Biology
Question Paper
2019 (Set-3)

General Instructions :

(i) There are total **27** *questions and* **four** *sections in the question paper.* **All** *questions are compulsory.*

(ii) Section **A** *contains questions number* **1** *to* **5**, *very short answer type questions of* **one** *mark each.*

(iii) Section **B** *contains questions number* **6** *to* **12**, *short answer type* **I** *questions of* **two** *marks each.*

(iv) Section **C** *contains questions number* **13** *to* **24**, *short answer type* **II** *questions of* **three** *marks each.*

(v) Section **D** *contains question number* **25 to 27**, *long answer type questions of* **five** *marks each.*

(vii) There is no overall choice in the question paper, however, an internal choice is provided in **two** *questions of* **one** *mark,* **two** *questions of* **two** *marks, four questions of* **three** *marks and all the* **three** *questions of* **five** *marks. In these questions, an examinee is to attempt any* **one** *of the* **two** *given alternatives.*

(vii) Wherever necessary, the diagram drawn should be neat and properly labelled.

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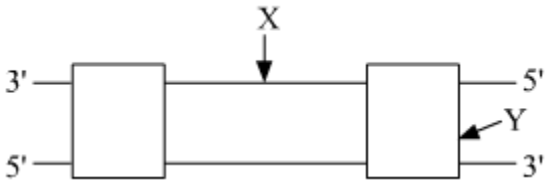
Question 1

What do 'X' and 'Y' represent in the transcription unit of the DNA molecule shown?



SOLUTION:

X - Template strand
Y – Terminator

Question 2

How are the members of genus *Glomus* useful to organic farmers?

SOLUTION:

Glomus belongs to a group of fungi which form mycorrhiza. They form symbiotic association with plants and absorb phosphorous from soil and pass it to the plants. Such associations help the plants in other ways as well - resistance to root borne pathogens, tolerance to salinity and drought. This also results in the overall increase in plant growth and development.

Question 3

The diploid number of chromosomes in an angiospermic plant is 16. What will be the number of chromosomes in its endosperm and antipodal cells?

OR

State the reason why pollen grains lose their viability when the tapetum in the anther is malfunctioning.

SOLUTION:

The endosperm is triploid in nature which means it will have 48 chromosomes.
The antipodal cells are haploid in nature which means, they will have 8 chromosomes.

OR

Tapetum is the innermost wall layer which provides nourishment to the developing pollen grains. If the tapetum is malfuntioned, proper nourishment to the pollen grains would not be provided and thus would eventually lose their vaiblity.

Question 4

Biotechnological techniques can help to diagnose the pathogen much before the symptoms of the disease appear in the patient. Suggest any two such techniques.

OR

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Mention the form in which inactive protein toxin is produced by *Bacillus thuringiensis*. How does it get activated in the pest body to kill it?

SOLUTION:

Two such techniques which help to diagnose the pathogen much before the symptoms of the disease appear in the patient are ELISA and PCR.

OR

The bacterium *Bacillus thuringiensis* produces Bt toxin in an inactive form known as protoxin. This inactive toxins gets activated by the alkaline pH in the gut of the insect.

Question 5

Name the disorder in humans with the following karyotype:
(a) 22 pairs of autosomes + XO
(b) 22 pairs of autosomes + 21^{st} chromosome + XY

SOLUTION:

(a) 22 pairs of autosomes + XO - Turner's syndrome
(b) 22 pairs of autosomes + 21^{st} chromosome + XY - Klinefelter's syndrome

Question 6

Humans are categorised as "regulators". Explain how they maintain a constant normal body temperature.

SOLUTION:

Regulators are those organisms which are able to maintain homeostasis by physiological means. During summer, when outside temperature is greater than that of body temperature (37^0C), we start sweating which results in evaporative cooling. During winters, when outside temperature is less than body temperature, we start shivering which is kind of exercise that produces heat and raises the temperature.

Question 7

You are given a tall pea plant and asked to find its genotype. How would you find its genotype? Explain.

SOLUTION:

A tall pea plant can be homozygous (TT) or heterozygous (Tt). In order to find its genotype, a test cross is performed by crossing the tall plant with the dwarf plant and analyzing the results. If the F1 offsprings are all tall, then the genotype of the tall plant is TT; if the offsprings are 50 per cent tall and 50 percent dwarf, then the genotype of the tall plant is Tt.

Case I - TT X tt

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Gametes	t	t
T	**Tt**	**Tt**
T	**Tt**	**Tt**

Case II - Tt X tt

Gametes	t	t
T	**Tt**	**Tt**
t	**tt**	**tt**

Question 8

Scientists are trying to solve the issues of malnutrition and hunger by using microbes. By taking one suitable example, explain how they have been able to help.

SOLUTION:

Conventional agricultural production of cereals, pulses, vegetables, fruits etc. may not be able to meet the demand of food at the rate at which human and animal population is increasing. More than 25 percent of the human population is suffering from hunger and malnutrition. One of the alternate sources of proteins for animal and human nutrition is Single Cell Protein (SCP). Microbes like *Spirulina* can be grown easily and served as protein-rich food. *Spirulina* can easily be grown on materials like straw, molasses, animal manure, waste water from potato processing plants which explains its cost effectivity.

Question 9

MOET is a programme for herd improvement. Write the steps in correct sequence that are carried in the programme.

OR

Why is tobacco smoking associated with rise in blood pressure and emphysema? Explain.

SOLUTION:

Multiple ovulation embryo transfer or MOET is a technique used in animal breeding to increase the number of progenies. It involves the following steps:

(a) A cow or other female animal is administered with hormones with FSH like activity. As a result, the cow superovulates i.e. instead of producing one egg produces 6-8 egg per cycle.

(b) The cow is then artificially inseminated or mated with a superior quality bull and fertilization occurs.

(c)The subsequently formed embryo are recovered at 8-32 cells stage from the cow by

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nonsurgical procedures and are implanted in surrogate mothers. As a result, multiple progenies are obtained from a pair of superior animals in a shorter time.

OR

Tobacco contains a large number of chemical substances including nicotine which is an alkaloid. Nicotine stimulates adrenal gland to release adrenaline and nor-adrenaline into blood circulation, both of which raise blood pressure and increase heart rate. Smoking tobacco is associated with a reduction of the surface area of alveoli, causing emphysema.

Question 10

(a) How will you measure population density of fish in a lake?
(b) In a pond there are 100 frogs. 20 more were born in a year. Calculate the birth rate of this population.

OR

Draw a "stable" human age pyramid. Comment on the population growth rate that is depicted by it.

SOLUTION:

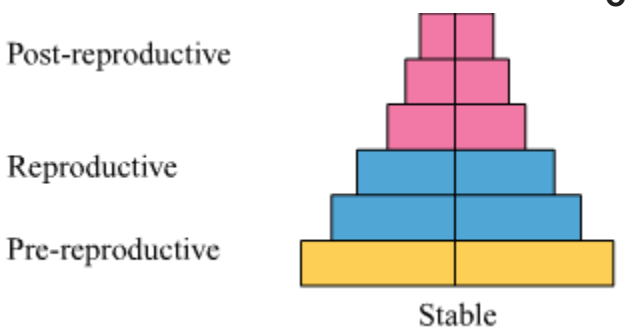
(a) Population density is a measure to determine the number of individuals of a species in a particular unit area. But, sometimes it is not practical to count the number of individuals of a species. Therefore, in some cases, relative densities are used to determine the population size in the given area. The population density of fish is determined by fish caught per trap.

(b) Birth Rate = $\frac{\text{number of births}}{\text{total population}} \times 100$

$= \frac{20 \times 100}{120}$

= 16.66 per year

OR



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The population shows less number of individuals in the pre-reproductive age while the number of individuals in reproductive and post-reproductive age structures are almost equal.

Question 11
What is cryopreservation? Mention how it is used in conservation of biodiversity.

SOLUTION:
Cryopreservation is a method to preserve cell or tissue structures in an extremely cold environment (-196 degree Celsius) by using liquid Nitrogen. Extreme cold conditions cease any metabolism. Cryopreservation is used in the preservation of pollens, seeds and other imprints of biodiversity. This acts as a gene bank which can sustain diversity in the face of catastrophic events like wars.

Question 12
How can childless couples be helped by the following assisted reproductive technologies :
(a) GIFT
(b) Cytoplasmic Sperm Injection

SOLUTION:
(a) GIFT: Gamete Intra Fallopian Transfer involves removal of eggs from the female and mixing it with sperms followed by immediately placing them back into the fallopian tubes. Fertilisation takes place in the fallopian tube. This helps couples

- where the male partner has a low sperm count
- the couple is reluctant to use IVF

(b) Cytoplasmic Sperm Injection: This involves injecting the sperm through a microneedle into a single ovum which is carefully held over a micropipette. This helps couples where the male partner has a low sperm count.

Question 13
Draw a diagram of LS of Maize grain and label its any six parts.

SOLUTION:
(Any 6 can be labelled)

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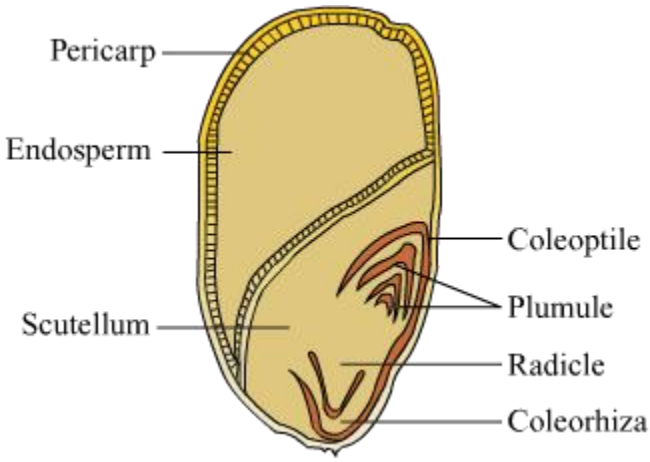
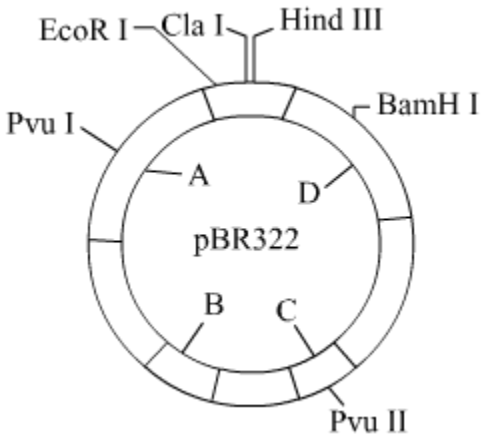


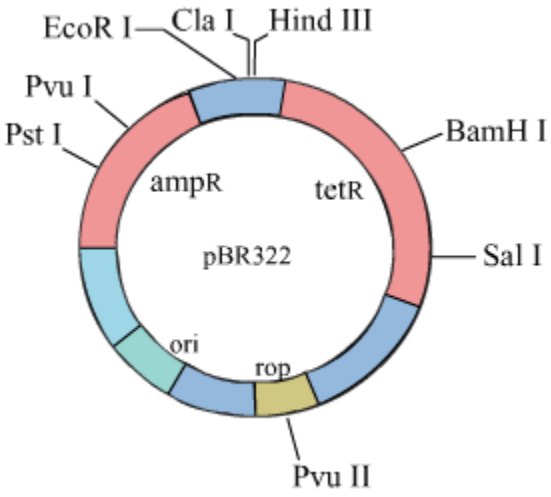
Question 14

Study the figure of vector pBR322 given below.



Identify A, B, C and D and explain their roles in cloning a vector.

SOLUTION:



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a: amp^R (ampicillin resistance gene) - It acts as selectable marker which provides resistance against antibiotic ampicillin.
b: ori (origin of replication) - This sequence acts as site from where replication starts. This sequence also controls copy number of linked DNA.
c: rop (repressor of primer) - It is responsible for restricting the plasmid copy number.
d: tet^R (tetracycline resistance gene) - It acts as selectable marker which provides resistance against antibiotic tetracyclin.

Question 15
Compare the mechanism of evolution as put forth by Charles Darwin and de Vries.

SOLUTION:
Darwin's theory of evolution via natural selection- According to Darwin, evolution took place by natural selection. The number of life forms depends upon their ability to multiply and their life span. Another aspect of natural selection is the survival of the fittest, where nature selects the individuals, which are most fit, to adapt to their environment. Darwin also observed that variations are inheritable & were small and directional.

Hugo deVries mutation theory:- Based on his work on evening primrose, he believed that it is a large mutation which causes evolution and not the minor variations (heritable). Mutations are random and directionless. He gave the name saltation (single step large mutation) to the mutations which brought about speciation.

Question 16
(a) A patient had suffered myocardial infarction and clots were found in his blood vessels. Name a 'clot buster' that can be used to dissolve the clots and the micro-organism from which it is obtained.
(b) A woman had just undergone a kidney transplant. A bioactive molecular drug is administered to oppose kidney rejection by the body. What is the bioactive molecule? Name the microbe from which this is extracted.
(c) What do doctors prescribe to lower the blood cholesterol level in patients with high blood cholesterol? Name the source organism from which this drug can be obtained.

SOLUTION:
(a) Streptokinase produced by the bacterium *Streptococcus* is used as clot buster in the patient that had suffered a myocardial infarction.

(b) Cyclosporin A is a bioactive molecule that acts as an immunosuppressive agent in organ-transplant patients. It is produced by the fungus *Trichoderma polysporum*.

(c) Statins produced by the yeast *Monascus purpureus* have been commercialized as

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blood-cholesterol lowering agents. These act as 'clot buster' that can be used to dissolve the clots.

Question 17

Give reasons for the following:

(a) Antibody mediated immunity is called humoral immunity.

(b) How is a child protected from a disease for which he/she is vaccinated?

(c) Name the type of cells the AIDS virus enters after getting into the human body.

OR

(a) Identify the nos. (i) to (iv) in the following table:

	Name of Disease	**Causative Organism**	**Symptoms**
w	Pneumonia	*Streptococcus*	(i)
x	Typhoid	(ii)	High fever, weakness, headache, stomach pain
y	(iii)	Rhinoviruses	Nasal congestion and discharge, sore throat, cough, headache
z	Ascariasis	*Ascaris*	(iv)

(b) Which ones of the above mentioned diseases are transmitted through mechanical carriers?

SOLUTION:

(a) Antibodies are the immunoglobulins that are produced by the B-lymphocytes. Since these antibodies are formed in the blood, the immune response is called a humoral immune response.

(b) The principle of vaccination is based on the principle of 'memory' of the immune system. In vaccination, a preparation of antigenic proteins of pathogens or inactivated pathogens (vaccine) is introduced in the body. The antibodies produced in the body against these antigens would neutralize the pathogenic agents during actual infection. This is how a child is protected from a disease for which he/she is vaccinated.

(c) After getting into the body, the AIDS virus (HIV) enters into macrophages. Simultaneously, the virus enters into helper T-lymphocytes (T_H).

OR

(a)

(i) Fever, chills, cough, and headache; in severe cases, the lips and fingernails may gray to bluish in color

(ii) *Salmonella typhi*

(iii) Common cold

(iv) Internal bleeding, muscular pain, fever, anemia and blockage of intestinal passage

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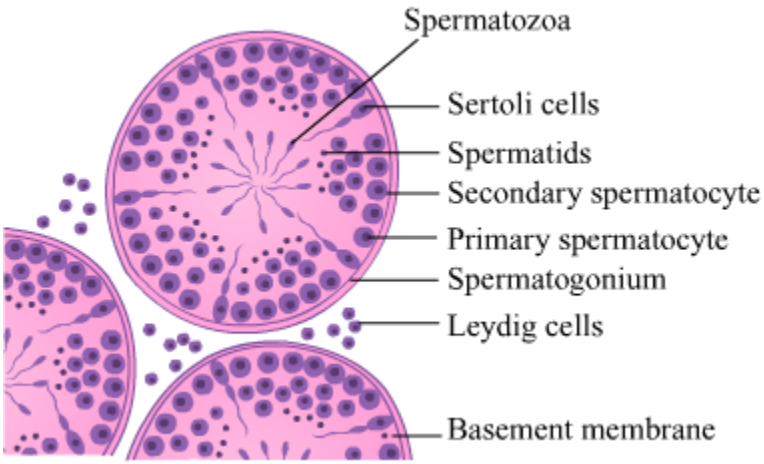
(b) None of the above-mentioned diseases are transmitted through mechanical carriers.

Question 18

Draw a diagram of the sectional view of a human seminiferous tubule and label any six of its parts.

(Any 6 can be labelled)

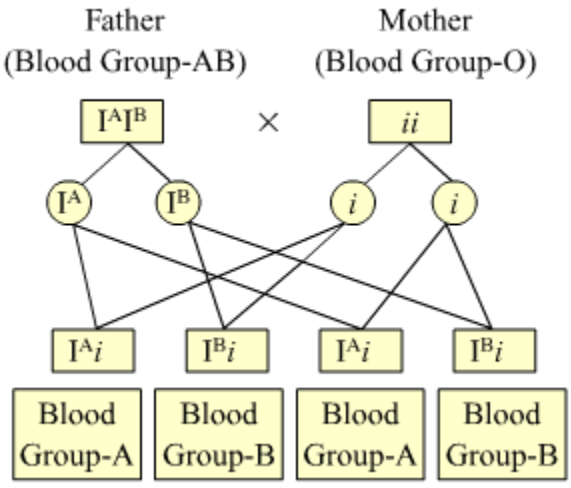


Question 19

A woman with 'O blood group' marries a man with 'AB blood group'. Work out the cross to show all the possible phenotypes and genotypes of the progeny with respect to blood groups. Explain the pattern of inheritance observed in this cross.

SOLUTION:

The pattern of inheritance involved in this cross is co-dominance, wherein, the F_1 generation resembles both parents. Alleles I^A and I^B are co-dominant while allele i is recessive.



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Question 20

(a) What is the breeding of crops for enhancing their nutritional value called? Why is the need felt for enhancing the nutritional value of the crops?

(b) Rice, wheat and maize are the most commonly used food grains the world over. How have these grains improved in their nutritional value in comparison to their conventional varieties?

OR

(a) Write the scientific names of the source plants from where opioids and canabinoids are extracted.

(b) Write their receptor sites in the human body. How do these drugs affect the human beings?

SOLUTION:

(a) Breeding of crops to increase their nutritive value is termed as biofortification. Biofortification increases the nutritive value of food crops and thus reduces under-nutrition and deficiency of required nutrients.

(b) Biofortified maize has double the amount of essential amino acids like lysine and tryptophan. Biofortified wheat Atlas 66 has higher protein content. In general bio-fortified crops contain:

(i) More protein content
(ii) More micronutrients
(iii) More vitamins and essential amino acids

OR

(a) *Papaver somniferum* or the opium plant is the source of many opioids and canabinoids.

(b) Opioid receptors are present in human brain, spinal cord, intestine and stomach. Abuse of opioids activates the opioid receptors leading to lung edema, respiratory problems, cardiac or respiratory collapse. Abuse of opioids leads to dose tolerance and physiological dependence on opioids.

Question 21

Write by taking a suitable example, the convention followed for naming the restriction enzymes.

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SOLUTION:

Restriction enzyme names are based on the species from which they are isolated.
For example:- Restriction enzyme BamHI got its name from its source species *Bacillus amyloliquifaciens*.
"B" comes from the first letter of the genus name (*Bacillus*).
"am" comes from first two letters of species name (*amyloliquifaciens*).
"H" comes from strain of the species that is H.
Roman letter "I" represent the order in which the enzyme was isolated from the species.

Question 22

Hershey and Chase carried out their experiment under three steps:
(a) Infection, (b) Blending, and (c) Centrifugation. Explain each one of these steps that helped them to prove that DNA is the hereditary material.

OR

(a) Why does DNA replication occur within a replication fork and not in its entire length simultaneously?
(b) "DNA replication is continuous and discontinuous on the two strands within the replication fork." Give reasons.

SOLUTION:

Alfred Hershey and Martha Chase performed an experiment to prove that DNA is the genetic material.The model organism they chose to work on this experiment was bacteriophage. A bacteriophage is the viruses that infect a bacteria.When a bacteriophage infects a bacteria, the genetic material of the virus gets attached to the genetic material of bacteria. The bacteria then consider the viral genetic material as their own to synthesize more virus proteins or particles.

Hershey and chase objective was to discover whether it was the protein or DNA that entered the bacteria from the virus.
a.) Infection: They labelled some bacteriophages with radioactive sulphur and other with radioactive phosphorus. These radioactive phages were used to infect *E. coli* which enabled the viruses to attach to the bacterial cells and eventually would result in the passing of their genetic material to the bacterial cells.
b.)Blending: After infection, the next step is blending. In this step the cells are agitated in a blender to separate the bacterium cells from the viral coats.
c.) Centrifugation: Blending is followed by centrifugation in which the virus particles were separated from the bacterial cells by spinning in a centrifuge.

Observation:
The bacteria with radioactive DNA were radioactive but the radioactive proteins lost their radioactivity.
This proved that it is DNA that enters bacteria from viruses and not proteins. Hence, it was proved that DNA is the genetic material.

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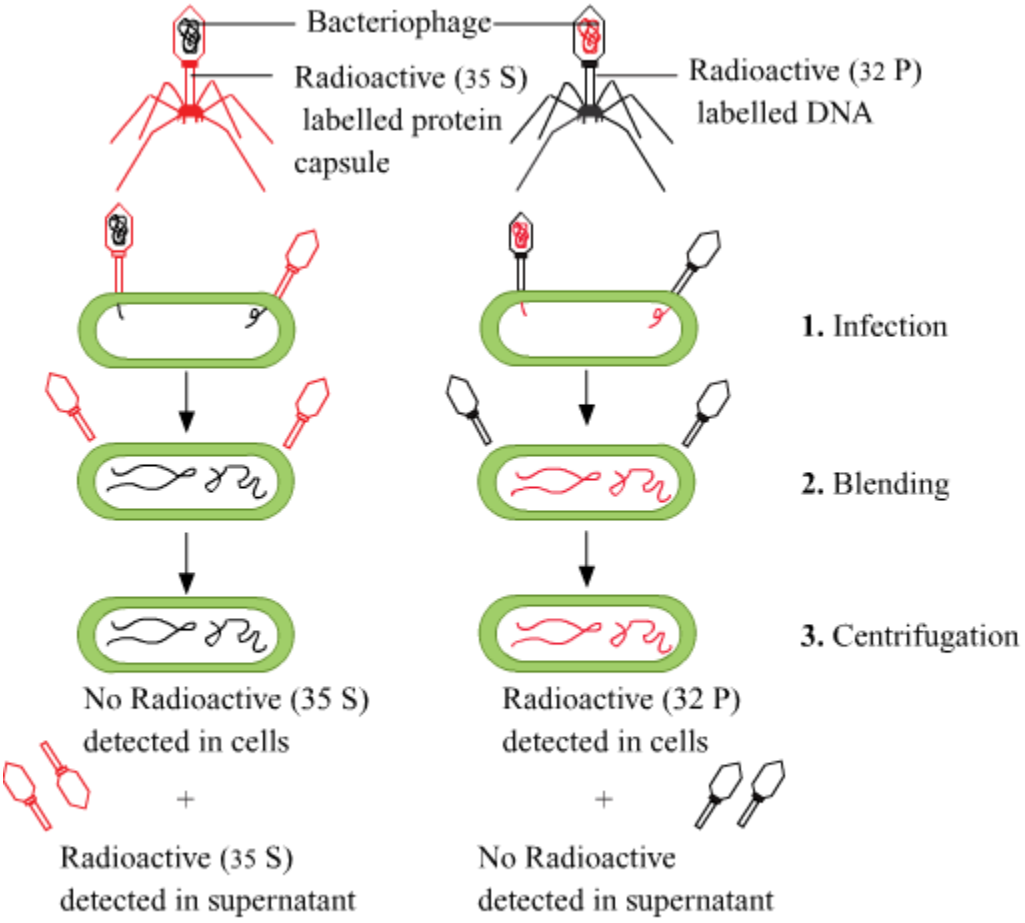

Hershey and Chase experiment

OR

a.) DNA replication occurs in small replication forks not in its entire length in one time as DNA is a very large molecule and only that part of DNA opens up which is being replicated. Opening of whole DNA molecule would be energetically more expensive process.

b.) The main enzyme involved in DNA replication is the DNA-dependent DNA polymerase. This enzyme catalyses the polymerisation of deoxynucleotides along the 5' → 3' direction, and hence, replication is continuous along the 3' → 5' strand (leading strand) and discontinuous along the template, i.e., the 5' → 3' direction (lagging strand). Okazaki fragments are short DNA segments on the lagging strand, formed in the 5' – 3' direction, starting from RNA primers. A separate RNA primer is needed for the synthesis of each Okazaki fragment. These discontinuously synthesized fragments are later joined by the enzyme DNA ligase.

Question 23

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Restriction endonucleases have played a very significant role in rDNA technology. Explain the roles of EcoRI and DNA ligase in formation of recombinant DNA.

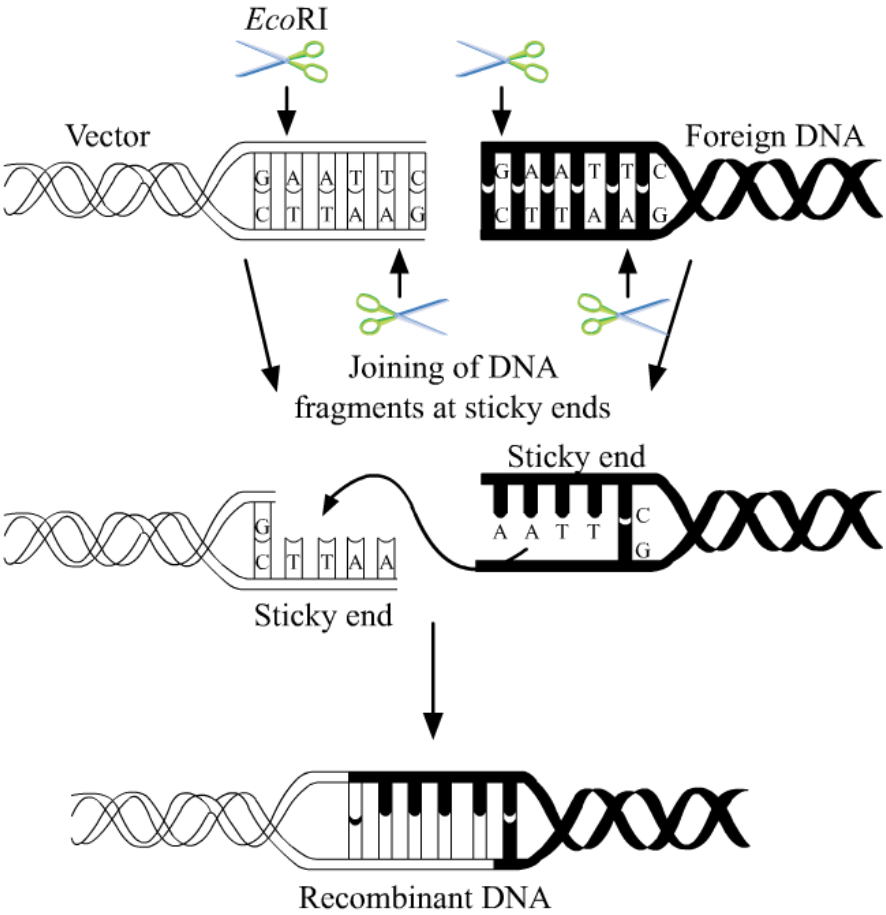
SOLUTION:

Recombinant DNA Technology implies engineering an organism's DNA to host a gene of interest that imparts to it the desired characteristic. For the said need, it is required to isolate the gene from the source organism and amalgamate it with the vector that will carry the gene to the host.

EcoRI is a restriction endonuclease. It is an enzyme that is able to cut the DNA at a specific palindromic recognition sequence (GAATTC). We use this to cut both the desired gene and the vector's DNA. Because of the specificity, both will be cut at the same sequence, and given complementarity, will be attracted to the other segments as they are sticky ends. We can expect a fair probable attraction between the desired gene and the vector's DNA which was cut by the same enzyme.

DNA Ligase is another enzyme that joins these segments by creating phosphodiester bonds between the segments, thereby creating our recombinant DNA.

Hence, we can see both the enzymes have pivotal roles in recombinant DNA technology.



Question 24

Describe the phosphorus cycle in an ecosystem.

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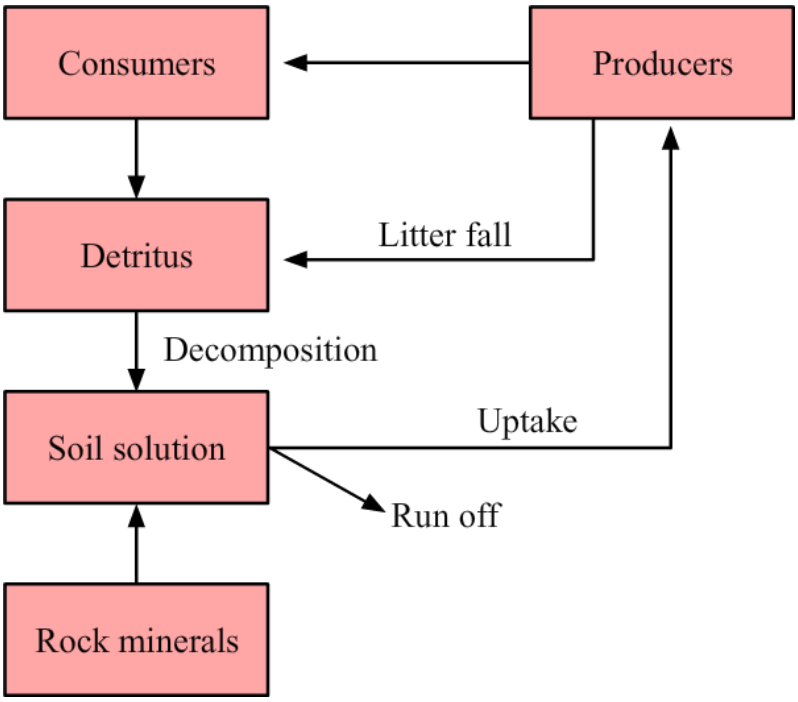
SOLUTION:

Phosphorus is a major constituent of nucleic acid, phospholipids and ATP, which makes it important for life.
The largest reservoir of phosphorus is sedimentary rocks and soil. Weathering adds phosphorus in forms of phosphates to soil from where it is absorbed by producers and incorporated into biological molecules. It passes to the consumers through the food chain. It is returned to soil via excretion by consumers or degradation of biomass.



Question 25

(a) Describe the experiment conducted by F. Griffith in 1928 with *Streptococcus pneumoniae* and write the conclusions he arrived at.

(b) State the contribution of Avery, MacLeod and McCarty in providing biochemical nature to the results as obtained by Griffith.

SOLUTION:

(a) Frederick Griffith in 1928 conducted his experiment based on *Streptococcus pneumonia*.
There are two colonies of this bacteria -
S - Strains are those cells that form smooth shiny colonies protected by a capsule and are virulent.
R - Strains are those cells that form rough colonies without a capsule and non-virulent.

- He injected S-strains bacteria into healthy mice, which developed pneumonia and died. He named these S-type bacteria as pathogenic.

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- He found R-strains bacteria were non-pathogenic.
- He then heat-killed S-strain bacteria and injected into healthy mice, and the mice remained healthy.
- Then he heat-killed S-strain bacteria and mixed with R-strain living bacteria and injected this mixture into healthy mice. Mice developed pneumonia and died.
- He isolated the bacteria from the dead mice and found they were of living S-type and R-type.
- He concluded that the R-strain bacteria had somehow been transformed by the heat-killed S-strain bacteria. Griffith termed this as 'transformation'. He could not define the nature of the transforming material.

(b) O. T. Avery, McLeod and McCarty repeated the experiments of Griffith and found that when living R cells were mixed with the capsule of heat-killed S type and injected into mice, there was no disease.

They took the cell extract from the S-strain. They treated these cell extracts with DNase (degrades DNA) and separately as well with a protease that cleaves the proteins.
Followed by which they mixed the treated cell extract with the R-strain (non-pathogenic).
The sample was incubated and then injected into mice.
They noticed that the extract treated with protease led to the development of S-strain (virulent), as DNA is not digested here.
The extract treated with DNase did not cause transformation into the virulent form, as DNA wass digested here. Thus, DNA as the genetic material was established.

Question 26

(a) State what is an ecological succession.
(b) Write one similarity and one difference between hydarch and xerarch successions.
(c) Explain the mechanism of co-evolution as seen in orchid *Ophrys* and bee.

OR

(a) List any two ways the biodiversity loss affects any region.
(b) Explain any two causes of biodiversity loss, with the help of suitable examples.

SOLUTION:

(a) The gradual and fairly predictable change in the species composition of a given area is called the ecological succession. During succession, some species colonize an area and their populations become more numerous, whereas populations of other species decline and even disappear.

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(b) The similarity between hydrach and xerarch succession is that both the successions lead to medium water conditions (mesic) that are neither too dry (xeric) nor too wet (hydric).

The difference between hydrarch and xerarch succession is that the pioneer species in former are lichens while in latter, the phytoplankton is the pioneer species.

(c) Mediterranean orchid *Ophrys* employs 'sexual deceit' to ensure its pollination by bees. Here, one petal of its flower bears an uncanny resemblance to the female of the bee in size, color, and markings. The male bee is attracted to what it perceives as a female, 'pseudocopulates' with the flower, and during that process is dusted with pollen from the flower. When this same bee 'pseudocopulates' with another flower, it transfers pollen to it and thus, pollinates the flower. This is a mechanism of co-evolution. If the female bee's color patterns change even slightly for any reason during evolution, pollination success will be reduced unless the orchid flower co-evolves to maintain the resemblance of its petal to the female bee.

OR

(a) Loss of biodiversity in a region may lead to :
(i) a decline in plant production,
(ii) lowered resistance to environmental perturbations such as drought.

(b) The cause of biodiversity loss are as follows:

(i) Habitat loss and fragmentation: The most dramatic examples of habitat loss come from tropical rain forests. Once covering more than 14 percent of the earth's land surface, these now cover no more than 6 percent. When large habitats are broken up into small fragments due to various human activities, mammals and birds requiring large territories are badly affected, leading to population declines.

(ii) Over-exploitation: Many species extinctions in the last 500 years, such as Steller's sea cow, passenger pigeon etc. were due to over-exploitation by humans. Presently, many marine fish populations around the world are over-harvested, endangering the continued existence of some commercially important species.

Question 27
(a) Draw the embryo sac of a flowering plant and label the following :
(i) Central cell
(ii) Chalazal end
(iii) Synergids

(b) Name the cell and explain the process it undergoes to develop into an embryo sac.

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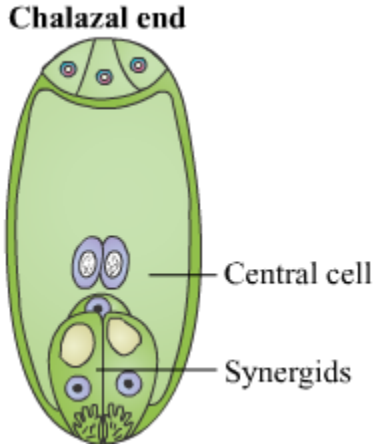
(c) Explain the development of endosperm in coconut.

OR

Write the duration and the events that occur in the ovary and the uterus during follicular and luteal phases of the menstrual cycle in humans. How do pituitary and ovarian hormones influence these two phases?

SOLUTION:

(a)



(b) Megasporogenesis is the process of formation of megaspores from megaspore mother cells (MMC). The megaspore mother cell (MMC) undergoes meiosis and forms a linear tetrad of 4 haploid megaspores. The process of meiotic formation of haploid megaspores from diploid megaspore mother cell is called megasporogenesis. Commonly the chalazal megaspore remains functional while the other 3 degenerate. The functional megaspore is the first cell of the female gametophyte. The cell enlarges and undergoes three free nuclear mitotic divisions. The first division produces two nucleate embryo sac. The two nuclei shift to the two ends and divide there twice forming four nucleate and then eight nucleate structure.
One nucleus from each side moves to the middle. They are called polar nuclei. The remaining three nuclei form cells at the two ends, 3 celled egg apparatus at the micropylar end and three antipodal cells at the chalazal end.
The middle bi-nucleate part organises itself into a central cell. Embryo sac developed from a single megaspore is called monosporic.

(c) The Primary Endosperm Nucleus (3n) undergoes nuclear divisions to give rise to free nuclear endosperm, also known as coconut water. A part of it undergoes cytokineses and forms the cellular endosperm, which is the white kernel.

OR

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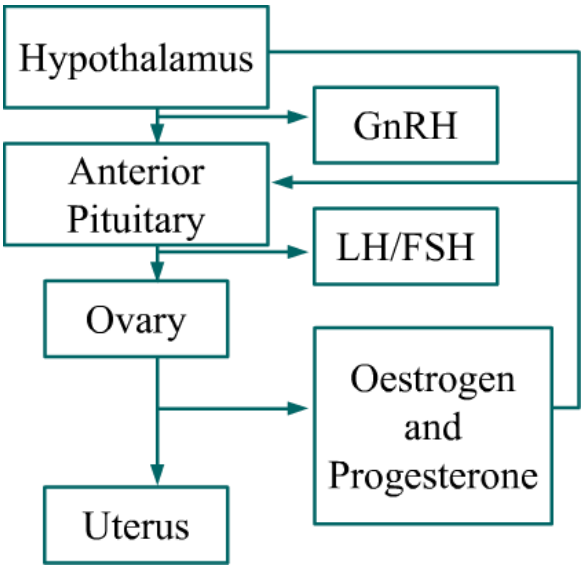
The ovarian cycle, which extends for 28-29 days is distributed in two stages: the follicular phase and the luteal phase.
The follicular phase marks the development of the egg in follicles inside ovary and ends with ovulation, the release of the egg from the ovary, which happens around 15th day of the cycle. The luteal phase follows the follicular phase.
The first 3-5 days of the menstrual cycle marks menstruation or discharge of blood and tissues from the uterus which is because of the low levels of FSH and LH.

Upon stimulation from the hypothalamus, via GnRH, anterior pituitary releases FSH and LH.
FSH stimulates the growth of follicles in the ovary. Estradiol, a secretion of follicles, rises and stimulates a release of FSH and LH. A peak of the FSH and LH level causes ovulation to occur (on the 15th day) with the release of secondary oocyte. Estradiol also stimulates thickening of the endometrium lining.

LH causes the remaining follicular tissue to form a glandular corpus luteum. Corpus luteum starts secreting progesterone and estradiol. This has two consequences:

- It exerts negative feedback on the hypothalamus thereby decreasing FSH and LH levels.
- It stimulates further development of the uterine lining.

If pregnancy doesn't occur, a deficit of gonadotropins leads to the disintegration of corpus luteum. A decrease in ovarian hormone levels causes the arteries to constrict and leads to the shredding of the uterine lining (menstruation).
The deficit in gonadotropins removes the negative feedback on the hypothalamus and the cycle begins again with GnRH release.



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