IBPS SO AGRICULTURAL FIELD OFFICER (SCALE I)
MAINS YEAR: 2012

Q1. Glycolysis is known as?
(a) EMP pathway
(b) Photorespiration
(c) Gluconeogenesis
(d) Hexose monophosphate
(e) None of the above

Q2. Which of the following is known as "Cell Organiser"?
(a) Ribosome
(b) Nucleolus
(c) Centriole
(d) Nucleus
(e) None of these

Q3. Rice seed is known as?
(a) Pod
(b) Berry
(c) Drupe
(d) Caryopsis
(e) None of the above

Q4. Paddy inflorescence is?
(a) Ear
(b) Silk
(c) Arrow
(d) Panicle
(e) None of these

Q5. Fruit ripening hormone?
(a) Cytokinin
(b) Gibberellin
(c) Ethylene
(d) Abscisic acid
(e) None of the above

Q6. Hardness in Woody's tissue due to?
(a) Lignin
(b) Suberin
(c) Silica
(d) Cellulose
(e) None of the above

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Q7. International Rice Research Institute is located in?
(a) Cuttack
(b) Geneva
(c) Hyderabad
(d) Los Banos
(e) Manila

Q8. The "powerhouse" of the cell?
(a) Lysosome
(b) Ribosome
(c) Nucleus
(d) Mitochondria
(e) None of these

Q9. Chipko movement is associated with whom?
(a) Indira Gandhi
(b) Jawaharlal Nehru
(c) H.N. Bahuguna (d) S.L. Bahuguna
(e) None of these

Q10. The National Bureau of Fish Genetic Resources is located in?
(a) Chennai
(b) New Delhi
(c) Lucknow
(d) Bangalore
(e) Kolkata

Q11. Which sanctuary have the maximum number of rare animals?
(a) Dudhwa national parks
(b) Kaziranga national park
(c) Manas National Park
(d) Corbett national park
(e) None of these

Q12. Which crop is grown for grain green manure and fodder?
(a) Red gram
(b) Cowpea
(c) Lentil
(d) Chickpea
(e) None of these

Q13. Cereal is deficient in lysine and rich in?
Methionine Leucine
Isoleucine

All of the above

Q14. Which of the following factor effects the highest in annual losses of Agricultural produce in India?
(a) Weeds< disease< insect
(b) Disease
(c) Weeds> insect> disease
(d) Insect
(e) None of these

Q15. Red Data Book is famous for?
(a) Important wildlife
(b) Extinct animals
(c) Endangered animals and plants
(d) Endangered animals
(e) None of these

Q16. The rate of photosynthesis is higher in which light?
(a) Red
(b) Blue
(c) White
(d) Green
(e) Ultraviolet

Q17. Botanical name of pearl millet is?
(a) Zea mays
(b) Avena sativa
(c) Eleusine coracana
(d) Pennisetum glaucum
(e) None of these

Q18. The largest herbarium located in which state of India?
(a) Pune
(b) Dehradun
(c) New Delhi
(d) Kolkata
(e) None of these

Q19. International Convention on Biological Diversity was ratified in which year?
(a) 1992
(b) 1990
(c) 1999
(d) 1985
(e) 2005

Q20. Machines used for de-husking of pulse is?
Rubber roll dehusker

Centrifugal dehusker
Emery Roll Dehusker
Under-runner disc sheller

Q21. Reptiles and Birds excreted nitrogen in the form of?
(a) Urea
(b) Lipids
(c) Ammonia
(d) Uric acid
(e) None of these

Q22. "Red orange" colour of saffron is due to?
(a) Lysine
(b) Crocin
(c) Chlorophyll
(d) Polyphenols
(e) Xanthophyll

Q23. Insects extract in the form of uric acid because most of them are? (a) Aquatic
(b) Terrestrial
(c) Either (a) or (b)
(d) Both (a) and (b)
(e) None of the above

Q24. The term microbiology is given by?
(a) Julius Richard Petri
(b) Louis Pasteur
(c) Robert Koch
(d) Anton Von Leeuwenhoek
(e) None of these

Q25. A sclerotium refers to a modified mycelium which is?
(a) A conidial type
(b) A food-storing organ
(c) Hard resting body
(d) An underground structure
(e) None of these

Q26. Which is considered a biological Paradise in India?
(a) Nanda Devi
(b) Sundarbans
(c) Gulf of Mannar
(d) Nilgiri Bioreserve
(e) None of these

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Q27. The phenomenon wherein a single gene has more than one phenotypic effect is known as?

Hypostasis
Pleiotropism
Epistasis
Duplicate genes

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Q28. DNA and RNA are similar to each other because both?
(a) Have similar sugars
(b) Are double stranded
(c) Have similar pyrimidines
(d) Are nucleotide polymers
(e) None of these

Q29. When disease attacks many in a community simultaneously?
(a) Epidemic
(b) A bacteremia
(c) A secondary infection
(d) A nosocomial infection
(e) None of these

Q30. Beaten rice is also known as?
(a) Puffed rice
(b) Flaked rice
(c) Mutant rice
(d) Polished rice
(e) None of these

Q31. Which synthetic polypeptides will form a triple helix?
(a) (Phe-Gly-Gly) n
(b) (Gly-Pro-Gly) n
(c) (Pro-Gly-Gly) n
(d) (Pro-Gly) n
(e) None of these

Q32. A simple technique has been developed in India by the use of which Biofertilizer?
(a) Azotobacter and Nostoc
(b) Azotobacter and Rhizobium
(c) Azolla and Rhizobium
(d) Azolla and Azotobacter
(e) None of these

Q33. Which is a rich source of protein? (according to option)
(a) Spirulina
(b) Spirogyra
(c) Scytnema
(d) Stigma
(e) None of these

Q34. The anti-codon region is present in?
(a) rRNA
(b) s-RNA

(c) mRNA
(d) tRNA
(e) None of these

Q35. Which is the correct food chain?
(a) Algae-insects-frog-snake-peacock
(b) Algae-insects-frog-peacock-snake
(c) Algae-frog-insects-snake-peacock
(d) Algae-frog-insects-peacock-snake
(e) None of these

Q36. Pea seeds will germinate best if found in a jar containing? (a) CO2
(b) N2
(c) H2
(d) O2(oxygen)
(e) None of these

Q37. Measurement of the rate of oxygen consumption in the unit volume of water over a period of time is carried out to determine?
(a) Biosynthetic pathway
(b) Biological oxygen demand
(c) Biogas generation
(d) Fermentation
(e) None of these

Q38. Obligate anaerobic Bactria grow?
(a) Grow without oxygen and produce high energy
(b) Have a fermentative metabolism and respiratory chain
(c) Grow with or without oxygen and produce medium energy
(d) Without oxygen and produce Low energy
(e) None of these

Q39. The size of the tractor tire may be represented up?
(a) Section radius x rim width
(b) Section thickness x Rim diameter
(c) Section height x rim width
(d) Section height x rim diameter
(e) None of these

Q40. Which is a matching set of classifications?
(a) Sea urchin, lobster, leech, locust
(b) Stanish, jellyfish, cuttlefish, octopus
(c) Nerves, planaria, roundworms, earthworms
(d) Millipedes, Crabs, Centipedes, and Cockroach
(e) None of these

Q41. Which techniques are used in assaying monoclonal antibodies?
(a) PAGE
(b) Flow cytometry
(c) HPLC
(d) Scintillation counter
(e) None
Q42. Tumor-causing viruses are known as?
(a) Variola viruses
(b) Para viruses
(c) Tungro viruses
(d) Oncogenic viruses
(e) None of these

Q43. Sudden mass death of fish from oxygen depletion is more likely in? (a) Eutrophic lakes
(b) Mesotrophic lakes
(c) Oligotrophic lakes
(d) Oxalotrophic lakes
(e) None of these

Q44. The biosphere is made up of organism lithosphere atmosphere and? (a) Atmosphere
(b) Organism
(c) Lithosphere
(d) Hydrosphere
(e) All of these

Q45. World Health Organization (WHO) announced the eradication of smallpox as a disease in which year?
(a) 1981
(b) 1977
(c) 1980
(d) 1979
(e) None of these

Q46. The bottom layer of deep freshwater habitat is?
(a) Metalimnion
(b) Thermocline
(c) Epilimnion
(d) Hypolimnion
(e) None of these

Q47. Spice bag is usually used for processing?
(a) Pickle
(b) Sauce

(c) Nectar
(d) Jam
(e) Jelly

Q48. The forces that can change the frequency of an allele in a population are?
(a) Gene interaction, gene transfer, gene mutation, and outbreeding
(b) Dominance, family selection, fitness, and diversification
(c) Random genetic drift, In-breeding, Migration, Mutagenesis, and selection
(d) Forward mutation, Gene conversion, Neutral evolution, and recombination (e) None of these

Q49. Roasting coffee beans improve the content of?
(a) Niacin
(b) Thiamine
(c) Chlorine
(d) All of the above
(e) None of these

Q50. The Shape of the growth curve is?
(a) Zig-zag
(b) Linear
(c) Inverted bell
(d) Sigmoid
(e) None of these

Solutions

S1. Ans.(a)
Sol. Glycolysis is often referred to as the "EMP pathway," which stands for the Embden-Meyerhof-Parnas pathway. It is one of the fundamental metabolic pathways in living organisms, involved in the breakdown of glucose to produce energy in the form of adenosine triphosphate (ATP) and other intermediates.
EMP Pathway (Embden-Meyerhof-Parnas Pathway):
→ The EMP pathway is the most common and well-known glycolytic pathway in which glucose is converted into pyruvate.
→ It occurs in the cytoplasm of cells and consists of a series of enzymatic reactions.
→ During glycolysis, one molecule of glucose (a 6-carbon sugar) is broken down into two molecules of pyruvate (3-carbon compounds).
→ Along the way, ATP and reduced cofactors (such as NADH) are generated.

S2. Ans.(b)
Sol. The nucleolus is often referred to as the "cell organizer" or "ribosome factory" due to its critical role in the organization and assembly of ribosomes, which are essential cellular structures involved in protein synthesis.

S3. Ans.(d)
Sol. A rice seed is known as a caryopsis, also referred to as a "grain." Caryopsis is a type of dry, one-seeded fruit, commonly found in cereal crops like rice, wheat, maize, and barley.
A caryopsis is a specific type of fruit that belongs to the grass family (Poaceae). It is unique in its structure. In a caryopsis, the seed is tightly fused with the fruit's wall, making it inseparable without damaging the seed. This characteristic is distinctive to caryopses and sets them apart from other types of fruits.

S4. Ans.(d)
Sol. Paddy, also known as rice (Oryza sativa), produces inflorescences that are called "panicles." A panicle is a type of branching flower cluster where smaller stalks (pedicels) bear flowers. In the case of paddy or rice plants, the panicle consists of multiple branches or secondary panicles that hold the rice spikelets, which are the actual grain-producing structures.

S5. Ans.(c)
Sol. Ethylene is known as the "fruit ripening hormone" because it plays a crucial role in regulating the ripening process of many fruits.

S6. Ans.(a)
Sol. Hardness in woody tissues is primarily due to the presence of lignin. Lignin is a complex, amorphous, and rigid polymer found in the cell walls of many plant tissues, particularly in woody plants. It plays a significant role in providing structural support and rigidity to these tissues.

S7. Ans.(e)
Sol. IRRI, which stands for the International Rice Research Institute, is a renowned agricultural research center focused on rice. It is located in Los Ban os, which is near Manila, the capital of the Philippines. The institute was established to address global food security challenges by researching and developing sustainable rice cultivation and production practices.

S8. Ans.(d)
Sol. Mitochondria are often referred to as the "powerhouse" of the cell because they play a central role in energy production. They are double-membraned organelles found in the cytoplasm of eukaryotic cells and are essential for generating adenosine triphosphate (ATP), the primary source of energy for cellular processes.

S9. Ans.(d)
Sol. The Chipko movement was a forest conservation movement in India that originated in the village of Mandal, in the state of Uttarakhand (formerly part of the state of Uttar Pradesh). The movement, which began in the early 1970s, was primarily led by Sunderlal Bahuguna, who played a prominent role in advocating for the preservation of forests.

S10. Ans.(c)
Sol. The National Bureau of Fish Genetic Resources (NBFGR) is a premier research institute and organization in India focused on the conservation and management of fish genetic resources. Its primary

objective is to support and promote sustainable fisheries and aquaculture practices by preserving and utilizing the genetic diversity of various fish species.
NBFGR is headquartered in Lucknow.

S11. Ans.(c)
Sol. Manas National Park, located in the state of Assam, India, is known for having the maximum number of rare and endangered animals among the options listed. Manas National Park has been recognized as a UNESCO World Heritage Site and a Tiger Reserve due to its rich biodiversity and conservation efforts.
Here are some of the reasons why Manas National Park is known for its rare and endangered animals:

- Bengal Tigers: Manas is a critical habitat for Bengal tigers, which are endangered. The park has a significant population of these majestic big cats.
- Indian Rhinoceros: Manas is home to a population of the Indian one-horned rhinoceros, another endangered species. This rhinoceros species is primarily found in the northeastern region of India.
- Pygmy Hog: Manas National Park is one of the last remaining strongholds for the pygmy hog, one of the world's rarest and smallest wild pig species.
- Golden Langur: The park is also known for its population of the golden langur, a highly endangered and colorful primate species.
- Hispid Hare: Manas is one of the few places where the critically endangered hispid hare can be found. This small herbivorous mammal is very rare.
- Assam Roofed Turtle: This endangered turtle species is found in Manas National Park and the adjoining regions.
- Other Endangered and Rare Species: The park is also home to a variety of other endangered and rare species, including clouded leopards, Asian elephants, wild water buffaloes, and many species of birds.

S12. Ans.(b)
Sol. Cowpea (Vigna unguiculata), also known as black-eyed pea, is a versatile crop grown for various purposes, making it suitable for grain, green manure, and fodder production.

S13. Ans.(a)
Sol. Cereals, such as wheat, rice, and maize, are known to be deficient in the essential amino acid lysine and are often described as having a "limiting" amino acid profile. They are relatively rich in some other amino acids, particularly methionine.

S14. Ans.(c)
Sol. The order of impact on annual losses of agricultural produce in India, from highest to lowest, is weeds > insects > disease. In the absence of crop protection, yield losses of up to 70% can occur across many major food crops, with weeds accounting for the highest losses at 30%, followed by animal pests and pathogens at 23% and 17%, respectively

S15. Ans.(c)
Sol. The "Red Data Book" is famous for documenting and listing endangered animals and plants. It serves as a comprehensive record of species that are facing the risk of extinction or are vulnerable due to various factors such as habitat loss, overexploitation, climate change, pollution, and other threats.

S16. Ans.(a)
Sol. Photosynthesis is the process by which green plants, algae, and some bacteria convert light energy into chemical energy in the form of glucose. It takes place in specialized cell organelles called chloroplasts, which contain pigments like chlorophyll. Chlorophyll plays a crucial role in capturing light energy and initiating the photosynthesis process. Red light is absorbed maximum by chlorophyll. So, the rate of photosynthesis is higher in the red light of the visible spectrum.

S17. Ans.(d)
Sol. Pearl millet, scientifically known as Pennisetum glaucum, is a type of cereal grain. It is one of the major millet crops and is widely grown in arid and semiarid regions.

S18. Ans.(d)
Sol. The largest herbarium in India is located in Indian Botanical Garden, Sibpur, Howrah.
A herbarium is a collection of dried (preserved) plant specimens and associated data used for scientific study.

S19. Ans.(a)
Sol. The Convention on Biological Diversity (CBD) was negotiated and signed by nations at the Earth Summit at Rio de Janeiro in Brazil on June 5, 1992. The convention came into force on December 29, 1993.

S20. Ans.(c)
Sol. Typically carborundum/emery coated rollers are used for dehusking of different pulses.
Cylindrical or taper rollers are used for the purpose. The foundation of taper rolls is kept horizontal whereas cylindrical rolls are mounted with inclination to the horizontal. This system facilitates ease of grain movement inside the drum. Normally, a slope of 15 cm for entire length of machine is recommended. Body of the roller is made of wood or steel on which mixture of carborundum/emery, chemical cement and salts are applied in layer of uniform thickness. The granule size of emery varies for crop to crop and type of operation to be performed on the grain.

S21. Ans.(d)
Sol. Nitrogenous wastes in the body tend to form toxic ammonia, which must be excreted. Mammals such as humans excrete urea, while birds, reptiles, and some terrestrial invertebrates produce uric acid as waste.

S22. Ans.(b)
Sol. Crocin is a water-soluble carotenoid compound found in saffron (Crocus sativus) and is responsible for the characteristic red-orange color of saffron threads. Crocin is one of the major chemical constituents of saffron, contributing to both its color and some of its medicinal properties.

S23. Ans.(b)
Sol. Insects typically excrete waste in the form of uric acid, and this adaptation is primarily associated with their terrestrial (land-dwelling) lifestyle.

S24. Ans.(b)
Sol. Louis Pasteur, the renowned French chemist and microbiologist, is credited with coining the term "microbiology." He made significant contributions to the field of microbiology, particularly in the study of microorganisms and their roles in various processes, such as fermentation, disease, and pasteurization.

S25. Ans.(c)
Sol. A sclerotium is a compact mass of hardened fungal mycelium containing food reserves. One role of sclerotia is to survive environmental extremes.

S26. Ans.(c)
Sol. Gulf of Mannar is considered a biological paradise in India due to its exceptional biodiversity and ecological significance.
The Gulf of Mannar (GoM), located between India and Sri Lanka, has astonishing faunal richness and diversity.

S27. Ans.(b)
Sol. Pleiotropism is a genetic phenomenon in which a single gene can have multiple phenotypic effects or influence several seemingly unrelated traits or characteristics. When a gene exhibits pleiotropy, it means that alterations or mutations in that gene can lead to a range of effects on different aspects of an organism's phenotype.

S28. Ans.(d)
Sol. DNA (deoxyribonucleic acid) and RNA (ribonucleic acid) are similar to each other because both are nucleotide polymers. Nucleotides are the building blocks of these two types of nucleic acids.

S29. Ans.(a)
Sol. When a disease attacks many individuals in a community or population simultaneously, it is termed an "epidemic." An epidemic refers to the occurrence of a specific disease in a significantly larger number of cases than is typically expected in a particular area or community over a defined period.

S30. Ans.(b)
Sol. Beaten rice, also known as "poha" in some regions, is a flattened or flaked form of rice. It is a popular ingredient used in various cuisines, especially in South Asia.

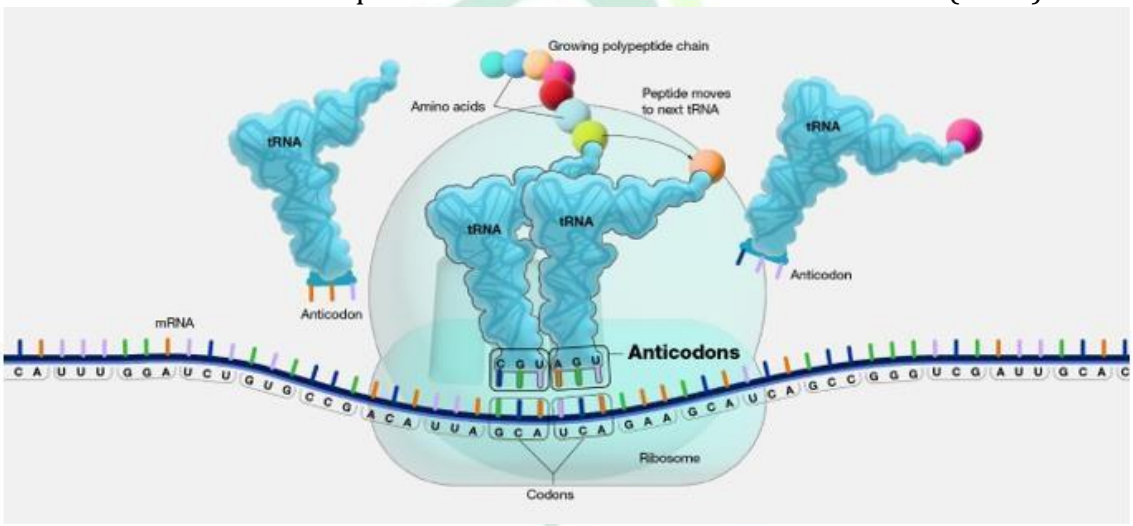
S31. Ans.(c)
Sol. The correct answer is (c) (Pro-Gly-Gly) n.
Triple helix formation in synthetic polypeptides is typically associated with the structure of collagen, a fibrous protein found in connective tissues. Collagen has a unique triple helical structure composed of three polypeptide chains, each of which is rich in glycine (Gly), proline (Pro), and hydroxyproline (Hyp) residues.

S32. Ans.(b)
Sol. The correct option is (b) Azotobacter and Rhizobium.
Azotobacter: Azotobacter is a nitrogen-fixing bacteria that converts atmospheric nitrogen into a form that plants can use. It is used as a biofertilizer to enhance the nitrogen content of the soil naturally.

Rhizobium: Rhizobium is another group of nitrogen-fixing bacteria that form a symbiotic relationship with leguminous plants. These bacteria live in the root nodules of leguminous plants and convert atmospheric nitrogen into a form that the plants can use for their growth. This process is known as nitrogen fixation and significantly enhances the fertility of the soil.
In India, the use of Azotobacter and Rhizobium as biofertilizers has been widely adopted in agricultural practices. These microorganisms play a vital role in enriching the soil with nitrogen, reducing the dependence on chemical fertilizers, and promoting sustainable agriculture.

S33. Ans.(a)
Sol. Spirulina (Option a) is a rich source of protein. It is a blue-green algae that contains all the essential amino acids, making it a complete protein. As a dietary supplement, spirulina is highly regarded for its high protein content, making it a valuable protein source for various dietary preferences, including vegetarian and vegan diets.

S34. Ans.(d)
Sol. An anticodon is a trinucleotide sequence located at one end of a transfer RNA (tRNA) molecule.



S35. Ans.(a)
Sol. The correct food chain represents the flow of energy and nutrients through different organisms in an ecosystem. **In this case, the correct option is (a) Algae-insects-frog-snake-peacock.**
Here's the explanation of the correct food chain in standard form:

→ **Algae:** Algae are primary producers that undergo photosynthesis to produce food using sunlight, water, and carbon dioxide.

→ **Insects:** Insects are herbivores that feed on algae. They are primary consumers that consume the energy stored in algae.

→ **Frog:** Frogs are carnivores that prey on insects. They are secondary consumers because they obtain energy by consuming primary consumers (insects).

→ **Snake:** Snakes are also carnivores that feed on frogs. They are tertiary consumers, obtaining energy by consuming secondary consumers (frogs).

→ **Peacock:** Peacocks are carnivores that may prey on snakes. They represent the quaternary consumers in this food chain, deriving energy from consuming tertiary consumers (snakes).

This sequence represents the flow of energy and nutrients from the bottom of the food chain (algae) to the top (peacock) and is consistent with the standard structure of a food chain in an ecosystem.

S36. Ans.(d)
Sol. Pea seeds, like most seeds, require oxygen (O2) for germination. During germination, seeds take in oxygen and release carbon dioxide (CO2) as they undergo aerobic respiration, converting stored energy into a form that the emerging plant can use. This process requires oxygen, and if seeds are deprived of oxygen, they may not germinate or germinate poorly.

S37. Ans.(b)
Sol. Biological Oxygen Demand (BOD) in simple terms is the amount of oxygen that would be used by the decomposing bacteria to decompose or break down the organic compounds in the water body. The increase in the BOD reflects that the concentration of the organic mass is tremendous and so a large amount of oxygen would be claimed by the bacteria. This results in the deficiency of the dissolved oxygen in the water and adversely affects the aquatic life due to hypoxia. So, the BOD can be defined as the measurement of the rate of oxygen utilization by a unit volume of water over a period of time.

S38. Ans.(d)
Sol. Obligate anaerobes. In this group, growth only occurs in the absence of oxygen. Typically, the metabolic processes in these organisms have components that are extremely sensitive to oxidation or inactivation by molecular oxygen.

S39. Ans.(b)
Sol. The correct option for representing the size of a tractor tire in standard form is (b) **Section thickness x Rim diameter.**

S40. Ans.(d)
Sol. The correct option is (d) Millipedes, Crabs, Centipedes, and Cockroach.
All the organisms listed in option (d) belong to the phylum Arthropoda, which is a diverse group of invertebrates characterized by having jointed legs and a hard exoskeleton. The four organisms listed in this option, millipedes, crabs, centipedes, and cockroaches, are all members of the Arthropoda phylum.
Millipedes are elongated arthropods with many legs, known for their numerous body segments.
Crabs are crustaceans with a hard exoskeleton, jointed legs, and a broad carapace. They are primarily aquatic.
Centipedes are elongated arthropods with many legs, belonging to the class Chilopoda. They are known for their venomous claws.
Cockroaches are insects that are also part of the Arthropoda phylum, known for their flat bodies and rapid movement.

S41. Ans.(b)
Sol. Monoclonal antibodies can be used to detect the presence of antigens. They can also be used in different techniques which include ELISA, western blot, immunoblot blot, **flow cytometry,** immunohistochemistry, radioimmunology assay, electron microscopy, fluorescence microscopy and confocal microscopy.

S42. Ans.(d)

Sol. The correct option is (d) Oncogenic viruses. Oncogenic viruses are viruses that have the ability to cause cancer or promote the development of tumors. These viruses can integrate their genetic material into the host cell's DNA, leading to uncontrolled cell division and the formation of tumors.

Tungro virus affects rice plants, the symptoms are as follows:

→ Plants affected by tungro exhibit stunting and reduced tillering. Their leaves become yellow or orangeyellow, may also have rust-colored spots.

→ Discoloration begins from leaf tip and extends down to the blade or the lower leaf portion

→ Delayed flowering, - panicles small and not completely exerted

→ Most panicles sterile or partially filled grains

→ Tungro virus disease affects all growth stages of the rice plant specifically the vegetative stage.

S43. Ans.(a)

Sol. When there is an accumulation of the organic mass in the water body, the dissolved oxygen in the water would be rapidly depleted due to the activity of the decomposing bacteria. Also, there will be an increase in the growth of the algal mass due to the presence of the organic and inorganic nutrients causing eutrophication. This algal bloom stops the mixing of atmospheric oxygen with the water body. Further the algal bloom also contributes to the build-up of the organic mass. Thus, it becomes hugely hypoxic for the aquatic animals especially fished to breathe in the water. There occurs a mass death and their dead bodies float up in the water body.

Therefore, the correct answer is 'Eutrophic Lake'

S44. Ans.(e)

Sol. Biosphere is a global ecological system consisting of all the living organisms, lithosphere, atmosphere and hydrosphere.

S45. Ans.(c)

Sol. In 1980, WHO declared smallpox officially eradicated: The world and all its people have won freedom from smallpox, which was the most devastating disease sweeping in epidemic form through many countries since earliest times, leaving death, blindness and disfigurement in its wake.

S46. Ans.(d)

Sol. Hypolimnion forms the deepest layer and receives no sunlight and has the lowest temperature.

S47. Ans.(b)

Sol. A spice bag is typically used for processing sauces. This means the correct option is **(b).**

A spice bag is commonly employed in the preparation of sauces. It is used to infuse various spices and herbs into the sauce, enhancing its flavor and aroma. Spice bags are often utilized in cooking to add complex and layered tastes to sauces, stews, soups, and other dishes. The mesh or cloth bag contains a mixture of whole or ground spices and herbs, allowing their flavors to permeate the sauce during cooking, creating a rich and flavorful dish.

S48. Ans.(c)

Sol. Option (c) states that the forces that can change the frequency of an allele in a population are random genetic drift, in-breeding, migration, mutagenesis, and selection.

Random Genetic Drift: This is a random process that can cause the frequencies of alleles in a population to change over time due to chance events. It is especially significant in small populations where chance events can have a big impact.

In-breeding: In-breeding increases the proportion of homozygous individuals in a population. This can lead to increased expression of deleterious recessive alleles and decreased genetic diversity within the population.

Migration: Migration, also known as gene flow, occurs when individuals move from one population to another. This can introduce new alleles into a population or remove alleles from a population, changing allele frequencies.

Mutagenesis: Mutagenesis refers to the process by which new alleles are formed due to mutations. Mutations are random changes in the DNA sequence that can create new genetic variation within a population.

Selection: Natural selection favors certain alleles that provide a reproductive advantage in a given environment. As a result, these advantageous alleles become more common in the population, leading to changes in allele frequencies.

S49. Ans.(a)

Sol. Roasting coffee beans can lead to various chemical changes in the beans, affecting their nutritional content. Specifically, during the roasting process, niacin (also known as vitamin B3) content in coffee beans can be increased. Niacin is an essential B-vitamin that plays a vital role in energy metabolism and overall health.

S50. Ans.(d)

Sol. A logistic function or logistic curve is a common "S" shape (sigmoid curve). S-shaped growth curve (sigmoid growth curve) is a pattern of growth in which, in a new environment, the population density of an organism increases slowly initially, in a positive acceleration phase; then increases rapidly, approaching an exponential growth rate as in the J-shaped curve; but then declines in a negative acceleration phase until at zero growth rate the population stabilizes.

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