
2010

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Section: A

Question: 1

Mention the site where syngamy occurs in amphibians and reptiles respectively. [1]

Answer:

- Amphibians: outside the body or in external medium.
- Reptiles: inside the body

Question: 2

How is snow blindness caused in humans? [1]

Answer:

High dose of UV-B radiation, inflammation of cornea.

Question: 3

Name one autosomal dominant and one autosomal recessive Mendel a disorder in humans. [1]

Answer:

Autosomal dominant: Myotonic dystrophy

Autosomal recessive: Phenylketonuria or sickle cell anemia or cystic fibrosis or thalassemia

Question: 4

How is the action of exonuclease different from that of end nuclease? [1]

Answer:

Exonuclease: Removes nucleotides from the ends of DNA molecules.

Endonuclease: Makes cut at specific position within a DNA.

Question: 5

India has more than 50,000 strains of rice. Mention the level of biodiversity it represents.[1]

Answer:

Genetic biodiversity.

Question: 6

Mention the information that the health workers derive by measuring BOD of a water Body. [1]

Answer:

A measure of organic waste matter present in the water, greater the BOD more is its polluting potential.

Question: 7

Name the enzyme involved in the continuous replication of DNA strand. Mention the Polarity of the template strand. [1]



Answer:

(DNA dependent) DNA polymerase 3' to 5'

Question: 8

Offspring's derived by asexual reproduction are called clones. Justify giving two Reasons.[1]

Answer:

Morphologically (structurally) is genetically identical.

Section: B

Question: 9

Mention the role of ribosome's in peptide bond formation. How does ATP facilitate it? [2]

Answer:

It provides the sites for the binding of amino acid, acts as a catalyst (23SrRNA) for the formation of peptide bond. ATP provides the energy for the bond formation.

Question: 10

How do copper and hormone releasing IUDs act as contraceptives? Explain. [2]

Answer:

Copper releasing IUDs:

Increase phagocytosis of sperms, suppress sperm mobility, and suppress the fertilizing of sperm.

Hormone releasing IUDs:

Increase phagocytosis of sperms, suppress sperm mobility, suppress the fertilizing of sperm, make the uterus unsuitable for implantation, and make the cervix hostile to the sperms.

Question: 11

If you squeeze a seed of orange you might observe many embryos of different sizes. How is it possible? Explain. [2]

Answer:

Some of the nuclear cells, surrounding embryo sac divide, protrude into the embryo sac, develop into the embryos thus each seed contains many embryos of different sizes.

Question: 12

A recombinant DNA is formed when sticky ends of vector DNA and foreign DNA join. Explain how the sticky ends are formed and get joined. [2]

Answer:

Sticky ends are formed by cutting the vector DNA and foreign DNA with molecular scissors known as restriction enzymes. Every enzyme cut a specific sequence of DNA. The basic procedure is to extract and cut up DNA from a donor genome into fragments containing from one to several genes and allow these fragments to insert themselves individually into opened-up small autonomously replicating DNA molecules such as bacterial plasmids



Question: 13 **

- a. Mention the number of primers required in each cycle of polymerase chain Reaction (PCR). Write the role of primers and DNA polymerase in PCR. [2]
- b. Give the characteristic feature and source organism of the DNA polymerase used in PCR. [2]

Question: 14

[2]

Define the term 'health' Mention any two ways of maintaining it.

Answer:

Health is defined as the state of complete physical mental and social wellbeing. Two ways of maintaining it are balanced diet, personal hygiene and regular exercise.

OR

Why does a doctor administer tetanus antitoxin and not a tetanus vaccine to a child injured in a roadside accident with a bleeding wound? Explain.

Answer:

Tetanus is a deadly disease requiring a quick immune response so performed antibodies are injected directly.

Question: 15

Giving two reasons explain why there is more species biodiversity in tropical latitudes than in temperate ones. [2]

Answer:

Two reasons to explain why there is more species biodiversity in tropical latitudes than in temperate ones are:

- Remain relatively undisturbed for millions of years so longer time for diversification.
- Less seasonal or more constant or predictable weather
- More solar energy available for productivity.

Question: 16

Name an upload drug and its source plant. How does the drug affect the human body? [2]

Answer:

- Heroin (smack) or morphine
- Poppy plant or papaver somniferum

Drugs bond with opioid receptors in CNS or gastro intestinal tract and slow down the system.

Question: 17

Mention the major cause of air pollution in metro cities. Write any three ways by which it can be reduced. [2]



Answer:

The various causes of air pollution in metro cities are:

- i. Combustion of natural gas, petroleum, coal and wood in industries, automobiles, aircrafts, railways, thermal plants, agricultural burning, kitchens.
- ii. Metallurgical processing.
- iii. Chemical industries including pesticides, fertilizers, weedicides, fungicides.
- iv. Cosmetics.
- v. Processing industries like cotton textiles, wheat flour mills, asbestos.
- vi. Welding, stone crushing, gem grinding.

Air pollution can be reduced by the following ways:

- i. Low sulphur fossil fuel usage.
- ii. Reduction in emissions.
- iii. Zoning of industries away from human settlements for dispersing pollution sources.
- iv. Destroying pollutants by thermal or catalytic combustion.
- v. Changing pollutants to less toxic forms.

Question: 18

How did Eli Lilly synthesize the human insulin? Mention one difference between this insulin and the one produced by the human pancreas. [2]

Answer:

It produce proinsulin chain A and chain B using separate DNA sequences introduced in the plasmids of E.Coli extracted combined by disulphide bond produces mature insulin. Insulin produced by human pancreas has an additional C peptide.

Section: C**Question: 19**

[3]

- a. Write the characteristic features of anther, pollen and stigma of wind pollinated flowers.

Answer:

- Pollen: Light and large number and non-sticky
- Anther: Well exposed
- Stigma: Large and feathery and open and sticky

- b. How do flowers reward their insect pollinators? Explain.

Answer:

It provides nectar, food for the larvae, pollen grains, safe place to lay eggs.

Question: 20

[3]

- a. Why are grasshopper and Drosophila said to show male heterogametic? Explain.

Answer:

In grasshopper males have one X only (XO type), in Drosophila males have one X and one Y (XY type). Males in both produce two different kinds of gametes.

- b. Explain female heterogamete with the help of an example.

Answer:

In birds female has ZW, produce two kinds of gametes and so heterogametic.



Question: 21

In a series of experiments with streptococcus and mice F. Griffith concluded that R-strain bacteria had been transformed. Explain. [3]

Answer:

See topics on 'DNA'.

Question: 22

[3]

- a. How does the Hardy-Weinberg's expression ($p^2+2pq+q^2=1$). Explain that genetic equilibrium is maintained in a population?

Answer:

Gene frequencies in a population are stable, constant from generation to generation until some change in frequency happens due to some factor.

- b. List any two factors that can disturb the genetic equilibrium.

Answer:

Two factors that can disturb the genetic equilibrium are gene migration, gene flow, gene drift, mutation.

Question: 23

Mention the name of the causal organism, symptoms and the mode of transmission of the disease Amoebiasis [3]

Answer:

Name:

Endameba histolytica

Symptoms:

Constipation, abdominal pain, cramps, mucous stool with blood clots.

Transmission:

Houseflies' carrier form feces to person via food products or contaminated water.

Question: 24

[3]

- a. Mention the property that enables the explants to regenerate into a new plant.

Answer:

Totipotency = 1

- b. A banana herb is virus – infected. Describe the method that will help in obtaining healthy banana plants from this diseased plant.

Answer:

Extract the disease free meristem, in vitro culture to get virus free plants.



Question: 25

Mention the product and its use produced by each the microbes listed below:

[3]

i. Streptococcus

Answer:

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

ii. Lactobacillus

Answer:

Micro-organisms such as Lactobacillus and others commonly called lactic acid bacteria (LAB) grow in milk and convert it to curd. LAB produces acids that coagulate and partially digest the milk proteins. It also improves its nutritional quality by increasing vitamin B12. In our stomach too, the LAB play very beneficial role in checking disease causing microbes.

iii. Saccharomyces

Answer:

Saccharomyces cerevisiae used for bread-making and commonly called brewer's yeast is used for fermenting malted cereals and fruit juices, to produce ethanol.

Question: 26

a. Name the organism in which the vector shown is inserted to get the copies of the desired gene. [3]

Answer:

Escherichia coli

b. Mention the area labelled in the vector responsible for controlling the copy of the inserted gene. [3]

Answer:

Ori

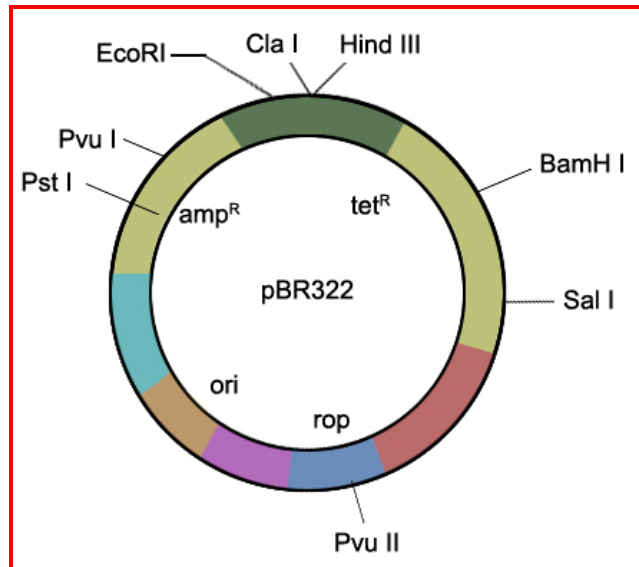
c. Name and explain the role of a selectable marker in the vector shown.

[3]

Answer:

ampR is the marker gene that helps in identification and elimination of the non-trans-formant growing in tetracycline medium or selectivity permitting the growth of the trans-formant resistant to tetracycline.





OR

Name the insect pest that is killed by the products of cryIAC gene. Explain how the gene makes the plant resistant to the insect pest.

Answer:

Meloidegyn incognitia

The gene (cry IAc) produces crystals of insecticidal protein which is inactive protoxin when the bollworm eats the protoxin the alkaline pH of the gut activates it, activated protoxin binds to the midgut epithelial cells, creates pore, causes swelling, causes lysis, kills the worm.

Question: 27

How do organisms like fungi, zooplanktons and bears overcome the temporary short-lived climatic stressful conditions? Explain. [3]

Answer:

Fungi:

Produce thick walled spores to survive unfavorable condition

Zooplanktons:

Diapause to suspend development

Bear:

Undergo hibernation in winter

Section: D

Question: 28

[5] or [3 + 2]

Describe in sequence the events that lead to the development of a three celled pollen grain from microspores mother cell in angiosperms.



Answer:

When the anther is young, a group of compactly arranged homogenous cells called the sporogenous tissue occupies the centre of each microsporangium.

As the anther develops, the cells of the sporogenous tissue undergo meiotic divisions to form microspore tetrads.

As each cell of the sporogenous tissue is capable of giving rise to a microspore tetrad. Each one is a potential pollen or microspore mother cell (PMC). The process of formation of microspores from a pollen mother cell through meiosis is called microsporogenesis.

The microspores, as they are formed, are arranged in a cluster of four cells—the microspore tetrad. As the anthers mature and dehydrate, the microspores dissociate from each other and develop into pollen grains.

Inside each microsporangium several thousands of microspores or pollen grains are formed that are released with the dehiscence of anther.

The cytoplasm of pollen grain is surrounded by a plasma membrane. When the pollen grain is mature it contains two cells, the vegetative cell and generative cell.

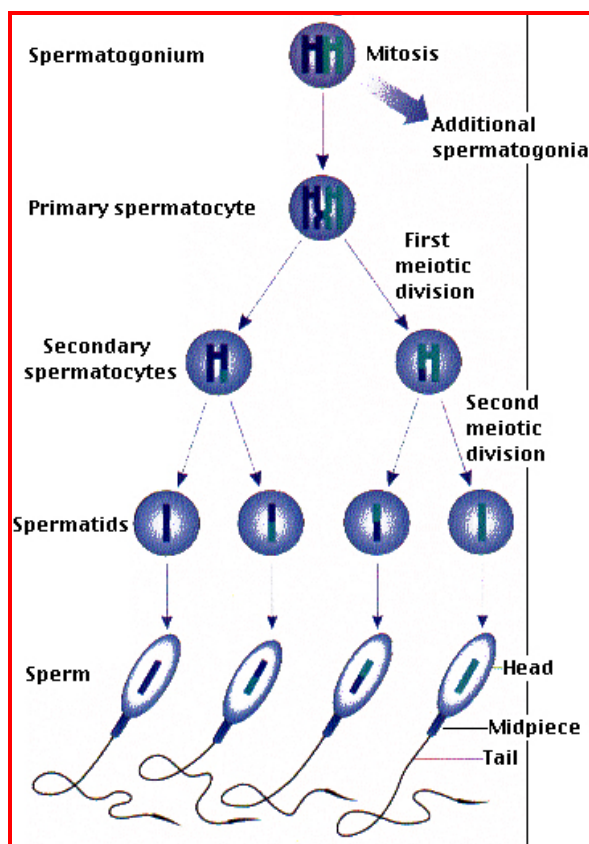
The pollen grain germinates on the stigma to produce a pollen tube through one of the germ pores.

Some plants shed pollen in two celled stage with a vegetative and a generative cell while some plant shed pollen in three celled stage where generative cell undergoes mitosis to produce two male gametes thus generating a three celled condition.

OR

a. Give a schematic representation showing the events of Spermatogenesis in human male.

Answer:



-
- b. Describe the structure of a human sperm.

Answer:

See topics on 'Structure of a sperm'.

Question: 29

- a. State the law of independent assortment.

[1]

Answer:

The law of independent assortment states that the two factors of each character assort or separate independent of the factors of other characters at the time gamete formation and get randomly rearranged in the offspring.

- b. Using punnet square demonstrate the law of independent assortment in a Dihybrid cross involving two heterozygous parents.

[4]

Answer:

See topics on 'Mendelian theory'.

OR

How did Alfred Hershey and Martha Chase arrive at the conclusion that DNA is the genetic material?

[5]

Answer:

Hershey and Chase grew viruses in a medium that contained ^{32}P radioactive phosphorus. These were allowed to infect E. coli. Medium was agitated in a blender viral coats and the bacterial cells with viral particles were separately by spinning them in a centrifuge.

In this case no radioactivity in the supernatant as the protein coats do not incorporate ^{32}P , but the viral DNA had ^{32}P and passed to it to the bacterial cell. So radioactivity was detected in the cells, proves that DNA is the hereditary material.

They repeated the procedure with radioactive sulphur ^{36}S , in this case no radioactivity was detected in the bacterial cell as S is not incorporated in DNA, while radioactivity was detected in the supernatant with protein coats of viruses.

Question: 30

[5]

Why herbivores are considered similar to predators in the ecological context. Explain.

Answer:

Transfer of energy fixed by plants to the next trophic level carnivores, maintains the plant population under control.

Differentiate between the following interspecific interactions in a population:

- a. Mutualism and competition

Answer:

- In mutualism both the species benefit.
- In competition survival of both challenged and struggle for existence.



b. Commensalism and Amensalism

Answer:

Commensalism:

One is benefitted. The other is neither benefitted nor harmed.

Amensalism:

One is harmed and the other is unaffected.

OR

a. Trace the succession of plants on a dry bare rock.

[4]

Answer:

Primary succession:

Lichens secrete acids to cause weathering of rock and soil formation, small plants like bryophytes to hold the soil.

b. How does phosphorus cycle differ from carbon cycle?

[1]

Answer:

- No respiratory release of phosphorus unlike CO_2 in carbon cycle, no gaseous exchange.
- Inputs of phosphorus through rainfall are less than carbon input.

****Out of syllabus. Answer will be provided up on request**

