in an organism.

109. In bryophytes, the gemmae help in which one of the following?

(1) Asexual reproduction

(2) Nutrient absorption

(3) Gaseous exchange

(4) Sexual reproduction

Answer (1)

Sol. Gemmae are green, multicellular, asexual buds which develop in small receptacles called gemma cups and help in asexual reproduction in bryophytes.

110. How many meiotic and mitotic divisions need to occur for the development of a mature female gametophyte from the megaspore mother cell in an angiosperm plant?

(1) 1 Meiosis and 2 Mitosis

(2) 1 Meiosis and 3 Mitosis

(3) No Meiosis and 2 Mitosis

(4) 2 Meiosis and 3 Mitosis

Answer (2)

Sol. Development of a mature female gametophyte, i.e., embryo sac from a megaspore mother cell in an angiosperm plant requires 1 meiotic and 3 mitotic divisions.

111. Role of the water vascular system in Echinoderms is :

A. Respiration and Locomotion

B. Excretion and Locomotion

C. Capture and transport of food

D. Digestion and Respiration

E. Digestion and Excretion

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

(1) A and C Only

(2) B and C Only

(3) B, D and E Only

(4) A and B Only

Answer (1)

Sol. Water vascular system in Echinoderms helps in locomotion, capture and transport of food and respiration.

Excretory system is absent in echinoderms. Excretion takes place through general body surface.

112. Read the following statements on plant growth and development.

(A) Parthenocarpy can be induced by auxins.

(B) Plant growth regulators can be involved in promotion as well as inhibition of growth.

(C) Dedifferentiation is a pre-requisite for re-differentiation.

(D) Abscisic acid is a plant growth promoter.

(E) Apical dominance promotes the growth of lateral buds.

Choose the option with all correct statements.

(1) A, C, E only

(2) A, D, E only

(3) B, D, E only

(4) A, B, C only

Answer (4)

Sol. ABA is a plant growth inhibitor and an inhibitor of plant metabolism.

Apical dominance promotes growth of apical bud.

Statements A, B and C are correct.

113. Which of the following type of immunity is present at the time of birth and is a non-specific type of defence in the human body?

(1) Innate Immunity
(2) Cell-mediated Immunity
(3) Humoral Immunity
(4) Acquired Immunity

Answer (1)

Sol. Innate immunity is non-specific type of defence, that is present at the time of birth. This is accomplished by providing different types of barriers to the entry of the foreign agents into our body. Acquired immunity is pathogen specific, characterised by memory cells.

Immune response mediated by B-lymphocytes is humoral immunity and other immune response mediated by T-lymphocytes is called cell-mediated immunity.

114. Why can't insulin be given orally to diabetic patients?

(1) It will be digested in Gastro-Intestinal (GI) tract
(2) Because of structural variation
(3) Its bioavailability will be increased
(4) Human body will elicit strong immune response

Answer (1)

Sol. Insulin can't be administered orally to diabetic patients as being the proteinaceous molecule, it will be digested in gastro-intestinal tract.

115. Which one of the following equations represents the Verhulst-Pearl Logistic Growth of population?

(1) $\frac{dN}{dt} = rN\left(\frac{K-N}{K}\right)$
(2) $\frac{dN}{dt} = rN\left(\frac{N-K}{N}\right)$
(3) $\frac{dN}{dt} = N\left(\frac{r-K}{K}\right)$
(4) $\frac{dN}{dt} = r\left(\frac{K-N}{K}\right)$

Answer (1)

Sol. Logistic growth is described by Verhulst-Pearl logistic growth equation $\frac{dN}{dt} = rN\left(\frac{K-N}{K}\right)$.

116. Silencing of specific mRNA is possible via RNAi because of

(1) Inhibitory ssRNA
(2) Complementary tRNA
(3) Non-complementary ssRNA
(4) Complementary dsRNA

Answer (4)

Sol. RNAi (RNA interference) takes place in all eukaryotic organisms as a method of cellular defense. This method involves silencing of a specific mRNA due to a complementary dsRNA molecule that binds to and prevents translation of the mRNA.

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

	List-I		**List-II**
A.	Adenosine	I.	Nitrogen base
B.	Adenylic acid	II.	Nucleotide
C.	Adenine	III.	Nucleoside
D.	Alanine	IV.	Amino acid

Choose the option with all **correct** matches.

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

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

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

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

Answer (2)

Sol. The correct answer is A-III, B-II, C-I, D-IV

- Adenosine – It is a nucleoside which is composed of nitrogen base and sugar only.
- Adenylic acid – It is a nucleotide which is composed of nitrogen base, sugar and a phosphate group is esterified to the sugar.
- Adenine – Nitrogen base (Purine)

Alanine – An amino acid that contains a methyl group as the 'R' group.

118. Frogs respire in water by skin and buccal cavity and on land by skin, buccal cavity and lungs.

Choose the **correct** answer from the following :

(1) The statement is true for both the environment

(2) The statement is false for water but true for land

(3) The statement is false for both the environment

(4) The statement is true for water but false for land

Answer (2)

Sol.
- In water, frogs respire through skin and not through buccal cavity *i.e.,* undergo cutaneous respiration only.
- On land, the buccal cavity, skin and lungs act as respiratory organs *i.e.,* undergo buccopharyngeal , cutaneous and pulmonary respiration.

119. All living members of the class Cyclostomata are :

(1) Endoparasite

(2) Symbiotic

(3) Ectoparasite

(4) Free living

Answer (3)

Sol. All living members of class Cyclostomata are ectoparasites.

120. Identify the statement that is **NOT** correct.

(1) The heavy and light chains are held together by disulfide bonds.

(2) Antigen binding site is located at C-terminal region of antibody molecules.

(3) Constant region of heavy and light chains are located at C-terminus of antibody molecules

(4) Each antibody has two light and two heavy chains.

Answer (2)

Sol. Each antibody molecule has four peptide chains, two small called light chains and two longer called heavy chains. Hence, an antibody is represented as H_2L_2.

In an antibody molecule, antigen binding site is located at N-terminal region.

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

Assertion (A) : The primary function of the Golgi apparatus is to package the materials made by the endoplasmic reticulum and deliver it to intracellular targets and outside the cell.

Reason (R) : Vesicles containing materials made by the endoplasmic reticulum fuse with the cis face of the Golgi apparatus, and they are modified and released from the trans face of the Golgi apparatus.

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

(1) Both **A** and **R** are true but **R** is **not** the correct explanation of **A**

(2) **A** is true but **R** is false

(3) **A** is false but **R** is true

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

Answer (1)

Sol. The primary function of Golgi apparatus is to package the materials made by endoplasmic reticulum and deliver it to intracellular targets and outside the cell, this statement is correct and the reason statement is also correct. Golgi apparatus remains in close association with endoplasmic reticulum. Here, assertion and reason statements both are correct but reason is not correctly explaining assertion.

122. Consider the following :

A. The reductive division for the human female gametogenesis starts earlier than that of the male gametogenesis.

B. The gap between the first meiotic division and the second meiotic division is much shorter for males compared to females.

C. The first polar body is associated with the formation of the primary oocyte.

D. Luteinizing Hormone (LH) surge leads to disintegration of the endometrium and onset of menstrual bleeding.

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

(1) A and C are true

(2) B and D are true

(3) B and C are true

(4) A and B are true

Answer (4)

Sol. Statements A and B are true while statements C and D are false.

The first polar body is associated with the formation of the secondary oocyte LH surge leads to ovulation. Decreased levels of progesterone during late luteal phase leads to degeneration of the endometrium and onset of menstrual bleeding.

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

	List I		**List II**
A.	Scutellum	I.	Persistent nucellus
B.	Non-albuminous seed	II.	Cotyledon of Monocot seed
C.	Epiblast	III.	Groundnut
D.	Perisperm	IV.	Rudimentary cotyledon

Choose the option with all **correct** matches.

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

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

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

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

Answer (4)

Sol. Scutellum is cotyledon of monocot seed.

Groundnut seed is non-albuminous seed.

Epiblast is rudimentary cotyledon in monocot seed.

Perisperm is persistent nucellus.

124. What is the main function of the spindle fibers during mitosis?

(1) To synthesize new DNA

(2) To repair damaged DNA

(3) To regulate cell growth

(4) To separate the chromosomes

Answer (4)

Sol. During mitosis, spindle fibre get attach to the kinetochores of the chromosome and help in the separation of the chromosome.

125. Which of the following statements about RuBisCO is true?

(1) It has higher affinity for oxygen than carbon dioxide

(2) It is an enzyme involved in the photolysis of water

(3) It catalyzes the carboxylation of RuBP

(4) It is active only in the dark

Answer (3)

Sol. Carboxylation is the most crucial step of the Calvin cycle where CO_2 is utilised for the carboxylation of RuBP. This reaction is catalysed by enzyme RuBP carboxylase. Since this enzyme also has an oxygenase activity, RuBisCO has higher affinity for carbon dioxide than oxygen.

126. Given below are two statements :

Statement I : The DNA fragments extracted from gel electrophoresis can be used in construction of recombinant DNA.

Statement II : Smaller size DNA fragments are observed near anode while larger fragments are found near the wells in an agarose gel.

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 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 cutting of DNA by restriction endonucleases results in the fragments of DNA. These fragments can be separated by a technique known as gel electrophoresis.

The separated bands of DNA are cut out from the agarose gel and extracted from the gel piece. This step is known as elution. The DNA fragments purified in this way are used in constructing rDNA by joining them with cloning vectors.

- In gel electrophoresis, the DNA fragments separate (resolve) according to their size through sieving effect provided by the agarose gel. Hence, the smaller the fragment size, the farther it moves from cathode towards anode.

127. Which factor is important for termination of transcription?

(1) σ (sigma) (2) ρ (rho)

(3) γ (gamma) (4) α (alpha)

Answer (2)

Sol. In prokaryotes the RNA polymerase is only capable of catalysing the process of elongation. It associates transiently with initiation factor (σ) and termination factor (ρ) to initiate and terminate the transcription respectively.

128. Consider the following statements regarding function of adrenal medullary hormones :

(A) It causes pupilary constriction.

(B) It is a hyperglycemic hormone.

(C) It causes piloerection.

(D) It increases strength of heart contraction.

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

(1) B, C and D only

(2) A, C and D only

(3) D only

(4) C and D only

Answer (1)

Sol. Adrenal medulla secretes two hormones called adrenaline or epinephrine and noradrenaline or norepinephrine (also called emergency hormones).

Both the hormones -

- Cause pupillary dilation (not constriction)
- Stimulate breakdown of glycogen resulting in increased concentration of glucose in blood *i.e.*, cause hyperglycemia.
- Cause piloerection (raising of hair).
- Increase strength of heart contraction *i.e.*, heartbeat.

129. Histones are enriched with -

(1) Leucine & Lysine
(2) Phenylalanine & Leucine
(3) Phenylalanine & Arginine
(4) Lysine & Arginine

Answer (4)

Sol. In eukaryotes, packaging of DNA is much more complex. There is a set of positively charged, basic proteins called histones.

Histones are organised to form a unit of light molecules called histone octamer.

They are rich in the basic amino acid residues lysine and arginine.

130. Genes R and Y follow independent assortment. If RRYY produce round yellow seeds and rryy produce wrinkled green seeds, what will be the phenotypic ratio of the F2 generation?

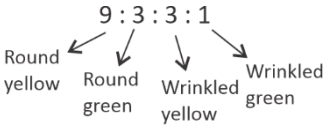
(1) Phenotypic ratio - 3 : 1
(2) Phenotypic ratio - 9 : 3 : 3 : 1
(3) Phenotypic ratio - 9 : 7
(4) Phenotypic ratio - 1 : 2 : 1

Answer (2)

Sol. A classical dihybrid cross performed by Mendel involves.

A cross which was made between a pure round yellow seeded pea plant (RRYY) with wrinkled green seeded plant (rryy). Yellow colour is dominant over green and round seed shape over wrinkled seed shape.

Phenotypic ratio in F2 generation



131. Which of the following hormones released from the pituitary is actually synthesized in the hypothalamus?

(1) Anti-diuretic hormone (ADH)
(2) Follicle-stimulating hormone (FSH)
(3) Adrenocorticotropic hormone (ACTH)
(4) Luteinizing hormone (LH)

Answer (1)

Sol. Neurohypophysis *i.e.*, posterior pituitary (Pars nervosa) stores and releases two hormones called oxytocin and vasopressin (Also called ADH *i.e.*, antidiuretic hormone) which are actually synthesised by hypothalamus and are transported axonally to neurohypophysis. The pars distalis (anterior pituitary) produces follicle stimulating hormone (FSH), adrenocorticotropic hormone (ACTH) and luteinizing hormone (LH).

132. 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 vertebrate.

Reason (R) : The members of subphylum vertebrata possess notochord during the embryonic period, the notochord is replaced by cartilaginous or bony vertebral column in adults.

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

(1) Both **(A)** and **(R)** are true but **(R)** is **not** the correct explanation of **(A)**

(2) **(A)** is true but **(R)** is false

(3) **(A)** is false but **(R)** is true

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

Answer (4)

Sol. Both (A) and (R) are true and (R) is the correct explanation of (A).

The members of subphylum vertebrata possess notochord during the embryonic period. The notochord is replaced by a cartilaginous or bony vertebral column in the adult.

Thus, all vertebrates are chordates but all chordates are not vertebrates.

133. Given below are two statements :

Statement I : Fig fruit is a non-vegetarian fruit as it has enclosed fig wasps in it.

Statement II : Fig wasp and fig tree exhibit mutual relationship as fig wasp completes its life cycle in fig fruit and fig fruit gets pollinated by fig wasp.

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 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 (1)

Sol. Fig fruit is a vegetarian fruit as it only gets pollinated by wasp. Fig tree and fig wasps shows mutualism in which both species are benefitted. So, statement I is incorrect. Statement II is also not correct as fig inflorescence/flower gets pollinated by fig wasp.

134. Sweet potato and potato represent a certain type of evolution. Select the correct combination of terms to explain the evolution.

(1) Homology, divergent

(2) Homology, convergent

(3) Analogy, divergent

(4) Analogy, convergent

Answer (4)

Sol. Sweet potato is a root modification while potato is a stem modification but both of them have same function. Analogous structures are not anatomically similar structures though they perform similar functions.

Analogous structures are the result of convergent evolution.

- Homologous organs are anatomically similar but they do not perform similar function. Homologous organs are the result of divergent evolution.

135. Which of the following microbes is **NOT** involved in the preparation of household products?

A. *Aspergillus niger*

B. *Lactobacillus*

C. *Trichoderma polysporum*

D. *Saccharomyces cerevisiae*

E. *Propionibacterium sharmanii*

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

(1) A and C only

(2) C and D only

(3) C and E only

(4) A and B only

Answer (1)

Sol. *Lactobacillus* is used for production of curd.

Saccharomyces cerevisiae is used for the fermentation of palm sap to obtain toddy drink.

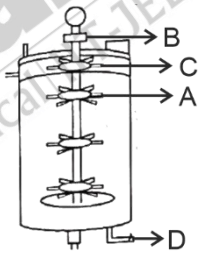
Propionibacterium sharmanii is used for production of swiss cheese.

Aspergillus niger is used for the commercial production of citric acid.

Trichoderma polysporum is used for the production of cyclosporin A and also act as a biocontrol agent.

A, C are used in industrial production of citric acid and cyclosporin-A.

136. Identify the part of a bio-reactor which is used as a foam braker from the given figure.

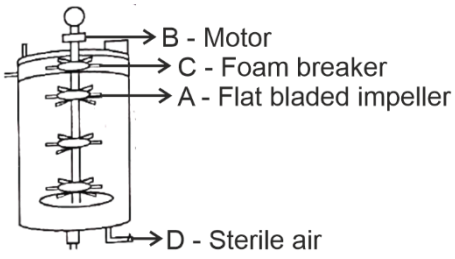


(1) B (2) D

(3) C (4) A

Answer (3)

Sol.



∴ Part labelled as C is foam breaker.

137. Name the class of enzyme that usually catalyze the following reaction :

$S - G + S^{\#} \rightarrow S + S^{\#} - G$

Where, G $\rightarrow$ a group other than hydrogen

S $\rightarrow$ a substrate

$S^{\#}$ $\rightarrow$ another substrate

(1) Lyase (2) Transferase

(3) Ligase (4) Hydrolase

Answer (2)

Sol. Enzymes catalysing a transfer of G group, (other than hydrogen) between a pair of substrates, S and S' are known as transferases.

$S - G + S^{\#} \rightarrow S + S^{\#} - G$

- Ligases catalyse the linking together of 2 compounds such as C – O, C – S, C – N bonds *etc*
- Lyases catalyse removal of groups from substrates by mechanisms other than hydrolysis leaving double bonds

Hydrolases are enzymes that catalyse hydrolysis of ester, ether, peptide , glycosidic, C – C, C – halide or P – N bonds.

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

	List-I		**List-II**
A.	Chlorophyll a	(I)	Yellow-green
B.	Chlorophyll b	(II)	Yellow
C.	Xanthophylls	(III)	Blue-green
D.	Carotenoids	(IV)	Yellow to Yellow-orange

Choose the option with all **correct** matches.

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

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

Answer (1)

Sol. A chromatographic separation of the leaf pigments shows that the colour that we see in leaves is not due to single pigment but due to four pigments.

Chlorophyll a	–	Bright or blue-green in the chromatogram
Chlorophyll b	–	Yellow-green
Xanthophylls	–	Yellow
Carotenoids	–	Yellow to Yellow-orange

139. The correct sequence of events in the life cycle of bryophytes is

A. Fusion of antherozoid with egg.

B. Attachment of gametophyte to substratum.

C. Reduction division to produce haploid spores.

D. Formation of sporophyte.

E. Release of antherozoids into water.

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

(1) B, E, A, C, D

(2) B, E, A, D, C

(3) D, E, A, B, C

(4) D, E, A, C, B

Answer (2)

Sol. The correct sequence of events in the life cycle of bryophytes is

- Attachment of gametophyte to substratum.
- Release of antherozoids into water.
- Fusion of antherozoid with egg.
- Formation of sporophyte.
- Reduction division to produce haploid spores.

140. Match **List-I** with **List- II**.

	List-I		**List-II**
A.	Centromere	I.	Mitochondrion
B.	Cilium	II.	Cell division
C.	Cristae	III.	Cell movement
D.	Cell membrane	IV.	Phospholipid Bilayer

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

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

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

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

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

Answer (3)

Sol. Centromere - Helps in cell division

Cilium - Helps in cell movement

Cristae - Finger like structures of mitochondria

Cell membrane - Is a phospholipid bilayer

141. Find the correct statement :

(A) In human pregnancy, the major organ systems are formed at the end of 12 weeks.

(B) In human pregnancy the major organ systems are formed at the end of 8 weeks.

(C) In human pregnancy heart is formed after one month of gestation.

(D) In human pregnancy, limbs and digits develop by the end of second month.

(E) In human pregnancy the appearance of hair is usually observed in the fifth month.

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

(1) B and C only

(2) B, C, D and E only

(3) A, C, D and E only

(4) A and E only

Answer (3)

Sol. In a human female's pregnancy.

- By the end of 12 weeks (1^{st} trimester), most of major organ systems are formed (not by end of 8 weeks).
- After one month of pregnancy, the embryo's heart is formed.
- By the end of second month of pregnancy, the foetus develops limbs and digits.
- The first movements of foetus and appearance of hair on head are usually observed during the fifth month.

142. Each of the following characteristics represent a Kingdom proposed by Whittaker. Arrange the following in increasing order of complexity of body organization.

A. Multicellular heterotrophs with cell wall made of chitin.

B. Heterotrophs with tissue/organ/organ system level of body organization.

C. Prokaryotes with cell wall made of polysaccharides and amino acids.

D. Eukaryotic autotrophs with tissue/organ level of body organization.

E. Eukaryotes with cellular body organization.

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

(1) C, E, A, D, B

(2) A, C, E, D, B

(3) C, E, A, B, D

(4) A, C, E, B, D

Answer (1)

Sol. Increasing order of complexity of body organisation in the kingdom given by R.H. Whittaker is as follows-

C. Monera-Prokaryotes with cell wall made up of polysaccharide.

↓

E. Protista - Unicellular eukaryotes.

↓

A. Fungi -Multicellular heterotrophic with cell wall made up of chitin.

↓

D. Plantae - Eukaryotes autotrophs with tissue body organisation.

↓

B. Animalia - Heterotrophs with tissue organ/system of body organisation

Correct sequence is C, E, A, D, B.

143. Which are correct:

A. Computed tomography and magnetic resonance imaging detect cancers of internal organs.

B. Chemotherapeutics drugs are used to kill non-cancerous cells.

C. α -interferon activate the cancer patients' immune system and helps in destroying the tumour.

D. Chemotherapeutic drugs are biological response modifiers.

E. In the case of leukaemia blood cell counts are decreased.

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

(1) D and E only

(2) C and D only

(3) A and C only

(4) B and D only

Answer (3)

Sol. Statements A and C are correct while statements B, D and E are incorrect.

Chemotherapeutic drugs are used to kill cancerous cells.

In case of leukaemia, blood cell counts are increased.

α-interferons are biological response modifiers.

144. Which of the following genetically engineered organisms was used by Eli Lilly to prepare human insulin?

(1) Yeast

(2) Virus

(3) Phage

(4) Bacterium

Answer (4)

Sol. The correct answer is bacterium.

In 1983, Eli Lilly, an American company, prepared two DNA sequences corresponding to 'A' and 'B' chains of human insulin and introduced them in plasmids of *E.coli* (a gram negative bacterium) to produce insulin chains.

145. What is the pattern of inheritance for polygenic trait?

(1) Non-mendelian inheritance pattern

(2) Autosomal dominant pattern

(3) X-linked recessive inheritance pattern

(4) Mendelian inheritance pattern

Answer (1)

Sol. Polygenic inheritance refers to the inheritance of a trait controlled by two or more genes. When human disorders are determined by mutation in the single gene then they are transmitted to the offspring as per Mendelian principle. Polygenic trait shows non-Mendelian inheritance pattern.

146. Which of the following are the post-transcriptional events in an eukaryotic cell?

A. Transport of pre-mRNA to cytoplasm prior to splicing.

B. Removal of introns and joining of exons.

C. Addition of methyl group at 5' end of hnRNA.

D. Addition of adenine residues at 3' end of hnRNA.

E. Base pairing of two complementary RNAs.

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

(1) B, C, D only

(2) B, C, E only

(3) C, D, E only

(4) A, B, C only

Answer (1)

Sol. The process of copying genetic information from one strand of the DNA into RNA is known as transcription. It occurs in the cytoplasm with the help of transcripting enzyme.

Transport of pre-mRNA to cytoplasm prior to splicing is a part of transcription.

The primary transcript is converted into functional mRNA after post transcriptional processing involves 3 steps as follows-

- Modification of 5' end by capping,
- Tailing,
- Splicing.

Base pairing of two complementary RNA is not on event of post-transcription. Hence, statements B, C, D are post-transcriptional modification events in eukaryotic cell.

147. Which one of the following phytohormones promotes nutrient mobilization which helps in the delay of leaf senescence in plants?

(1) Abscisic acid

(2) Gibberellin

(3) Cytokinin

(4) Ethylene

Answer (3)

Sol. Cytokinins help to overcome apical dominance. They promote nutrient mobilisation which helps in the delay of leaf senescence.

148. Which one of the following statements refers to Reductionist Biology?

(1) Physiological approach to study and understand living organisms

(2) Chemical approach to study and understand living organisms

(3) Behavioural approach to study and understand living organisms

(4) Physico-chemical approach to study and understand living organisms

Answer (4)

Sol. The physico-chemical approach to study and understand living organisms is called 'Reductionist Biology'.

149. Match **List-I** with **List-II**.

	List-I		List-II
A.	Emphysema	I.	Rapid spasms in muscle due to low Ca^{++} in body fluid
B.	Angina Pectoris	II.	Damaged alveolar walls and decreased respiratory surface
C.	Glomerulonephritis	III.	Acute chest pain when not enough oxygen is reaching to heart muscle
D.	Tetany	IV.	Inflammation of glomeruli of kidney

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

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

Answer (3)

Sol. Emphysema - Damaged alveolar walls and decreased respiratory surface

Angina pectoris - Acute chest pain when not enough oxygen is reaching to heart muscle

Glomerulonephritis - Inflammation of glomeruli of kidney

Tetany - Rapid spasms in muscle due to low Ca^{++} in body fluid

150. Epiphytes that are growing on a mango branch is an example of which of the following?

(1) Mutualism

(2) Predation

(3) Amensalism

(4) Commensalism

Answer (4)

Sol. Commensalism is the type of interaction in which one-species benefits and another is neither harmed nor benefited. An orchid growing as an epiphyte on a mango branch is an example of commensalism.

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

	List-I		List-II
A.	Alfred Hershey and Martha Chase	I.	Streptococcus pneumoniae
B.	Euchromatin	II.	Densely packed and dark-stained
C.	Frederick Griffith	III.	Loosely packed and light-stained
D.	Heterochromatin	IV.	DNA as genetic material confirmation

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

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

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

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

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

Answer (2)

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

Euchromatin are lightly stained region with loosely packed chromatin fibre.

Frederick Griffith performed series of experiments by selecting the different strains of *Streptococcus pneumoniae.*

Heterochromatin are darkly stained region with tightly packed chromatin fibre.

152. Which chromosome in the human genome has the highest number of genes?

(1) Chromosome Y
(2) Chromosome 1
(3) Chromosome 10
(4) Chromosome X

Answer (2)

Sol. In human genome, Chromosome 1 has the highest number of genes, *i.e.*, 2968.

153. What are the potential drawbacks in adoption of the IVF method?

A. High fatality risk to mother
B. Expensive instruments and reagents
C. Husband/wife necessary for being donors
D. Less adoption of orphans
E. Not available in India
F. Possibility that the early embryo does not survive

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

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

Answer (4)

Sol. Statements B, D and F are correct while statements A, C and E are incorrect.

Husband/wife is not necessary for being donors. IVF is available in India.

154. Match **List - I** with **List - II.**

	List - I		**List - II**
A.	Head	(i)	Enzymes
B.	Middle piece	(ii)	Sperm motility
C.	Acrosome	(iii)	Energy
D.	Tail	(iv)	Genetic material

Choose the correct answer from the options given below :

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

Answer (4)

Sol.
- The sperm head contains elongated nucleus which possesses the genetic material.
- The middle piece possesses numerous mitochondria, which produce energy for movement.
- Acrosome is a cap-like structure filled with enzymes that help in fertilization of ovum.
- The tail of sperm facilitates sperm motility essential for fertilisation.

155. From the statements given below choose the **correct** option :

A. The eukaryotic ribosomes are 80S and prokaryotic ribosomes are 70S.

B. Each ribosome has two sub-units.

C. The two sub-units of 80S ribosome are 60S and 40S while that of 70S are 50S and 30S.

D. The two sub-units of 80S ribosome are 60S and 20S and that of 70S are 50S and 20S.

E. The two sub-units of 80S are 60S and 30S and that of 70S are 50S and 30S.

(1) A, B, D are true
(2) A, B, E are true
(3) B, D, E are true
(4) A, B, C are true

Answer (4)

Sol. The eukaryotic ribosomes are 80S and prokaryotic ribosomes are 70S type.

Each ribosome has two sub-units.

The two sub-units of 80S ribosome are 60S and 40S while that of 70S are 50S and 30S.

156. Which of the following is an example of non-distilled alcoholic beverage produced by yeast?

(1) Brandy
(2) Beer
(3) Rum
(4) Whisky

Answer (2)

Sol. Wine and beer are produced without distillation whereas whisky, brandy and rum are produced by distillation of fermented broth.

157. Who is known as the father of Ecology in India?

(1) Ramdeo Misra
(2) Ram Udar
(3) Birbal Sahni
(4) S.R. Kashyap

Answer (1)

Sol. Ramdeo Misra is known as the father of Ecology in India.

158. In the seeds of cereals, the outer covering of endosperm separates the embryo by a protein-rich layer called :

(1) Coleorhiza
(2) Integument
(3) Aleurone layer
(4) Coleoptile

Answer (3)

Sol. In monocot seeds, the outer covering of endosperm separates the embryo by a proteinous layer called aleurone layer.

159. Which of the following statement is **correct** about location of the male frog copulatory pad?

(1) First digit of hind limb

(2) Second digit of fore limb

(3) First digit of the fore limb

(4) First and Second digit of fore limb

Answer (3)

Sol. In male frogs, copulatory pad is present on the first digit of the forelimbs which are absent in female frogs.

160. A specialised membranous structure in a prokaryotic cell which helps in cell well wall formation, DNA replication and respiration is

(1) Chromatophores

(2) Cristae

(3) Endoplasmic Reticulum

(4) Mesosome

Answer (4)

Sol. Mesosome is membranous extension in bacterial cell that helps in cell wall formation, DNA replication and contains enzymes for respiration.

161. Given below are two statements :

Statement I : Transfer RNAs and ribosomal RNA do not interact with mRNA.

Statement II : RNA interference (RNAi) takes place in all eukaryotic organisms as a method of cellular defence.

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 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 (3)

Sol. Both transfer RNAs and ribosomal RNA interact with mRNA.

RNA interference (RNAi) takes place in all eukaryotic organisms as a method of cellular defence.

162. What is the name of the blood vessel that carries deoxygenated blood from the body to the heart in a frog?

(1) Pulmonary artery

(2) Pulmonary vein

(3) Vena cava

(4) Aorta

Answer (3)

Sol. Frog's heart is a muscular structure with three chambers. It receives deoxygenated blood from body parts through the major veins called vena cava. Vena cava carries deoxygenated blood. Aorta and pulmonary vein carries oxygenated blood. Whereas, pulmonary artery will carry deoxygenated blood towards the lungs.

163. Given below are two statements :

Statement I : In the RNA world, RNA is considered the first genetic material evolved to carry out essential life processes. RNA acts as a genetic material and also as a catalyst for some important biochemical reactions in living systems. Being reactive, RNA is unstable.

Statement II : DNA evolved from RNA and is a more stable genetic material. Its double helical strands being complementary, resist changes by evolving repairing mechanism.

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 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. In RNA world, RNA was the first genetic material as there are enough evidences to suggest that essential life processes (such as metabolism, translation, splicing, etc) evolved around RNA. RNA used to act as a genetic material as well as catalyst (there are some important biochemical reaction in living systems that are catalysed by RNA catalysts not by protein enzymes) so, statement I is correct statement II is also correct as DNA being double stranded and having complementary strands further resists changes by evolving a process of repair.

164. Which one of the following is an example of ex-situ conservation?

(1) Wildlife Sanctuary

(2) Zoos and botanical gardens

(3) Protected areas

(4) National Park

Answer (2)

Sol. Zoological parks (Zoos), botanical gardens and wildlife safari parks are examples of ex-situ conservation. Sacred groves, biosphere reserves, national parks and wildlife sanctuaries are examples of in-situ conservation.

165. Which one of the following enzymes contains 'Haem' as the prosthetic group?

(1) Carbonic anhydrase

(2) Succinate dehydrogenase

(3) Catalase

(4) RuBisCo

Answer (3)

Sol. In peroxidase and catalase, which catalyze the breakdown of hydrogen peroxide to water and oxygen, haem is the prosthetic group and it is part of the active site of the enzymes.

Zinc is the cofactor in enzyme carbonic anhydrase.

RuBisCo is the most abundant protein in whole of the biosphere.

Succinate is the substrate of enzyme succinic dehydrogenase.

166. Given below are the stages in the life cycle of pteridophytes. Arrange the following stages in the correct sequence.

A. Prothallus stage

B. Meiosis in spore mother cells

C. Fertilisation

D. Formation of archegonia and antheridia in gametophyte.

E. Transfer of antherozoids to the archegonia in presence of water.

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

(1) B, A, E, C, D

(2) D, E, C, A, B

(3) E, D, C, B, A

(4) B, A, D, E, C

Answer (4)

Sol. In a pteridophytes life cycle, the correct sequence of stages will be given as follows:

B $\rightarrow$ Meiosis in spore mother cells

A $\rightarrow$ Prothallus stage

D $\rightarrow$ Formation of archegonia and antheridia in gametophyte

E $\rightarrow$ Transfer of antherozoids to the archegonia in presence of water

C $\rightarrow$ Fertilisation will occur

So, the correct sequence is B $\rightarrow$ A $\rightarrow$ D $\rightarrow$ E $\rightarrow$ C

167. Which of following organisms **cannot** fix nitrogen?

A. *Azotobacter*

B. *Oscillatoria*

C. *Anabaena*

D. *Volvox*

E. *Nostoc*

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

(1) D only

(2) B only

(3) E only

(4) A only

Answer (1)

Sol. *Azotobacter*, *Oscillatoria*, *Anabaena* and *Nostoc* can fix nitrogen but *Volvox* cannot fix nitrogen.

168. While trying to find out the characteristic of a newly found animal, a researcher did the histology of adult animal and observed a cavity with presence of mesodermal tissue towards the body wall but no mesodermal tissue was observed towards the alimentary canal. What could be the possible coelome of that animal?

(1) Pseudocoelomate
(2) Schizocoelomate
(3) Spongocoelomate
(4) Acoelomate

Answer (1)

Sol. In pseudocoelomates, the body cavity is not entirely lined with mesoderm, instead, mesodermal tissue is present along the body wall but not towards the gut.

- Schizocoelomates are animals whose coelom or body cavity develops middle from a split in the mesoderm, the middle germ layer of the embryo.
- In acoelomates, coelom is absent.

Spongocoel is a central cavity found in Sponges.

169. Given below are two statements:

Statement I: In a floral formula ⊕ stands for zygomorphic nature of the flower, and $\underline{G}$ stands for inferior ovary.

Statement II: In a floral formula ⊕ stands for actinomorphic nature of the flower and $\underline{G}$ stands for superior ovary.

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 (3)

Sol. The floral formula symbol ⊕ is used for actinomorphic flower, while % is used for zygomorphic flower.

The symbol G represents gynoecium and $\underline{G}$ symbol represent superior ovary, while inferior ovary is represented by $\bar{\underline{G}}$.

Thus, statement I is incorrect and Statement II is correct.

170. Given below are two statements:

Statement I : The primary source of energy in an ecosystem is solar energy.

Statement II : The rate of production of organic matter during photosynthesis in an ecosystem is called net primary productivity (NPP).

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 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

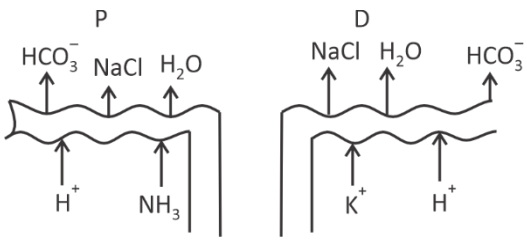
Answer (2)

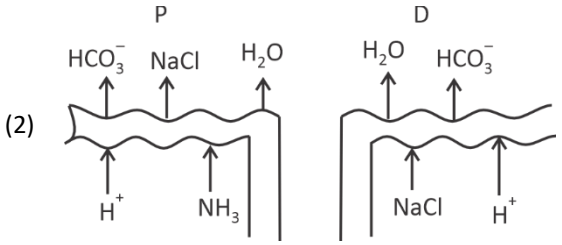
Sol. Primary source of energy in the ecosystem is solar energy.

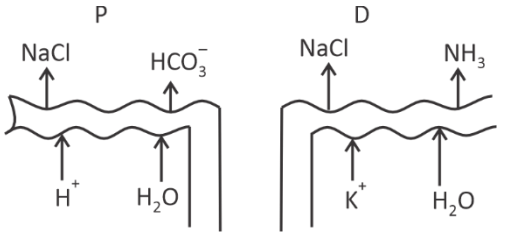
Gross primary productivity of an ecosystem is the rate of production of organic matter during photosynthesis.

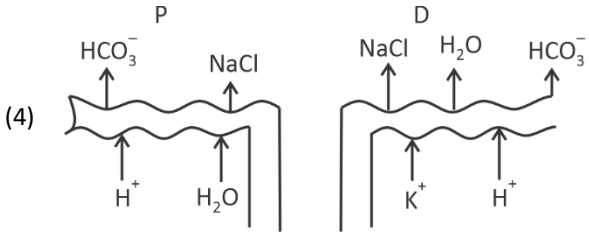
Hence, statement I is correct but statement II is incorrect.

171. Which of the following diagrams is correct with regard to the proximal (P) and distal (D) tubule of the Nephron.

(1) 

(2) 

(3) 

(4) 

Answer (1)

Sol. During urine formation, the tubular cells secrete substances like H^+, K^+ and ammonia into the filtrate. Tubular secretion is also an important step in urine formation as it helps in the maintenance of ionic and acid base balance of body fluids.

PCT $\rightarrow$ Selective secretion of H^+, ammonia and K^+ into the filtrate.

DCT $\rightarrow$ Capable of reabsorption of HCO_3^- and selective secretion of H^+, K^+ and NH_3.

172. Streptokinase produced by *bacterium Streptococcus* is used for

(1) Ethanol production

(2) Liver disease treatment

(3) Removing clots from blood vessels

(4) Curd production

Answer (3)

Sol. Streptokinase produced by the bacterium *Streptococcus* and modified by genetic engineering is used as a 'clot buster' for removing clots from blood vessels of patients who have undergone myocardial infarction leading to heart attack. Curd production is done by *Lactobacillus* and ethanol production is done by *Saccharomyces.*

173. Cardiac activities of the heart are regulated by:

A. Nodal tissue

B. A special neural centre in the medulla oblongata

C. Adrenal medullary hormones

D. Adrenal cortical hormones

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

(1) A, B, C and D

(2) A, C and D Only

(3) A, B and D Only

(4) A, B and C Only

Answer (4)

Sol. Normal cardiac activities of the heart are regulated intrinsically, i.e., auto regulated by specialised muscles (nodal tissue), hence the heart is called myogenic. A special neural centre in the medulla oblongata can moderate the cardiac function through autonomic nervous system.

Sympathetic nervous system can increase the rate of heartbeat, ventricular contraction and thereby cardiac output.

Parasympathetic neural signals decrease the rate of heartbeat, speed of conduction of action potential and thereby the cardiac output. Adrenal medullary hormones can also increase the cardiac output.

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

Assertion (A) : A typical unfertilised, angiosperm embryo sac at maturity is 8 nucleate and 7-celled.

Reason (R) : The egg apparatus has 2 polar nuclei.

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

(1) Both **A** and **R** are true but **R** is **NOT** the correct explanation of **A**

(2) **A** is true but **R** is false

(3) **A** is false but **R** is true

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

Answer (2)

Sol. A typical Angiosperm embryo sac, at maturity is 7-celled and 8 nucleate.

Polar nuclei are situated below the egg apparatus in the large central cell.

Three cells are grouped together at micropylar end and constitute the egg apparatus.

Hence, A is true but R is false.

175. Find the statement that is **NOT** correct with regard to the structure of monocot stem.

(1) Vascular bundles are scattered.

(2) Vascular bundles are conjoint and closed.

(3) Phloem parenchyma is absent.

(4) Hypodermis is parenchymatous.

Answer (4)

Sol. In monocot stem, hypodermis is sclerenchymatous.

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

Assertion (A) : Both wind and water pollinated flowers are not very colourful and do not produce nectar.

Reason (R) : The flowers produce enormous amount of pollen grains in wind and water pollinated flowers.

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

(1) Both **A** and **R** are true but **R** is **NOT** the correct explanation of **A**

(2) **A** is true but **R** is false

(3) **A** is false but **R** is true

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

Answer (1)

Sol. Both wind and water pollinated flowers are not very colourful and do not produce nectar, this is because they rely on wind and water to carry their pollen. Wind and water pollinated flower do not need to attract insect, so they did not evolve to produce bright coloured flower.

177. Neoplastic characteristics of cells refer to :

A. A mass of proliferating cell

B. Rapid growth of cells

C. Invasion and damage to the surrounding tissue

D. Those confined to original location

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

(1) A, B, C only

(2) A, B, D only

(3) B, C, D only

(4) A, B only

Answer (1)

Sol. The correct answer will include : A, B and C only.

A neoplasm is a general term for any abnormal growth of tissue.

Neoplastic characteristics of cells refer to

(1) A mass of proliferating cell.
(2) Rapid growth of cells.
(3) Invasion and damage to the surrounding tissue.

Cancer specifically refers to malignant neoplasms, which are cancerous and invasive.

Benign tumours remain confined to their original location. Thus, D is not included in the answer.

The malignant tumours, on the other hand are a mass of proliferating cells called neoplastic or tumour cells. These cells grow very rapidly, invading and damaging the surrounding normal tissues.

178. The complex II of mitochondrial electron transport chain is also known as

(1) Succinate dehydrogenase

(2) Cytochrome c oxidase

(3) NADH dehydrogenase

(4) Cytochrome bc_1

Answer (1)

Sol. Complex II of mitochondrial electron transport chain is also known as succinate dehydrogenase. Cytochrome c oxidase (complex IV), NADH dehydrogenase (complex I), cytochrome bc_1 (complex III).

179. Polymerase chain reaction (PCR) amplifies DNA following the equation.

(1) 2^n (2) $2n + 1$

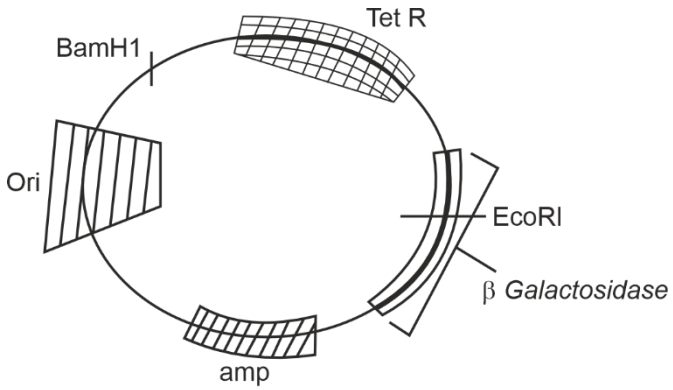
(3) $2N^2$ (4) N^2

Answer (1)

Sol. PCR *i.e.*, polymerase chain reaction amplifies DNA as per the equation 2^n, where '*n*' refers to number of cycles.

Thus, say, if 3 PCR cycles will run, then 2^3 *i.e.*, $2 \times 2 \times 2 \Rightarrow 8$ DNA fragments will be formed.

180.



In the above represented plasmid, an alien piece of DNA is inserted at EcoRI site. Which of the following strategies will be chosen to select the recombinant colonies?

(1) Blue color colonies will be selected.

(2) White color colonies will be selected.

(3) Blue color colonies grown on ampicillin plates can be selected.

(4) Using ampicillin & tetracycline containing medium plate.

Answer (2)

Sol. The correct answer is that white-colored colonies will be selected.

Since an alien piece of DNA is being inserted at *Eco*RI site, the gene β-galactosidase present here will undergo insertional inactivation.

This gene is responsible for producing blue-colored colonies, but since it has been insertionally inactivated, white colored colonies will be produced.

Ampicillin and tetracycline resistance genes present in the given DNA will remain intact. Thus, the given DNA will show amp^R and tet^R.

❑ ❑ ❑