Section : **Biology**

Q.1 **Arrange the given organisms involved in an ecosystem in correct sequence from lower to higher order.**
(A) Fish
(B) Phytoplankton
(C) Man
(D) Zooplankton
Choose the correct answer from the options given below:
1. (A), (B), (C), (D)
2. (B), (D), (A), (C)
3. C), (D), (A), (B)
4. (D), (C), (B), (A)

Options 1. 1
2. 2
3. 3
4. 4

Q.2 **The elucidation of the *lac* operon was the result of close association between the geneticist _____ and the biochemist _____.**
1. Francois Jacob, Hargobind Khorana
2. Francois Crick, Jacque Monod
3. Francois Jacob, Jacque Monod
4. Francois Jacob, Mathew Messelson

Options 1. 1
2. 2
3. 3
4. 4

Q.3 **Match List-I with List-II**

List-I	**List-II**
Terms	**Explanations**
(A) Natality	**(I) Exit of individuals**
(B) Mortality	**(II) Entry of individuals**
(C) Immigration	**(III) Death rate**
(D) Emigration	**(IV) Birth rate**

Choose the correct answer from the options given below:
1. (A) – (I), (B) – (II), (C) – (III), (D) – (IV)
2. (A) – (IV), (B) – (III), (C) – (II), (D) – (I)
3. (A) – (III), (B) – (IV), (C) – (I), (D) – (II)
4. (A) – (II), (B) – (I), (C) – (IV), (D) – (III)

Options 1. 1
2. 2
3. 3
4. 4

Q.4 **The type of antibodies that produce the immune response in the presence of allergens like pollen, dust, animal dander etc. is _____.**
1. IgA
2. IgE
3. IgM
4. IgG

Options 1. 1
2. 2
3. 3
4. 4

Q.5 **Match List-I with List-II**

List-I	List-II
Terms	Features
(A) Bioprocess engineering	(I) Use of bio resources without proper authorisation
(B) Somatic hybridization	(II) Correction of gene defect
(C) Gene Therapy	(III) Fusion of protoplasts from two different organisms
(D) Biopiracy	(IV) Maintenance of sterile ambiance for microbial growth

Choose the correct answer from the options given below:

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

Options 1. 1

2. 2

3. 3

4. 4

Q.6 Which of the following is not the saleint feature of Human Genome Project (HGP)?

1. The human genome contains 3164.7 million bp.
2. The average gene consists of 3000 bases, but sizes vary greatly, with the largest known human gene being dystrophin at 2.4 million bases.
3. More than 2 percent of the genome codes for proteins.
4. Chromosome 1 has the most genes (2968), and the Y has the fewest (231).

Options 1. 1

2. 2

3. 3

4. 4

Q.7 Which of the following will have 46 chromosomes?

1. Spermatogonium and secondary spermatocytes
2. Spermatids and spermatozoa
3. Secondary oocyte and oogonia
4. Oogonia and spermatogonia

Options 1. 1

2. 2

3. 3

4. 4

Q.8 Which one of the following expressions is used for comparing productivity of different ecosystems?

1. $\mathrm{kg\ m^{-1}\ yr^{-1}}$ or $\mathrm{(kcal\ m^{-1})\ yr^{-1}}$
2. $\mathrm{g\ m^{-2}\ yr^{-1}}$ or $\mathrm{(kcal\ m^{-2})\ yr^{-1}}$
3. $\mathrm{g\ m^{-2}\ yr^{-2}}$ or $\mathrm{(kcal\ m^{-2})\ yr^{-2}}$
4. $\mathrm{g\ m^{-2}\ yr^{-1}}$ or $\mathrm{(kcal\ m^{-1})\ yr^{-2}}$

Options 1. 1

2. 2

3. 3

4. 4

Q.9 Match List-I with List-II

List-I	List-II
Causes of biodiversity losses	Examples
(A) Habitat loss and fragmentation	(I). *Parthenium*, *Lantana* and water hyacinth (*Eichornia*)
(B) Over-exploitation	(II). Co-evolved plant-pollinator mutualism
(C) Alien species invasion	(III). Deforestation for conversion of forest to grasslands
(D) Co-extinctions	(IV). Excessive fishing and over harvesting of certain fish populations

Choose the correct answer from the options given below:

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

Options 1. 1

2. 2

3. 3

4. 4

Q.10 C and Z in the species-area relationship log S = log C + Z log A represents:

1. Slope of the line (regression coefficient) and Y-intercept, respectively
2. Y-intercept and slope of the line (regression coefficient), respectively
3. Area and species richness, respectively
4. Species richness and slope of the line (regression coefficient), respectively

Options 1. 1

2. 2

3. 3

4. 4

Q.11 The net primary productivity (NPP) in an ecosystem can be represented by:

1. GPP + R = NPP
2. GPP - R = NPP
3. GPP + PP = NPP
4. GPP - SP = NPP

Options 1. 1

2. 2

3. 3

4. 4

Q.12 Ringworms is not caused by –

1. *Microsporum*
2. *Trichophyton*
3. *Trichoderma polysporum*
4. *Epidermophyton*

Options 1. 1

2. 2

3. 3

4. 4

Q.13 In Sickle-cell anemia the substitution of amino acid in the globin protein results due to the single base substitution at the sixth codon of the β-globin gene from _____.

1. GAG to AUG
2. GAG to GUG
3. CAG to AUG
4. UAG to GUG

Options 1. 1

2. 2

3. 3

4. 4

Q.14 **Which of the following hormones are produced by placental tissue?**
(A). hCG
(B). Relaxin
(C). hPL
(D). Progestogens
Choose the correct answer from the options given below:
1. (A), (B) and (D) only
2. (B), (C) and (D) only
3. (A), (B), (C) and (D)
4. (A), (C) and (D) only

Options 1. 1
2. 2
3. 3
4. 4

Q.15 **The type of pollination which brings genetically different types of pollen grains to the stigma is -**
1. Autogamy
2. Geitonogamy
3. Xenogamy
4. Polygamy

Options 1. 1
2. 2
3. 3
4. 4

Q.16 **Arrange the number of species of organisms in tropical Amazonian rain forest in decreasing order.**
(A) Fishes
(B) Birds
(C) Plants
(D) Mammals
Choose the correct answer from the options given below:
1. (C), (A), (B), (D)
2. (A), (B), (C), (D)
3. (B), (A), (D), (C)
4. (A), (C), (D), (B)

Options 1. 1
2. 2
3. 3
4. 4

Q.17 **Transmission of HIV-Infection occurs by-**
(A). Using infected needles by the health staff or by drug abusers
(B). Transfusion of contaminated blood and blood product
(C). Sexual contact with infected person
(D). Sharing food and sanitation facilities
Choose the correct answer from the options given below:
1. (A), (B) and (D) only
2. (A), (B) and (C) only
3. (A), (B), (C) and (D)
4. (B), (C) and (D) only

Options 1. 1
2. 2
3. 3
4. 4

Q.18 Which of the following component was not the part of S.L. Miller's experiment?

1. CH4
2. NH3
3. Water vapour
4. N2

Options 1. 1

2. 2

3. 3

4. 4

Q.19 Identify the incorrect statement about genetically modified plants.

1. GM crops are more tolerant to abiotic stresses.
2. GM crops show high reliance on chemical pesticides.
3. GM crops have higher nutritional value of food.
4. GM crops have reduced post-harvest losses.

Options 1. 1

2. 2

3. 3

4. 4

Q.20 In Bt cotton plant, the insecticidal protein encoded by the genes *cry1Ac* and *cry IIAb* control -

1. Cotton bollworms
2. Corn borer
3. *Meloidegyne incognitia*
4. Wheat borer

Options 1. 1

2. 2

3. 3

4. 4

Q.21 Identify the correct statement for the species diversity.

1. Species diversity increases as we move away from the equator towards the poles.
2. Species diversity decreases as we move away from the equator towards the poles.
3. Species diversity remains constant, as we move away from the equator towards the poles.
4. Species diversity first decreases and then increases as we move away from the equator towards the poles.

Options 1. 1

2. 2

3. 3

4. 4

Q.22 Which of the followings belong to false fruit category?

(A). Apple
(B). Cashew
(C). Strawberry
(D). Orange
Choose the correct answer from the options given below:

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

Options 1. 1

2. 2

3. 3

4. 4

Q.23 Match List-I with List-II

List-I	List-II
Interspecific interaction	Species A and B respectively
(A). Commensalism	(I). - ; -
(B). Amensalism	(II). + ; -
(C). Competition	(III). + ; 0
(D). Predation	(IV). - ; 0

'+' = beneficial interaction; '–' = detrimental interaction; '0' = neutral interaction

Choose the correct answer from the options given below:

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

Options

1. 1
2. 2
3. 3
4. 4

Q.24 In a typical test cross:

1. An organism (pea plant) showing dominant phenotype is crossed with the dominant parent.
2. An organism (pea plant) showing recessive phenotype is crossed with dominant parent to determine its phenotype.
3. An organism (pea plant) showing dominant phenotype is self-crossed to determine its genotype.
4. An organism (pea plant) showing a dominant phenotype is crossed with a recessive parent to determine its genotype.

Options

1. 1
2. 2
3. 3
4. 4

Q.25 Identify the correct sequence of mature embryo formation from zygote.

(A) Heart-shaped embryo
(B) Globular embryo
(C) Proembryo
(D) Mature embryo

Choose the correct answer from the options given below:

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

Options

1. 1
2. 2
3. 3
4. 4

Q.26 Identify the correct sequence of events during menstrual cycle in human.

(A) Next cycle begins
(B) Secretory phase
(C) Follicular phase
(D) Menstruation

Choose the correct answer from the options given below:

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

Options

1. 1
2. 2
3. 3
4. 4

Q.27 Which disease is not the sexually transmitted infection?

1. Chlamydiasis
2. Elephantiasis
3. Trichomoniasis
4. Gonorrhoea

Options 1. 1

2. 2

3. 3

4. 4

Q.28 The factors that affect the Hardy-Weinberg equilibrium are:

(A). Gene migration or gene flow
(B). Natural selection
(C). Mutation
(D). Genetic drift
Choose the correct answer from the options given below:

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

Options 1. 1

2. 2

3. 3

4. 4

Q.29 Mucosa-associated lymphoid tissue (MALT) is located within the lining of -

1. Nervous and skeletal system
2. Endocrine and circulatory system
3. Skin and muscle system
4. Respiratory, digestive and urogenital tracts

Options 1. 1

2. 2

3. 3

4. 4

Q.30 Histones are rich in amino acids -

1. Lysine and leucine
2. Lysine and phenylalanine
3. Arginine and asparagine
4. Lysine and arginine

Options 1. 1

2. 2

3. 3

4. 4

Q.31 Identify the hormone releasing IUD.

1. Multiload 375
2. LNG-20
3. Saheli
4. Lippes loop

Options 1. 1

2. 2

3. 3

4. 4

Q.32 If in a pond there were 20 lotus plants last year and through reproduction 8 new plants are added, taking the current population to 28, then the birth rate will be -

1. 0.1 offspring per lotus per month
2. 0.4 offspring per lotus per day
3. 0.1 offspring per lotus per year
4. 0.4 offspring per lotus per year

Options 1. 1

2. 2

3. 3

4. 4

Q.33 Medical termination of pregnancy (MTPs) are considered safe during the -

1. **Upto 24 weeks of pregnancy**
2. **Upto 12 weeks of pregnancy**
3. **Upto 36 weeks of pregnancy**
4. **Upto 18 weeks of pregnancy**

Options 1. 1

2. 2

3. 3

4. 4

Q.34 Two different sex chromosomes, designated as Z and W involved in sex determination are found in:

1. ***Taenia***
2. **Human**
3. ***Drosophila***
4. **Birds**

Options 1. 1

2. 2

3. 3

4. 4

Q.35 Which one of the following organization is set by the Indian Government for making decisions regarding the validity of GM research and the safety of introducing GM-organisms for public services.?

1. **Genetic Engineering Approval Commission (GEAC)**
2. **Genetic Engineering Approval Co-operative (GEAC)**
3. **Genetic Engineering Approval Company (GEAC)**
4. **Genetic Engineering Approval Committee (GEAC)**

Options 1. 1

2. 2

3. 3

4. 4

Q.36 Arrange the following steps in correct sequence for the technique of DNA fingerprinting.

(A). Detection of hybridized DNA fragments by autoradiography
(B). Separation of DNA fragments by electrophoresis
(C). Isolation and digestion of DNA
(D). Transferring of separated DNA fragments and hybridization using labelled VNTR probe
Choose the correct answer from the options given below:

1. **(A), (B), (C), (D)**
2. **(A), (C), (B), (D)**
3. **(B), (A), (D), (C)**
4. **(C), (B), (D), (A)**

Options 1. 1

2. 2

3. 3

4. 4

Q.37 *Bacillus thuringiensis* produces insecticidal proteins that kills insects, belongs to -

(A). Dipterans
(B). Lepidopterans
(C). Coleopterans
(D). Ephimepterans
Choose the correct answer from the options given below:

1. **(A), (B) and (D) only**
2. **(A), (B) and (C) only**
3. **(A), (B), (C) and (D)**
4. **(B), (C) and (D) only**

Options 1. 1

2. 2

3. 3

4. 4

Q.38 Identify, which is not the example of homology in evolution.

1. **Vertebrate hearts or brains**
2. **Eye of the octopus and of mammals**
3. **Bones of forelimbs in mammals**
4. **Thorn and tendrils of *Bougainvillea* and *Cucurbita*, respectively**

Options 1. 1

2. 2

3. 3

4. 4

Q.39 The infective stage of malarial parasite, *Plasmodium* is:

1. **Female gametocyte**
2. **Male gametocyte**
3. **Sporozoite**
4. **Trophozoite**

Options 1. 1

2. 2

3. 3

4. 4

Q.40 Match List-I with List-II

List-I	List-II
Hormones	Role/functions
(A). LH	(I). Causes stronger uterine contractions
(B). FSH	(II). Essential for maintenance of the endometrium during menstrual cycle
(C). Oxytocin	(III). Acts on Leydig cells and stimulates synthesis and secretion of androgens
(D). Progesterone	(IV). Acts on Sertoli cells and stimulates secretion of some factors which help in the process of spermiogenesis

Choose the correct answer from the options given below:

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

Options 1. 1

2. 2

3. 3

4. 4

Q.41 Microbes in human welfare

Microbes are a very important component of life on earth. we use microbes and microbially derived products almost every day, like LAB to make curd, yeast to make bread, adding flavor and texture to cheese, producing antibiotics etc. The addition of LAB, improves the milk quality by increasing vit. B12. Cheese is one of the oldest food items in which microbes are used. For example, large holes in Swiss cheese are due to CO_2 produced by the bacterium *Propionibacterium sharmanii*. The BOD test measures the rate of uptake of oxygen by microorganisms in a sample of water and thus, indirectly, BOD is a measure of the organic matter present in the water. The greater the BOD of waste water, the more is its polluting potential. In anaerobic sludge digesters, bacteria produce a mixture of gases like methane, hydrogen sulphide and carbon dioxide. These gases form biogas

and can be used as a source of energy. Biofertilisers are organisms that enrich the nutrient quality of the soil. The main sources of biofertilisers are bacteria, fungi and cyanobacteria. You have studied about the nodules on the roots of leguminous plants formed by the symbiotic association of *Rhizobium*. These bacteria fix atmospheric nitrogen into organic forms, which is used by the plant as a nutrient. Other bacteria can fix atmospheric nitrogen while free-living in the soil (examples *Azospirillum* and *Azotobacter*).

BOD refers to the -

1. Amount of the oxygen that would be released if all the organic matter in one liter of water were reduced by bacteria.
2. Amount of the oxygen that would be consumed if all the organic matter in one liter of water were reduced by bacteria.
3. Amount of the oxygen that would be released if all the organic matter in one liter of water were oxidised by bacteria.
4. Amount of the oxygen that would be consumed if all the organic matter in one liter of water were oxidised by bacteria.

Options 1. 1

2. 2

3. 3

4. 4

Q.42 Microbes in human welfare

Microbes are a very important component of life on earth. we use microbes and microbially derived products almost every day, like LAB to make curd, yeast to make bread, adding flavor and texture to cheese, producing antibiotics etc. The addition of LAB, improves the milk quality by increasing vit. B12. Cheese is one of the oldest food items in which microbes are used. For example, large holes in Swiss cheese are due to CO_2 produced by the bacterium *Propionibacterium sharmanii*. The BOD test measures the rate of uptake of oxygen by microorganisms in a sample of water and thus, indirectly, BOD is a measure of the organic matter present in the water. The greater the BOD of waste water, the more is its polluting potential. In anaerobic sludge digesters, bacteria produce a mixture of gases like methane, hydrogen sulphide and carbon dioxide. These gases form biogas and can be used as a source of energy. Biofertilisers are organisms that enrich the nutrient quality of the soil. The main sources of biofertilisers are bacteria, fungi and cyanobacteria. You have studied about the nodules on the roots of leguminous plants formed by the symbiotic association of *Rhizobium*. These bacteria fix atmospheric nitrogen into organic forms, which is used by the plant as a nutrient. Other bacteria can fix atmospheric nitrogen while free-living in the soil (examples *Azospirillum* and *Azotobacter*).

In anaerobic sludge digesters, the biogas produced by the bacteria, is composed of -

1. CH_4, H_2 and CO_2
2. CH_4, H_2S and H_2
3. CH_4, H_2S and CO_2
4. CH_4, H_2 and CO_2

Options 1. 1

2. 2

3. 3

4. 4

Q.43 Microbes in human welfare

Microbes are a very important component of life on earth. we use microbes and microbially derived products almost every day, like LAB to make curd, yeast to make bread, adding flavor and texture to cheese, producing antibiotics etc. The addition of LAB, improves the milk quality by increasing vit. B12. Cheese is one of the oldest food items in which microbes are used. For example, large holes in Swiss cheese are due to CO_2 produced by the bacterium

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of biofertilisers are bacteria, fungi and cyanobacteria. You have studied about the nodules on the roots of leguminous
plants formed by the symbiotic association of *Rhizobium*. These bacteria fix atmospheric nitrogen into organic forms, which is
used by the plant as a nutrient. Other bacteria can fix atmospheric nitrogen while free-living in the soil (examples *Azospirillum*
and *Azotobacter*).

Which statement is true about LAB ?

1. Inoculum containing LAB produces bases which coagulate and convert milk into curd.
2. Addition of LAB in milk improves the nutritional quality by increasing vitamin B12.
3. Addition of LAB in milk improves the nutritional quality by increasing vitamin D.
4. LAB cause diseases and are very harmful to human.

Options 1. 1

2. 2

3. 3

4. 4

Q.44 **Microbes in human welfare**

Microbes are a very important component of life on earth. we use microbes and microbially derived products almost every day,
like LAB to make curd, yeast to make bread, adding flavor and texture to cheese, producing antibiotics etc. The addition of LAB,
improves the milk quality by increasing vit. B12. Cheese is one of the oldest food items in which microbes are used. For example,
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plants formed by the symbiotic association of *Rhizobium*. These bacteria fix atmospheric nitrogen into organic forms, which is
used by the plant as a nutrient. Other bacteria can fix atmospheric nitrogen while free-living in the soil (examples *Azospirillum*
and *Azotobacter*).

Identify, the free living bacteria in soil, which can fix the atmospheric nitrogen.

1. *Rhizobium*
2. *Glomus*
3. *Azospirillum*
4. *Anabaena*

Options 1. 1

2. 2

3. 3

4. 4

Q.45 **Microbes in human welfare**

Microbes are a very important component of life on earth. we use microbes and microbially derived products almost every day,

like LAB to make curd, yeast to make bread, adding flavor and texture to cheese, producing antibiotics etc. The addition of LAB, improves the milk quality by increasing vit. B12. Cheese is one of the oldest food items in which microbes are used. For example, large holes in Swiss cheese are due to CO2 produced by the bacterium *Propionibacterium sharmanii*. The BOD test measures the rate of uptake of oxygen by microorganisms in a sample of water and thus, indirectly, BOD is a measure of the organic matter present in the water. The greater the BOD of waste water, the more is its polluting potential. In anaerobic sludge digesters, bacteria produce a mixture of gases like methane, hydrogen sulphide and carbon dioxide. These gases form biogas and can be used as a source of energy. Biofertilisers are organisms that enrich the nutrient quality of the soil. The main sources of biofertilisers are bacteria, fungi and cyanobacteria. You have studied about the nodules on the roots of leguminous plants formed by the symbiotic association of *Rhizobium*. These bacteria fix atmospheric nitrogen into organic forms, which is used by the plant as a nutrient. Other bacteria can fix atmospheric nitrogen while free-living in the soil (examples *Azospirillum* and *Azotobacter*).

The large holes in Swiss cheese are generated by -

1. *Propionibacterium shamanii*
2. *Propioibacterium sharmanii*
3. *Propionibacterium sharmanii*
4. *Propioibacterium shamanii*

Options 1. 1

2. 2

3. 3

4. 4

Q.46 There are two kinds of nucleases - exonucleases and endonucleases. Exonucleases remove nucleotides from the ends of the DNA whereas, endonucleases make cuts at specific positions within the DNA. 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. Since DNA fragments are negatively charged molecules they can be separated by forcing them to move towards the anode under an electric field through a medium/matrix. Small volume cultures cannot yield appreciable quantities of products. To produce in large quantities, the development of bioreactors, where large volumes (100-1000 litres) of culture can be processed, was required. Thus, bioreactors can be thought of as vessels in which raw materials are biologically converted into specific products, individual enzymes, etc., using microbial plant, animal or human cells. PCR stands for Polymerase Chain Reaction. In this reaction, multiple copies of the gene (or DNA) of interest are synthesised in *vitro* using two sets of primers (small chemically synthesised oligonucleotides that are complementary to the regions of DNA) and the enzyme DNA polymerase.

Bioreacters are generally used to process large volumes of culture to obtain yield of desire protein. Identify the correct volume of given culture processed by a bio-reactor?

1. 5-100000 litres
2. 10-1000 litres
3. 1000-100000 litres
4. 100-1000 litres

Options 1. 1

2. 2

3. 3

4. 4

Q.47 There are two kinds of nucleases - exonucleases and endonucleases. Exonucleases remove nucleotides from the ends of the DNA whereas, endonucleases make cuts at specific positions within the DNA. 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. Since DNA

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Which one of the following enzymes remove nucleotides from the ends of the DNA?

1. Endonucleases
2. Exonucleases
3. Restriction enzymes
4. *Hind* II

Options 1. 1

2. 2

3. 3

4. 4

Q.48 There are two kinds of nucleases - exonucleases and endonucleases. Exonucleases remove nucleotides from the ends of the DNA whereas, endonucleases make cuts at specific positions within the DNA. 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. Since DNA fragments are negatively charged molecules they can be separated by forcing them to move towards the anode under an electric field through a medium/matrix. Small volume cultures cannot yield appreciable quantities of products. To produce in large quantities, the development of bioreactors, where large volumes (100-1000 litres) of culture can be processed, was required. Thus, bioreactors can be thought of as vessels in which raw materials are biologically converted into specific products, individual enzymes, etc., using microbial plant, animal or human cells. PCR stands for Polymerase Chain Reaction. In this reaction, multiple copies of the gene (or DNA) of interest are synthesised in *vitro* using two sets of primers (small chemically synthesised oligonucleotides that are complementary to the regions of DNA) and the enzyme DNA polymerase.

Identify the correct enzyme to release the DNA from the fungal cells.?

1. Cellulase
2. Lysozyme
3. Chitinase
4. Lipase

Options 1. 1

2. 2

3. 3

4. 4

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individual enzymes, etc., using microbial plant, animal or human cells. PCR stands for Polymerase Chain Reaction. In this reaction, multiple copies of the gene (or DNA) of interest are synthesised in *vitro* using two sets of primers (small chemically synthesised oligonucleotides that are complementary to the regions of DNA) and the enzyme DNA polymerase.

Identify the incorrect fact about the PCR?

1. Primers are small chemically synthesised oligonucleotides that are complementary to the regions of DNA.
2. In PCR, multiple copies of the gene (or DNA) of interest is synthesised in vitro using two sets of primers.
3. If the process of replication of DNA is repeated many times, the segment of DNA can be amplified to approximately billion times, i.e., 1 billion copies are made.
4. The repeated amplification in PCR is achieved by the use of a thermostable DNA polymerase, isolated from a bacterium, *Thermus quatica*.

Options 1. 1

2. 2

3. 3

4. 4

Q.50 There are two kinds of nucleases - exonucleases and endonucleases. Exonucleases remove nucleotides from the ends of the DNA whereas, endonucleases make cuts at specific positions within the DNA. 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. Since DNA fragments are negatively charged molecules they can be separated by forcing them to move towards the anode under an electric field through a medium/matrix. Small volume cultures cannot yield appreciable quantities of products. To produce in large quantities, the development of bioreactors, where large volumes (100-1000 litres) of culture can be processed, was required. Thus, bioreactors can be thought of as vessels in which raw materials are biologically converted into specific products, individual enzymes, etc., using microbial plant, animal or human cells. PCR stands for Polymerase Chain Reaction. In this reaction, multiple copies of the gene (or DNA) of interest are synthesised in *vitro* using two sets of primers (small chemically synthesised oligonucleotides that are complementary to the regions of DNA) and the enzyme DNA polymerase.

Which one of the following statements is correct about DNA separation and isolation?

1. DNA fragments are positively charged and move towards cathode under the electic field.
2. DNA fragments are negatively charged and move towards anode under the centrifugal field.
3. DNA fragments are negatively charged and move towards anode under the electic field.
4. DNA fragments are negatively charged and move towards cathode under the centrifugal field.

Options 1. 1

2. 2

3. 3

4. 4