CAREERS 360

PRACTICE Series

RBSE Class 12

Biology

Previous Year Questions with Detailed Solution

RBSE Class 12 Biology Question with Solution - 2024

SECTION-A

1. Choose the correct answer from multiple-choice questions.

i) An example of a non-albuminous seed is
A) Wheat
B) Maize
C) Pea
D) Castor

Answer:

The correct answer is C) Pea.

A non-albuminous seed is one in which the endosperm is fully consumed during seed development, and the food reserve is stored in the cotyledons. In peas, the endosperm is completely used up, and hence they are classified as non-albuminous seeds.

ii) Choose the correct sequence of processes in human reproduction:
A) Gametogenesis → Gamete fusion → Zygote → Embryonic development
B) Zygote → Gametogenesis → Gamete fusion → Embryonic development
C) Embryonic development → Gametogenesis → Zygote → Gamete fusion
D) Gamete fusion → Embryonic development → Gametogenesis → Zygote

Answer:

The correct sequence of processes in human reproduction is:

A) Gametogenesis → Gamete fusion → Zygote → Embryonic development

- **Gametogenesis**: Formation of male (sperm) and female (egg) gametes.
- **Gamete fusion (Fertilization)**: The sperm and egg fuse to form a **zygote**.
- **Zygote**: The single cell formed after fertilization.
- **Embryonic development**: The zygote undergoes cell division and differentiation to develop into an embryo.

iii) Which of the following is sterilisation process in females?
A) Oogenesis
B) Tubectomy
C) Spermatogenesis
D) Vasectomy

Answer:

The correct answer is **B) Tubectomy**.

Tubectomy is a sterilization process in females in which the fallopian tubes are surgically cut or blocked to prevent the eggs from reaching the uterus, thereby preventing pregnancy.

- **Oogenesis** is the process of egg formation.
- **Spermatogenesis** refers to sperm formation in males.
- **Vasectomy** is the male sterilization process

iv) The unequivocal proof that DNA is the genetic material, came from the experiments of which scientists.
A) Schleiden and Schwann
B) Mathew Meselson and Franklin Stahl
C) Francois Jacob and Jacque Monod
D) Alfred Hershey and Martha Chase'

Answer:

The correct answer is **D) Alfred Hershey and Martha Chase**.

The **Hershey-Chase experiment** in 1952 provided unequivocal proof that DNA is the genetic material. They used bacteriophages (viruses that infect bacteria) and demonstrated that it was DNA, not protein, that carried genetic information into bacterial cells during viral infection.

v) Which nitrogenous base pairs with guanine nitrogenous base in DNA
A) Adenine
B) Cytosine
C) Thymine
D) Uracil

Answer:

The correct answer is **B) Cytosine**.

In DNA, **guanine (G)** pairs with **cytosine (C)** through three hydrogen bonds. This is one of the base-pairing rules in DNA, where adenine pairs with thymine and guanine pairs with cytosine.

vi) Darwin's finches is an example of

A) Convergent evolution

B) Parallel evolution

C) Adaptive radiation

D) Chemical evolution

Answer:

The correct answer is **C) Adaptive radiation**.

Darwin's finches are a classic example of **adaptive radiation**, where a single ancestral species diversified into multiple species, each adapted to different environmental niches. These finches evolved distinct beak shapes to exploit different food sources on the Galápagos Islands.

vii) Bacterial disease is
A) Diphtheria
B) Malaria
C) Amoebiasis
D) Ascariasis

Answer:

The correct answer is **A) Diphtheria**.

Diphtheria is a bacterial disease caused by *Corynebacterium diphtheriae*.

- **Malaria** is caused by a protozoan parasite (*Plasmodium* species), transmitted by mosquitoes.
- **Amoebiasis** is caused by a protozoan parasite (*Entamoeba histolytica*).
- **Ascariasis** is caused by a parasitic worm (*Ascaris lumbricoides*).

viii) Citric acid is produced by which of the following microorganism.
A) Acetobacter aceti
B) Clostridium butylicum
C) Lactobacillus species
D) Aspergillus niger °

Answer:

The correct answer is **D) Aspergillus niger**.

Aspergillus niger is a fungus commonly used in industrial production of **citric acid** through fermentation. This method is widely utilized for large-scale production of citric acid.

ix) Agarose gel is extracted from
A) Fungus
B) Sea weeds
C) Hydrilla
D) Wheat

Answer:

The correct answer is **B) Sea weeds**.

x) Agarose gel is extracted from **seaweeds**, specifically from certain species of red algae. It is commonly used in molecular biology for gel electrophoresis to separate DNA or RNA molecules.

x) "Golden rice" developed by biotechnology is rich in-
A) Vitamin 'A'
B) Vitamin 'D'
C) Vitamin ' K '
D) Vitamin 'E'

Answer:

The correct answer is **A) Vitamin A**.

Golden rice is genetically modified to be rich in **beta-carotene**, a precursor of **Vitamin A**. It was developed to help combat Vitamin A deficiency, which is a major health issue in many parts of the world.

xi) Correct set of processes which decreases the population density are
A) Natality, Emigration
B) Mortality, Immigration
C) Natality, Immigration
D) Mortality, Emigration

Answer:

The correct answer is **D) Mortality, Emigration**.

Mortality (death rate) and **emigration** (individuals leaving a population) both decrease the population density.

- **Natality** (birth rate) and **immigration** (individuals entering a population) increase population density.

xii) Population interactions, in which both the species get benefited.
A) Parasitism
B) Competition
C) Mutualism.
D) Predation

Answer:

The correct answer is **C) Mutualism**.

In **mutualism**, both species involved in the interaction benefit from the relationship. A classic example is the relationship between bees and flowering plants: bees get nectar, and the plants get pollinated.

- **Parasitism**: One species benefits, and the other is harmed.
- **Competition**: Both species are harmed due to competition for the same resources.
- **Predation**: One species benefits (the predator), while the other is harmed (the prey).

xiii) An example of man-made ecosystem is -
A) Desert
B) Rivers
C) Estuary
D) Aquarium

Answer:

The correct answer is **D) Aquarium**.

An **aquarium** is an example of a man-made ecosystem, where humans artificially create and control the environment to support aquatic life.

- **Deserts**, **rivers**, and **estuaries** are natural ecosystems.

xiv) The natural interconnection of food chain is called.
A) Food web
B) Standing crop
C) Trophic level
D) Productivity

Answer:

The correct answer is **A) Food web**.

A **food web** is the natural interconnection of multiple food chains within an ecosystem, showing how different organisms are interconnected through various feeding relationships. It represents the complex interactions between producers, consumers, and decomposers.

xv) When was the world summit on sustainable development held in Johannesbi South Africa?
https://www.rajasthanboard.com
A) 1990
B) 2002 .
C) 2010
D) 2020

Answer:

The correct answer is **B) 2002**.

The **World Summit on Sustainable Development** was held in **Johannesburg, South Africa, in 2002**. It was a major global conference focused on sustainable development and building on the outcomes of the 1992 Earth Summit held in Rio de Janeiro.

xvi) An example of a hotspot is
A) North Indian Plains
B) South Indian Plains
C) Tundra region
D) Himalayas

Answer:

The correct answer is **D) Himalayas**.

The **Himalayas** are considered a biodiversity hotspot, containing a high number of endemic species and experiencing significant levels of habitat loss. Biodiversity hotspots are regions that are rich in species but are under threat from human activities.

Fill in the blanks:

i) The central cell after triple fusion becomes the .

Answer:

The central cell after triple fusion becomes the **endosperm**.

ii) help in collection of the ovum after ovulation.

Answer:

Fimbriae help in the collection of the ovum after ovulation.

iii) To determine the genotype of a tall plant in F_2, Mendel crossed the tall plant of F_2 with a dwarf plant, this is called a .

Answer:

To determine the genotype of a tall plant in F, Mendel crossed the tall plant of F with a dwarf plant, this is called a **test cross**.

iv) Deletion or insertion of base pairs in DNA cause mutation.

Answer:

Deletion or insertion of base pairs in DNA causes **frameshift** mutation.

v) principle says that allele frequencies in a population are stable anc is constant from generation to generation.

Answer:

Hardy-Weinberg principle says that allele frequencies in a population are stable and constant from generation to generation

vi) is a protozoan parasite which causes amoebiasis.

Answer:

Entamoeba histolytica is a protozoan parasite that causes amoebiasis.

vii) The puffed-up appearance of dough fermented by bacteria is due to th production of gas.

Answer:

The puffed-up appearance of dough fermented by bacteria is due to the production of **carbon dioxide** gas.

viii) The cutting of DNA at specific sites became possible with the discovery o the enzy Page $_6$ d is 10 olecula $\Theta^{\text{scissors.}}$

Answer:

The cutting of DNA at specific sites became possible with the discovery of the **restriction** enzymes, also known as molecular scissors.

3. Give the answers of the following questions in a word or a line.

i) Define apomixis.

Answer:

Apomixis is the asexual production of seeds without fertilization, resulting in offspring genetically identical to the parent plant.

ii) Write type of sex determination in Grasshopper.

Answer:

The type of sex determination in grasshoppers is **XO type**, where males have one X chromosome (XO), and females have two X chromosomes (XX).

iii) Write the type of RNA which brings aminoacids and reads the genetic code.

Answer:

The type of RNA that brings amino acids and reads the genetic code is transfer RNA (tRNA).

iv) Write the name of bond between phosphate group and nucleoside in DNA.

Answer:

The bond between the phosphate group and nucleoside in DNA is called a **phosphoester bond**.

v) What was the approximately brain size of Homo erectus man?

Answer:

The approximate brain size of **Homo erectus** was around **900 to 1100 cubic centimeters (cc)**.

vi) Write analogy.

Answer:

Analogy is a comparison between two different things based on a similarity in some respects, often used to explain or clarify an idea by showing how it is similar to something more familiar. For example, "The human brain is like a computer" is an analogy that compares the brain's functioning to that of a computer to help understand its complexity.

vii) Define active immunity.

Answer:

Active immunity is the immunity that develops when an individual's immune system is exposed to a pathogen or its antigens, prompting the production of antibodies and memory cells. This can occur through natural infection or vaccination and typically provides long-term protection.

viii) Write the name of microorganism used in bread making.

Answer:

The microorganism used in bread making is **Saccharomyces cerevisiae**, commonly known as **yeast**.

SECTION-B

Short answer type questions

4) Describe the structure of megasporangium.

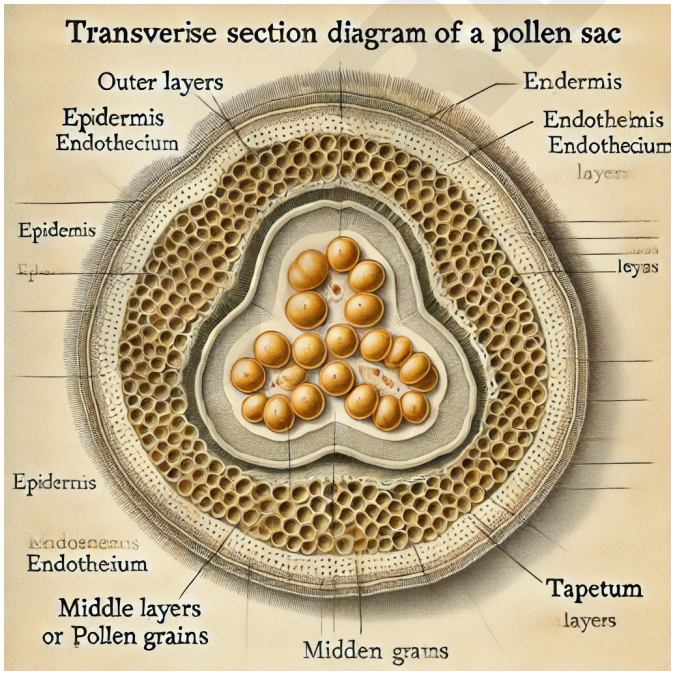
Answer:

The megasporangium, or ovule, consists of a protective outer layer called integument, a central tissue called nucellus, and a single functional megaspore inside. The micropyle is the opening for pollen entry, and the chalaza is its base, connecting to the plant.

5) Draw labelled diagram of transverse section of a pollen sac.

Answer:

Here is a labeled diagram of the transverse section of a pollen sac. Let me know if you'd like any additional details or adjustments.



6) Write any three examples of assisted reproductive technologies.

Answer:

Three examples of assisted reproductive technologies (ART) are:

1. **In Vitro Fertilization (IVF)** – Fertilization occurs outside the body, and the embryo is implanted into the uterus.
2. **Intracytoplasmic Sperm Injection (ICSI)** – A single sperm is directly injected into an egg to assist fertilization.
3. **Gamete Intrafallopian Transfer (GIFT)** – Eggs and sperm are placed into the fallopian tube for fertilization inside the body.

6) Explain reason of sickle-cell anaemia disease.

Answer:

Sickle-cell anemia is caused by a mutation in the gene that codes for the beta-globin chain of hemoglobin. This mutation leads to the substitution of valine for glutamic acid at the sixth position of the beta-globin chain. As a result, the hemoglobin molecules form abnormal structures, causing red blood cells to become rigid and sickle-shaped. These abnormally shaped cells can block blood flow in small vessels, leading to pain, tissue damage, and anemia.

7) Explain reason of sickle-cell anaemia disease.

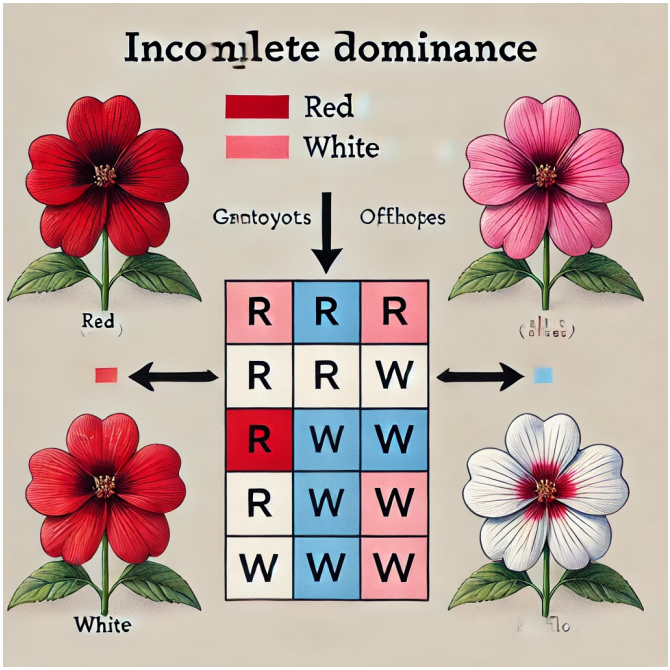
Answer:

Sickle-cell anemia is caused by a genetic mutation in the HBB gene that leads to the production of abnormal hemoglobin known as hemoglobin S (HbS). In this condition, a single nucleotide substitution changes glutamic acid to valine in the hemoglobin beta-chain. This causes red blood cells to adopt a sickle shape under low oxygen conditions, reducing their flexibility and leading to blockages in blood vessels, causing pain, organ damage, and chronic anemia.

8) Draw a Punnett square diagram showing the incomplete dominance.

Answer:

Here is a Punnett square diagram showing incomplete dominance, where the cross between red and white flowers results in pink offspring. Let me know if you need further explanations!



9) Explain role of microorganisms in sewage treatment.

Answer:

Microorganisms play a vital role in sewage treatment by breaking down organic waste and pollutants in wastewater. Their role is divided into two main stages:

1. **Primary Treatment (Aerobic Process)**: In the first stage, aerobic bacteria decompose organic matter by oxidizing it into simpler compounds. This reduces the biological oxygen demand (BOD) of the sewage, helping to clean the water. Aerobic microbes in the presence of oxygen digest organic pollutants and produce carbon dioxide, water, and biomass.

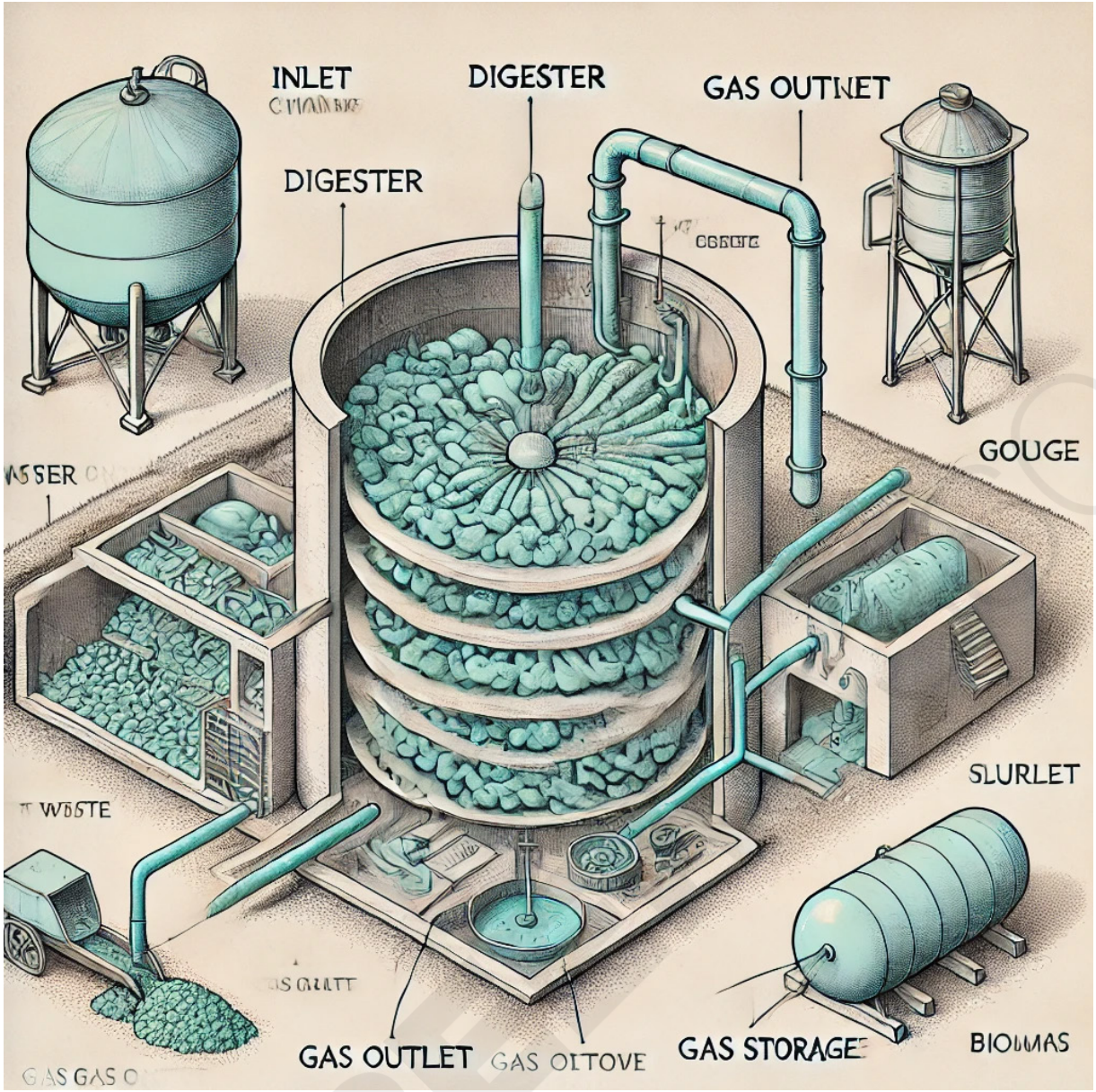
2. **Secondary Treatment (Anaerobic Process)**: In the second stage, anaerobic bacteria digest the remaining organic matter in the absence of oxygen. This process produces biogas (mainly methane and carbon dioxide) which can be used as an energy source, while the remaining sludge is further treated or disposed of.

   Microorganisms are crucial in transforming harmful substances in sewage into non-toxic forms, thus purifying the water and enabling its safe disposal or reuse.

10) Draw a labelled diagram of biogas plant.

Answer:

Here is a labeled diagram of a biogas plant, showing its key components and how it functions. Let me know if you need further details or explanations



11) One method of introducing foreign DNA into host cells is transformatio. In this process, the host cells take up foreign DNA from their surroundings, often with the help of chemical treatments or heat shock to make the cell membrane more permeable, allowing the DNA to enter and integrate into the host genome.

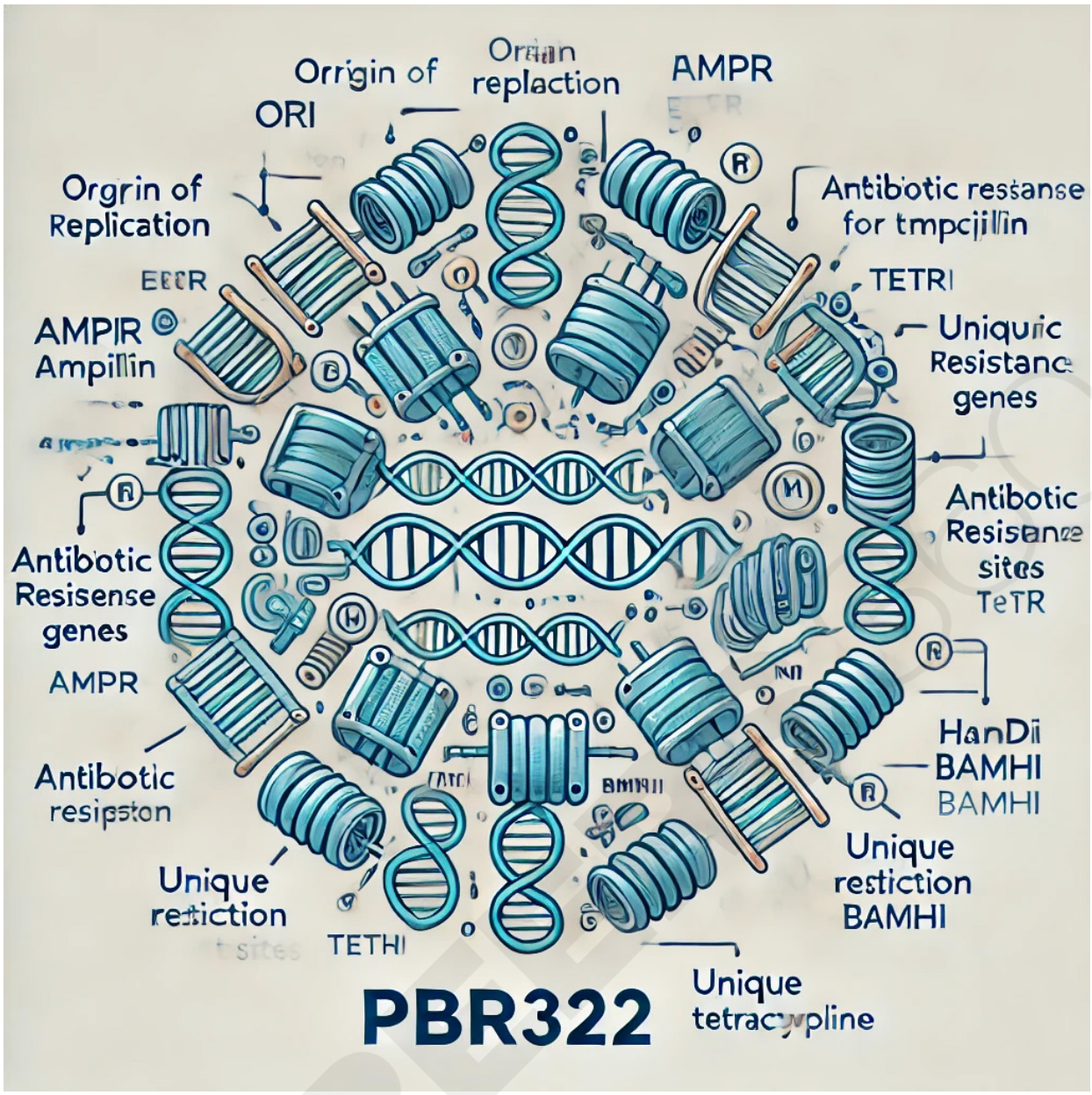
Answer:

One method of introducing foreign DNA into host cells is transformation. In this process, the host cells take up foreign DNA from their surroundings, often with the help of chemical treatments or heat shock to make the cell membrane more permeable, allowing the DNA to enter and integrate into the host genome.

12) Draw a diagram of E. coli cloning vector pBR 322 .

Answer:

Here is a labeled diagram of the E. coli cloning vector pBR322, highlighting its key components. Let me know if you need any further details or explanations



13) Define transgenic animals. Write one benefit for man by transgenic animals.

Answer:

Transgenic animals are those that have had foreign genes deliberately inserted into their genome through genetic engineering. These genes are introduced to give the animal new traits or characteristics.

One benefit for humans is the production of **therapeutic proteins**, such as insulin, in animals, which can be harvested and used for medical treatments.

14) Explain with an example, how molecular diagnostic techniques are helpful in early diagnosis of the diseases.

Answer:

Molecular diagnostic techniques, such as **Polymerase Chain Reaction (PCR)**, are highly useful for the early diagnosis of diseases by detecting specific genetic material of pathogens or abnormal genes. For example, in **HIV detection**, PCR can identify the presence of viral RNA in a patient's blood even before

antibodies are produced, enabling early treatment and management of the disease before symptoms appear, thereby improving patient outcomes.

15) Explain In situ conservation by giving an example.

Answer:

In situ conservation is the process of protecting endangered species in their natural habitat, allowing them to thrive and evolve without human interference. This method preserves not just the species but also the ecosystems they inhabit. An example is **national parks**, such as **Kaziranga National Park** in India, where endangered species like the one-horned rhinoceros are protected in their natural environment.

SECTION-C

16) Explain spermatogenesis.

Answer:

Spermatogenesis is the process of the formation of sperm cells (spermatozoa) in the male testes. It occurs in the seminiferous tubules and involves three main phases:

1. **Multiplication phase**: Diploid spermatogonia (germ cells) undergo mitosis to produce primary spermatocytes.
2. **Meiotic phase**: The primary spermatocytes undergo meiosis I to form two haploid secondary spermatocytes, which then undergo meiosis II to form four haploid spermatids.
3. **Differentiation phase (Spermiogenesis)**: The spermatids mature and differentiate into spermatozoa (sperm cells) by developing a head, midpiece, and tail for mobility and fertilization.

Spermatogenesis is regulated by hormones like testosterone and occurs continuously from puberty onwards in males.

17) Write three differences between DNA and RNA.

Solution:

Here are three key differences between DNA and RNA:

1. **Structure**: DNA is double-stranded, forming a double helix, while RNA is typically single-stranded.
2. **Sugar**: DNA contains deoxyribose sugar, whereas RNA contains ribose sugar.
3. **Bases**: DNA has the bases adenine (A), thymine (T), cytosine (C), and guanine (G), while RNA has adenine (A), uracil (U), cytosine (C), and guanine (G) (uracil replaces thymine in RNA).

18) Describe the logistic population growth.

Answer:

Logistic population growth describes how a population grows rapidly at first when resources are abundant but slows as resources become limited, eventually reaching a stable population size or carrying capacity. The growth follows an S-shaped (sigmoid) curve, with three phases:

1. **Lag phase**: Slow initial growth due to a small population size.
2. **Exponential phase**: Rapid growth as the population expands, with abundant resources and minimal competition.
3. **Stationary phase**: Growth slows and stabilizes as the population reaches the carrying capacity (K) of the environment, where birth and death rates balance out due to resource limitations.

This model reflects real-world population dynamics, where resource constraints prevent indefinite exponential growth.

SECTION-D

19
i) Write the full name of AIDS.

Answer:

Acquired Immuno Deficiency Syndrome
ii) Write four ways of transmission of HIV infection.

Answer:

Four ways of transmission of HIV infection: Unprotected sexual contact, sharing needles, blood transfusions with infected blood, from mother to child during childbirth or breastfeeding.
iii) Write a way to prevent HIV infection.

Answer:

A way to prevent HIV infection: Use of condoms during sexual intercourse.

20 i) Define net primary productivity.

Answer:

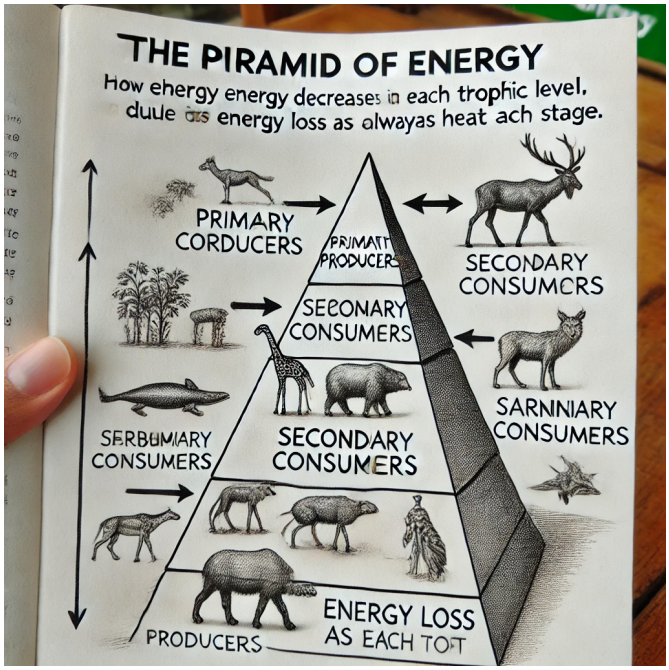
Net Primary Productivity (NPP) is the amount of organic matter produced by plants through photosynthesis, minus the energy they use for respiration. It represents the energy available to herbivores and higher trophic levels in an ecosystem.
ii) Explain with a diagram that the pyramid of energy is always upright.

Answer:

The pyramid of energy is always upright because energy decreases as it moves through each trophic level, from producers to herbivores and then to carnivores. At each level, energy is lost as heat during metabolic processes, meaning less energy is available at higher levels.

Here's a diagram illustrating the upright pyramid of energy:

- **Producers (base)**: Capture energy from sunlight, most energy is present here.
- **Primary consumers (herbivores)**: Consume producers, less energy due to loss in respiration.
- **Secondary consumers (carnivores)**: Consume herbivores, even less energy.
- **Tertiary consumers**: Least energy as it's reduced further with each step up the pyramid.



RBSE Class 12 Biology Question with Solution - 2023

SECTION-A

i) Asexual reproductive structures in Hydra are
A) Bud
B) Conidia
C) Zoospores
D) Gemmules

Answer:

The correct answer is:

A) Bud

ii) Not an example of sexually transmitted disease is -
A) Gonorrhea
B) Syphilis
C) Chlamydiasis
D) Cancer

Answer:

The correct answer is:

D) Cancer

Cancer is not a sexually transmitted disease, while Gonorrhea, Syphilis, and Chlamydiasis are

iii) The genetic code that codes for Methionine is -
A) UUU
B) AUG
C) ACG
D) AAA

Answer:

The correct answer is:

B) AUG

AUG is the start codon and codes for the amino acid Methionine in the genetic code.

iv) Example of lymphoid organ is -
A) Thymus
B) Liver
C) Pancreas
D) Stomach

Answer:

The correct answer is:

A) Thymus

v) The thymus is a primary lymphoid organ where T cells mature.

Microbe that is used as biofertilizer.
A) Trichoderma
B) Penicillium notatum
C) Cyanobacteria
D) Lactobacillus

Answer:

The correct answer is:

C) Cyanobacteria

Cyanobacteria, also known as blue-green algae, are used as biofertilizers because they can fix atmospheric nitrogen, enriching the soil.

vi) An enzyme that cut DNA into fragments -
A) DNA Ligase
B) Restriction enzyme
C) DNA Polymerase
D) Proteases enzyme

Answer:

The correct answer is:

B) Restriction enzyme

Restriction enzymes, also known as restriction endonucleases, cut DNA into fragments at specific recognition sites.

vii) Which protein gene 'cry' controls the corn borer.
A) I - Ac
B) I - Ac \& II - Ab
C) II - Ac
D) I - Ab

Answer:

The correct answer is:

B) I - Ac & II - Ab

The **cry I-Ac** and **cry II-Ab** genes from *Bacillus thuringiensis* (Bt) are used to control the corn borer by producing proteins that are toxic to the insect.

viii) Example of In-situ conservation of biodiversity is -
A) Wildlife sanctuaries
B) Zoological park
C) Botanical garden
D) Wildlife safari park

Answer:

The correct answer is:

A) Wildlife sanctuaries

In-situ conservation involves protecting species in their natural habitat, and wildlife sanctuaries are an example of this type of conservation. Zoological parks, botanical gardens, and wildlife safari parks are examples of ex-situ conservation, where species are preserved outside their natural environments.

ix) Main example of greenhouse gas is -
A) Nitrogen
B) Carbon monoxide
C) Methane
D) Oxygen

Answer:

The correct answer is:
C) Methane

Methane (CH_4) is a potent greenhouse gas, along with others like carbon dioxide (CO_2) and nitrous oxide (N_2O). These gases trap heat in the Earth's atmosphere, contributing to global warming.

2) Fill in the blanks :

i) Male honey bee are (Ploidy) having chromosomes.

Answer:

Male honey bee are **haploid** (Ploidy) having **16** chromosomes.

ii) Insulin used for diabetes was extracted from the (organ) of slaughtered pigs and animals.

Answer:

Insulin used for diabetes was extracted from the **pancreas** (organ) of slaughtered pigs and animals.

iii) The rate of biomass production is called .

Answer:

The rate of biomass production is called **productivity**

iv) The world Summit on Sustainable Development held in 2002 in , South Africa.

Answer:

The World Summit on Sustainable Development held in 2002 in **Johannesburg**, South Africa.

3) Give the answer of the following questions in a word or a line.

i) Define external fertilisation.

Answer:

The fusion of gametes (sperm and egg) occurs outside the body of the organisms, typically in water.

ii) Write full name of ZIFT.

Answer:

ZIFT: Zygote Intra-Fallopian Transfer.

iii) The phenotype of RRyy genotype seeded plant will be

Answer:

The **phenotype of RRyy genotype** seeded plant will be: **Round yellow seeds** (assuming round (R) is dominant for shape and yellow (Y) is dominant for color).

iv) What is Transgenic animal?

Answer:

An animal that has had a foreign gene deliberately inserted into its genome.

v) Write function of Adenosine deaminase.

Answer:

It is an enzyme involved in the breakdown of adenosine and deoxyadenosine, crucial for the development and maintenance of the immune system. Deficiency in this enzyme leads to severe combined immunodeficiency (SCID).

vi) Write name of components of nucleoside.

Answer:

A nitrogenous base and a sugar (ribose in RNA or deoxyribose in DNA).

vii) Write one adaptation of seals found in polar seas.

Answer:

Thick layer of blubber (fat) beneath the skin for insulation and energy storage in cold environments.

viii) Explain one reason of deforestation.

Answer:

Agricultural expansion, where forests are cleared to make way for crops or livestock grazing.

SECTION-B

Short answer type questions (Answer word limit 50 words) :

4) Write name and function of three parts of female reproductive system.

Answer:

Ovaries: Produce eggs (ova) and secrete hormones like estrogen and progesterone.

Fallopian tubes: Transport the egg from the ovary to the uterus; site of fertilization.

Uterus: Nourishes and supports the developing fetus during pregnancy.

5) Write three hormones secreted by placenta.

Answer:

Human Chorionic Gonadotropin (hCG): Maintains the corpus luteum during early pregnancy.

Progesterone: Supports the endometrium and prevents uterine contractions.

Estrogen: Promotes fetal development and prepares the body for childbirth.

6) Explain 'Incomplete dominance' with example.

Answer:

Incomplete dominance occurs when neither allele is completely dominant over the other, resulting in a blended phenotype. For example, in snapdragons, crossing a red flower (RR) with a white flower (WW) results in pink flowers (RW), an intermediate color.

7) Explain Turner's syndrome with symptoms.

Answer:

Turner's syndrome is a genetic disorder in females where one X chromosome is missing or partially missing (XO). Symptoms include short stature, webbed neck, infertility, and underdeveloped secondary sexual characteristics. It can also lead to heart and kidney defects.

8) Write brain capacity and two characters of life style of Neanderthal man.

Answer:

- **Brain capacity**: Approximately 1400-1600 cc.
- **Two lifestyle characteristics**:

1. **Tool-making skills**: Neanderthals used advanced tools for hunting and daily activities.
2. **Cave dwellers**: They lived in caves and practiced burial rituals, indicating a sense of community.

9) Explain 'Adaptive radiation' with example.

Answer:

Adaptive radiation is the evolutionary process in which organisms diversify rapidly into new forms, particularly when a change in the environment makes new resources available or creates new challenges. Example: **Darwin's finches** on the Galápagos Islands evolved from a common ancestor into multiple species with different beak shapes suited to various food sources.

10) Define inbreeding. Write name of any one animal developed from interspecific hybridisation.

Answer:

Inbreeding is the mating of closely related individuals to preserve desired traits or increase genetic uniformity within a population.
Example of interspecific hybridization: The **mule**, which is a hybrid of a male donkey and a female horse.

11) Part - A contains the name of crop and Part - B contains their related disease resistance variety.

Match the following :

PART - A
A) Cowpea
B) Cauliflower
C) Chilli

PART - B
i) Pusa Sadabahar
ii) Pusa Komal
iii) Pusa Shubhra

Answer:

Here is the correct matching between Part A (Crops) and Part B (Disease-resistant varieties):

A) Cowpea - ii) Pusa Komal
B) Cauliflower - iii) Pusa Shubhra
C) Chilli - i) Pusa Sadabahar

12) Write the name of the microorganism commonly called brewer's yeast. Write one use of it.

Answer:

The microorganism commonly called **brewer's yeast** is **Saccharomyces cerevisiae**.

One use: It is used in the fermentation process to produce **beer** and other alcoholic beverages by converting sugars into alcohol and carbon dioxide.

13) Write full name of BOD. What is the relation of polluting potential and BOD of waste water.

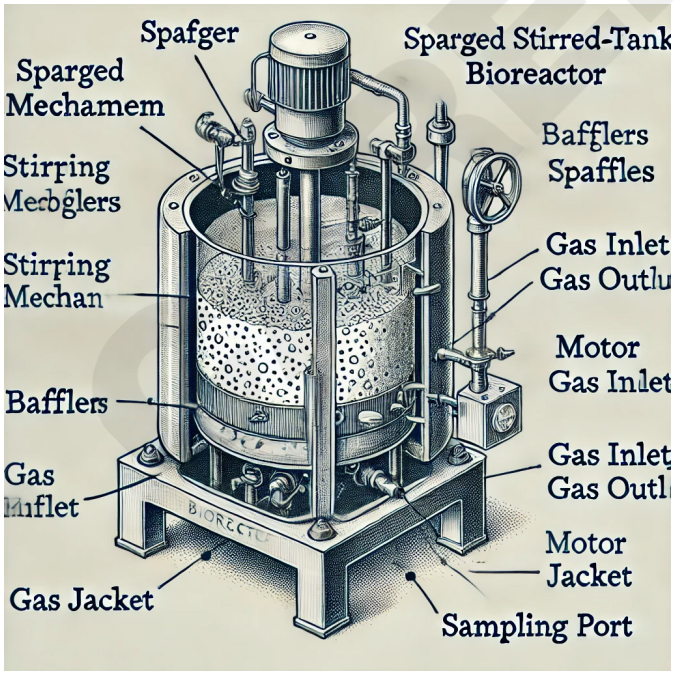
Answer:

Relation of polluting potential and BOD of wastewater: The **higher the BOD**, the greater the amount of organic matter in the water, which means more oxygen is required by microorganisms to decompose it. This indicates a higher polluting potential of the wastewater, as it depletes oxygen, harming aquatic life.

14) Draw a labelled diagram of sparged stirred-tank bioreactor.

Answer:

Here is a labeled diagram of a sparged stirred-tank bioreactor. Let me know if you'd like further details or adjustments



15) Explain any one feature of cloning vector.

Answer:

Origin of replication (Ori): This is a specific DNA sequence in the cloning vector that allows it to replicate independently within a host cell. The Ori ensures that when the host cell divides, copies of the vector (and the inserted gene of interest) are also replicated, enabling the propagation of the cloned DNA. Without a functional Ori, the vector cannot multiply within the host cell.

SECTION-C

16) Write the name of the pathogen of amoebiasis. Write two symptoms and two source of infection.

Answer:

The pathogen responsible for amoebiasis is **Entamoeba histolytica**.

Two symptoms:

1. Abdominal pain and cramping.
2. Diarrhea, often with blood or mucus.

Two sources of infection:

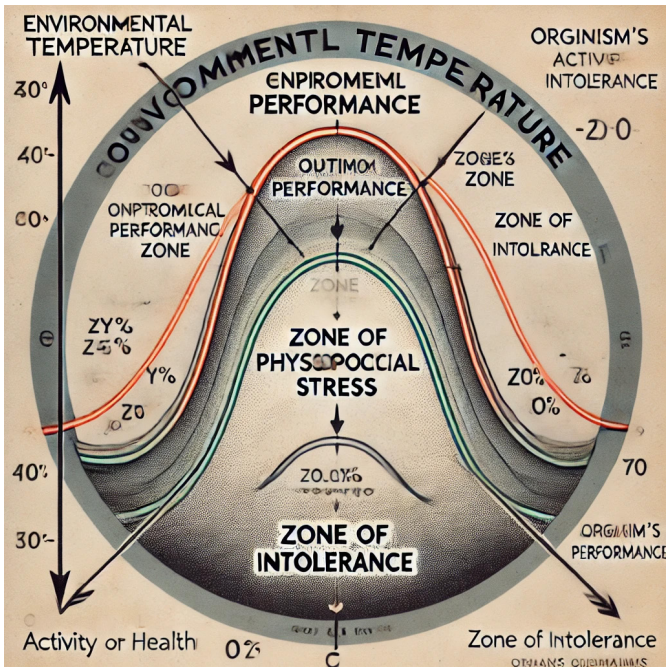
1. Contaminated food or water.
2. Fecal-oral transmission, often through poor sanitation practices.

17) What are the stenothermal organism? Draw a diagrammatic representation of organismic response.

Answer:

Stenothermal organisms are organisms that can survive only within a narrow range of temperatures. They are sensitive to temperature changes and cannot tolerate significant variations. Examples include certain fish species and polar animals.

Here is a simple explanation of **organismic response** through a diagrammatic representation. It typically shows how organisms respond to varying environmental factors like temperature, with zones of survival, stress, and optimum performance.



Here is a diagrammatic representation of the organismic response to temperature, highlighting the zones of optimum performance, physiological stress, and intolerance. Let me know if you'd like further clarification.

18) Define ecological succession. Explain Hydrarch succession and Xerarch succession in brief.

Answer:

Ecological succession is the gradual process by which ecosystems change and develop over time. It involves a series of stages where different species of plants and animals colonize an area, altering the environment until a stable climax community is established.

Hydrarch Succession (Succession in wet areas):

- **Definition**: It occurs in areas that begin with water, such as ponds, lakes, or wetlands.
- **Process**: The succession starts with **pioneer species** like phytoplankton and progresses through various stages (submerged, floating, and emergent plants) until it reaches a **terrestrial climax community** like a forest.
- **Example**: A pond may gradually fill with sediment, allowing rooted plants to grow, which eventually leads to the development of a forest.

Xerarch Succession (Succession in dry areas):

- **Definition**: It occurs in dry, barren areas like deserts, rocky terrains, or sand dunes.
- **Process**: The succession starts with **pioneer species** like lichens and mosses that can survive in harsh, dry conditions. Over time, soil forms, and grasses and shrubs colonize the area, leading to a stable **climax community** such as a forest or grassland.
- **Example**: A rocky landscape may gradually develop soil and vegetation, eventually becoming a forest or grassland.

Both types of succession show how ecosystems develop over time from barren or aquatic conditions to more complex and stable communities.

i) Define pollination.

Answer:

Pollination is the process of transferring pollen grains from the male part (anther) of a flower to the female part (stigma) of the same flower or another flower, leading to fertilization and the formation of seeds.

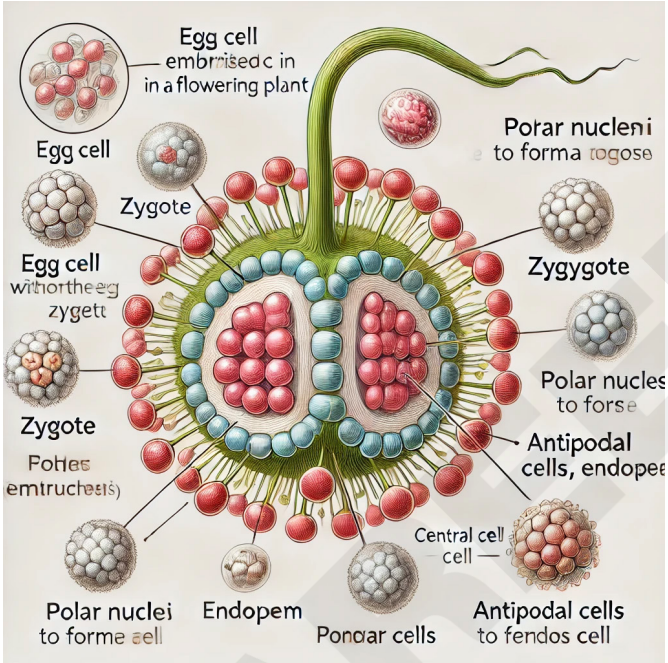
ii) Explain double fertilisation.

Answer:

Double fertilisation is a unique process in angiosperms (flowering plants) where two fertilization events occur. One sperm cell fertilizes the egg cell, forming the **zygote** (which will develop into the embryo), while the other sperm cell fuses with two polar nuclei to form the **triploid endosperm**, which will provide nourishment to the developing embryo.

iii) Draw a labelled diagram of structure of fertilised embryo sac.

Answer:



Here is a labeled diagram of the structure of a fertilized embryo sac, illustrating the key components involved in double fertilization. Let me know if you need any additional explanation.

20 i) Define translation.

Answer:

Xenogamy is a type of cross-pollination where pollen is transferred from the anther of a flower of one plant to the stigma of a flower of a genetically different plant of the same species. This results in genetic diversity.

ii) Explain process of translation.

Answer:

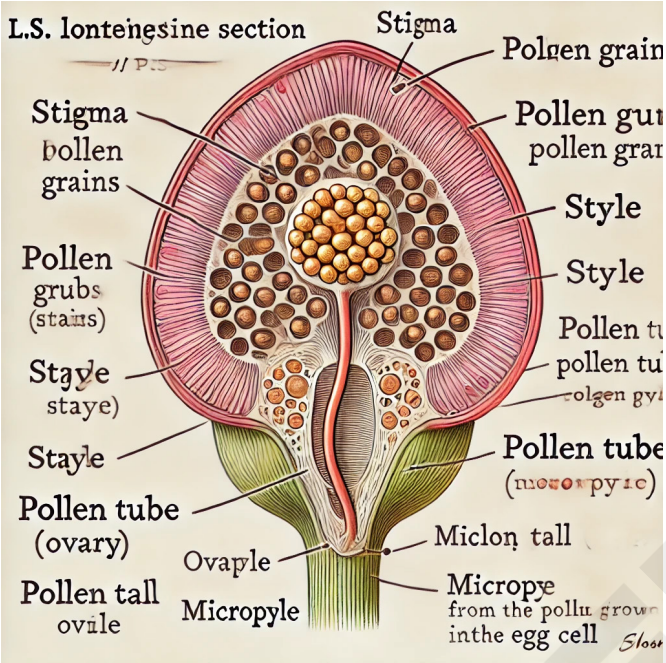
- **Non-albuminous seed**: **Pea** (no residual endosperm, cotyledons absorb all nutrients).
- **Albuminous seed**: **Castor** (endosperm is present and provides nutrition to the embryo).

- **Perispermic seed**: **Black pepper** (the seed contains a persistent perisperm, a nutritive tissue derived from the nucellus).

iii) Draw a labelled diagram of translation.

Answer:

Here is the labeled diagram of the longitudinal section (L.S.) of a pistil showing the path of pollen tube growth. If you need any further explanation, feel free to ask



RBSE Class 12 Biology Question with Solution - 2022

SECTION-A

1. Answer the following questions by selecting the correct option in answer book.

(i) Number of chromosomes have in meiocyte of human being -

(A) 46

(C) 19

(B) 23

(D) 12

Answer:

(A) 46

(ii) In which of the following perisperm is found?

(A) Beetroot

(B) Pea

(C) Groundnut

(D) Sunflower

Answer:

(B) Pea

(iii) In which chromosomal disorder one X chromosome is missing and the sex chromosome is XO?

(A) Down's Syndrome

(B) Thalassemia

(C) Kinefelter's Syndrome

(D) Turner's Syndrome

Answer:

(D) Turner's Syndrome

iv) Purine nitrogenous base is

(A) Cytosine

(B) Adenine

(C) Uracil

(D) Thymine

Answer:

(B) Adenine

v) The Pathogen of elephantiasis is -
(A) Amoeba
(B) Ascaris
(C) Filarial worm
(D) Plasmodium

Answer:

(C) Filarial worm

vi) The capacity to generate a whole plant from any cell is called
(A) Micropropagation
(B) Somatic hybridisation
(C) Hybridisation
(D) Totipotency

Answer:

(D) Totipotency

vii) Which fever could be confirmed by Widal test
(A) Malaria
(B) Dengue
(C) Corona
(D) Typhoid

Answer:

(D) Typhoid

viii) The status of green plants in the food chain is -
(A) Producer
(B) Primary Consumer

(C) Secondary Consumer
(D) Decomposer

Answer:

(A) Producer

ix) Which protein gene cry is controlled the cotton boll worm?
(A) I-Ac
(B) I-Ab
(C) II-Ac
(D) I-Ac and II-Ab

Answer:

(D) I-Ac and II-Ab

2. Fill in the blanks :

(i) When there is breeding between animals of the same breed, it is called .

Answer:

Inbreeding

(ii) Bt toxin is produced by bacterium

Answer:

Bacillus thuringiensis

(iii) If an inheritable mutation is observed in population at high frequency, it is called DNA .

Answer:

Polymorphism

(iv) When a species becomes extinct, the other plant and animal species associated with it is obligatory to extinct, is called

Answer:

co-extinction

3. Give the answer of following questions in a word or a line

(i) Define biotechnology.

Answer:

Biotechnology is the use of living organisms, systems, or processes to develop products or technologies for human use.

(ii) Which will be the blood group of the progeny getting IA allele from mother and i allele from father?

Answer:

The blood group will be **A**.

(iii) Write the definition of biopiracy.

Answer:

Biopiracy is the exploitation of biological resources or indigenous knowledge without proper authorization or compensation.

(iv) Which colours cannot be discriminated by person in colour-blindness ?

Answer:

A person with red-green color blindness cannot discriminate between **red and green**.

(v) Define innate immunity.

Answer:

Innate immunity is the body's natural, non-specific defense mechanism against pathogens that is present from birth.

(vi) Define Genetically Modified Organisms (GMO).

Answer:

Genetically Modified Organisms (GMO) are organisms whose genetic material has been altered using genetic engineering techniques to introduce new traits or characteristics.

(vii) Which type of pyramids of biomass is found in the ocean?

Answer:

In the ocean, an **inverted pyramid of biomass** is typically found, where the biomass of consumers is greater than that of the producers.

(viii) What is ex situ conservation?

Answer:

Ex situ conservation is the conservation of species outside their natural habitats, such as in botanical gardens, zoos, or gene banks.

SECTION-B

Short answer type questions (Answer word limit 50 words) :

4. Write the name of any three contraceptive methods.

Answer:

Three contraceptive methods:

- Barrier methods (e.g., condoms)
- Intrauterine devices (IUDs)
- Hormonal methods (e.g., birth control pills)

5. What is gene gun (Biolistic)? Write its one use.

Answer:

Gene gun (Biolistic): A device that delivers DNA into cells by bombarding them with high-velocity microprojectiles.
Use: It is used in genetic modification of plants.

6. Write any three important points of beekeeping.

Answer:

Three important points of beekeeping:

- Selecting good breeds of honeybees.
- Regular inspection of bee colonies.
- Providing adequate nutrition for bees

7. What is animal breeding ? Explain two aims of animal breeding.

Answer:

It is the selective mating of animals to enhance desirable traits.
Two aims:

- Improve productivity (e.g., milk or meat yield).
- Enhance disease resistance.

8. Explain the reason of population growth explosion.

Answer:

Advances in medicine and healthcare, leading to reduced mortality rates and increased life expectancy, have contributed to rapid population growth.

9. Explain any one feature required to facilitate cloning into a vector.

Answer:

It allows the vector to replicate within the host cell, ensuring multiple copies of the inserted gene.

10. Explain any one application of biotechnology in medicine.

Answer:

Production of **insulin** using recombinant DNA technology to treat diabetes is a key application of biotechnology in medicine.

11) Write any two advantages of production of genetically modified plants. Give any one example of genetically modified plant.

Answer:

- Increased resistance to pests and diseases, reducing the need for chemical pesticides.
- Enhanced nutritional content, such as Vitamin A-enriched *Golden Rice*.

Example: Bt cotton.

12. Explain one cause for the loss of biodiversity.

Answer:

Habitat destruction due to deforestation and urbanization is a major cause of biodiversity loss, leading to the extinction of many species.

13. The pyramid of energy is always upright, explain.

Answer:

The pyramid of energy is always upright because energy decreases at each trophic level, with only a fraction of energy transferred from one level to the next due to energy loss as heat during metabolism.

14. What is the role of transgenic animal in the biological product ?

Answer:

Transgenic animals are used to produce therapeutic proteins and other biological products, such as human insulin and clotting factors, which can be harvested from their milk, blood, or urine.

15. Define species area relationship patterns of biodiversity.

Answer:

The species-area relationship states that larger areas tend to have higher biodiversity, with more species. This is described by the formula S = cA^z, where S is species richness, A is area, and c and z are constants.

SECTION-C

Long answer type questions (Answer Word limit 100 words) :

1) Define asexual reproduction. Write two examples of vegetative propagule in flowering plants.

Answer:

Asexual reproduction is a mode of reproduction where offspring are produced from a single parent without the involvement of gametes or sexual processes, resulting in genetically identical offspring (clones).

Two examples of vegetative propagules in flowering plants:

1. **Rhizome** (e.g., Ginger)
2. **Tuber** (e.g., Potato)

2) Explain the law of dominance by the help of Punnett Square.

Answer:

Law of Dominance (Mendel's First Law) states that in a heterozygous condition, the allele that is expressed is dominant, while the one that is not expressed is recessive.

Let's explain this using a **Punnett Square** with an example of a monohybrid cross between a plant with **dominant** trait (tall, "T") and a plant with **recessive** trait (dwarf, "t").

When a **homozygous tall** plant (TT) is crossed with a **homozygous dwarf** plant (tt), the offspring in the F1 generation are heterozygous (Tt), and all appear tall because the dominant allele (T) masks the expression of the recessive allele (t).

Punnett Square:

T	T	
t	Tt	Tt
t	Tt	Tt

- **Genotype**: 100% Tt (heterozygous)
- **Phenotype**: 100% Tall (since "T" is dominant over "t")

In the F2 generation (when Tt is crossed with Tt):

	T	t
T	TT	Tt
t	Tt	tt

- **Genotype**: 1 TT (homozygous tall), 2 Tt (heterozygous tall), 1 tt (homozygous dwarf)
- **Phenotype**: 3 Tall (TT, Tt) : 1 Dwarf (tt)

Thus, the **Law of Dominance** explains why in a heterozygous condition (Tt), only the dominant trait (Tall) is expressed, while the recessive trait (Dwarf) is masked.

3) Explain test cross with the help of an example.

Answer:

A **test cross** is used to determine the genotype of an organism displaying a dominant phenotype. The organism is crossed with a homozygous recessive individual. If the dominant phenotype organism is homozygous, all offspring will display the dominant trait; if it is heterozygous, the offspring will show a 1:1 ratio of dominant and recessive phenotypes.

Example:

Consider a plant with a **dominant phenotype** (Tall, represented by "T"). To determine if the plant is **homozygous dominant (TT)** or **heterozygous (Tt)**, it is crossed with a **homozygous recessive** (dwarf, represented by "tt") plant.

Two possible outcomes:

1. **If the tall plant is homozygous dominant (TT):**

	T	T
t	Tt	Tt
t	Tt	Tt

- All offspring will be **Tt** (Tall).
- **Phenotype**: 100% Tall.

2. **If the tall plant is heterozygous (Tt):**

	T	t
t	Tt	tt
t	Tt	tt

- **Genotype**: 50% Tt (Tall), 50% tt (Dwarf).
- **Phenotype**: 50% Tall, 50% Dwarf.

Conclusion:

If the test cross results in a 1:1 ratio of tall and dwarf plants, the original tall plant is heterozygous (Tt). If all offspring are tall, the plant is homozygous dominant (TT). This is how the test cross reveals the genotype.

18) Write the name of a water-borne disease. Explain preventive measures of water-borne diseases.

Answer:

Preventive measures of water-borne diseases:

1. **Access to clean and safe drinking water:**
   Ensure that drinking water is treated or boiled to kill any pathogens, and avoid consuming water from unclean or contaminated sources.

2. **Proper sanitation and hygiene:**
   Use proper toilet facilities and avoid open defecation to prevent the contamination of water sources. Wash hands with soap before eating and after using the toilet.

3. **Avoid consuming contaminated food or water:**
   Ensure that food is properly cooked, and avoid raw or street food that may have been exposed to contaminated water.

4. **Regular water treatment and filtration:**
   Municipal water should be treated with chlorine or other disinfectants to eliminate water-borne pathogens.

5. **Public health education:**
   Raise awareness in communities about the importance of hygiene, sanitation, and safe water consumption to prevent water-borne diseases.

19) What is floriculture? Describe the structure of stamen. Draw a labelled diagram of a typical stamen.

Answer:

Floriculture:

Floriculture is a branch of horticulture that focuses on the cultivation and management of flowering plants for gardens, landscaping, and the floral industry. It includes the growing of ornamental plants for decoration and commercial purposes, such as the production of flowers, potted plants, and cut flowers for events, homes, and other uses.

Structure of Stamen:

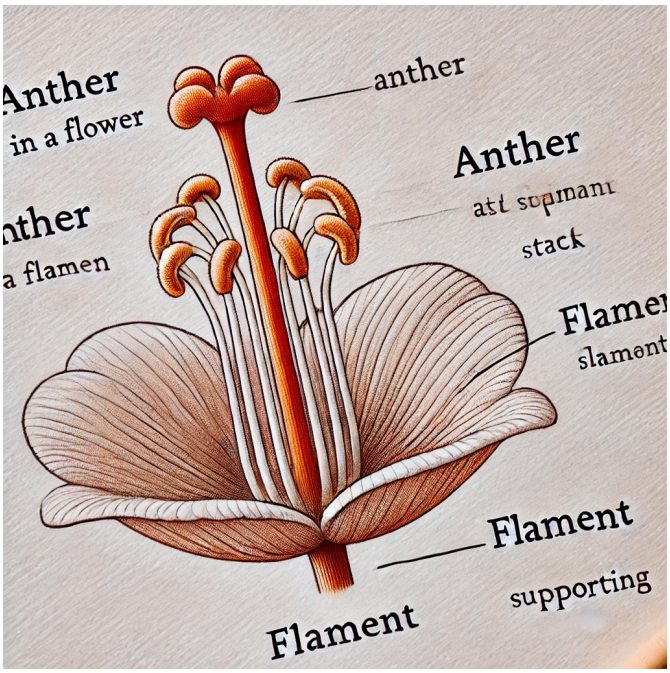
A **stamen** is the male reproductive part of a flower. It typically consists of two main parts:

1. **Anther**:
   The anther is the terminal part of the stamen that produces and releases pollen, which contains male gametes (sperm cells). It typically has two lobes, each containing two pollen sacs, making a total of four pollen sacs.

2. **Filament**:
   The filament is the stalk that supports the anther. It holds the anther in place, ensuring it is positioned to release pollen for pollination.

Labelled Diagram of a Typical Stamen:

Here is a labelled diagram of a typical stamen:



20) Write the components of nucleotide. Write one salient feature of the double helix structure of DNA. Draw a labelled diagram of double helix of DNA.

Answer:

Components of a Nucleotide:

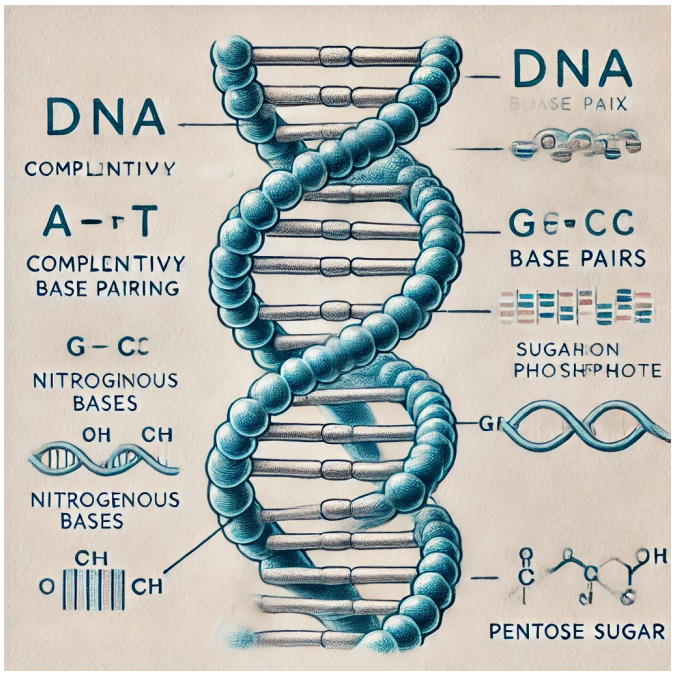
A nucleotide, the building block of nucleic acids like DNA and RNA, consists of three components:

1. **Nitrogenous base**: This can be a purine (Adenine - A, Guanine - G) or a pyrimidine (Cytosine - C, Thymine - T in DNA, and Uracil - U in RNA).
2. **Pentose sugar**: In DNA, the sugar is deoxyribose, and in RNA, it is ribose.
3. **Phosphate group**: It links nucleotides together by forming phosphodiester bonds between the 5' carbon of one sugar and the 3' carbon of the next.

Salient Feature of the Double Helix Structure of DNA:

One salient feature of the DNA double helix is **complementary base pairing**: Adenine (A) always pairs with Thymine (T) via two hydrogen bonds, and Guanine (G) always pairs with Cytosine (C) via three hydrogen bonds. This allows the DNA to replicate accurately during cell division.

Labelled Diagram of the Double Helix of DNA:


DNA
COMPLENTIVY
A – T
COMPLENTIVY
BASE PAIRING
G – C
NITROGINOUS
BASES
OH CH
NITROGENOUS
BASES
CH
O CH
DNA
G – C
BASE PAIRS
SUGAR ON
PENTOSE SUGAR