Class XII Session 2023-24
Subject - Biology
Sample Question Paper – 9

Maximum Marks: 70 **Time: 3 Hours**

General Instructions:

(i) All questions are compulsory.
(ii) The question paper has five sections and 33 questions. All questions are compulsory.
(iii) Section-A has 16 questions of 1 mark each; Section-B has 5 questions of 2 marks each; Section- C has 7 questions of 3 marks each; Section- D has 2 case-based questions of 4 marks each; and Section-E has 3 questions of 5 marks each.
(iv) There is no overall choice. However, internal choices have been provided in some questions. A student has to attempt only one of the alternatives in such questions.
(v) Wherever necessary, neat and properly labeled diagrams should be drawn.

SECTION-A

1. If a double stranded DNA has 20% of cytosine, what will be the percentage of adenine in it?
(a) 20%
(b) 40%
(c) 30%
(d) 60%

2. The given Punnett's square represents the pattern of inheritance in a dihybrid cross where yellow (Y) and round (R) seed condition is dominant over white (y) and wrinkled (r) seed condition.

	YR	Yr	yR	yr
YR	F	J	N	R
Yr	G	K	O	S
yR	H	L	P	T
yr	I	M	Q	U

A plant of type 'H' will produce seeds with the genotype identical to seeds produced by the plants of

(a) type M
(b) type J
(c) type P
(d) type N.

3. Hardy-Weinberg equilibrium is known to be essentially affected by factors like, gene flow, genetic drift, mutation, genetic recombination and
(a) evolution
(c) saltation
(b) limiting factors
(d) natural selection.

4. If most individuals in a population are young, why is the population likely to grow rapidly in the future?
(a) Many individuals will begin to reproduce soon
(b) Death rates will be low
(c) Immigration and emigration can be ignored
(d) All of these

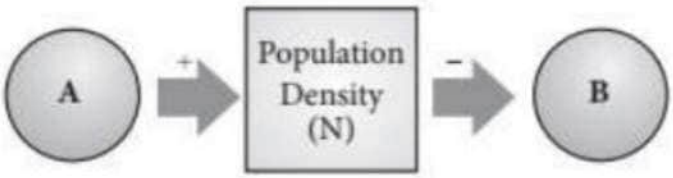
5. Which of the following is a cause of transmission of HIV?
(a) Multiple sexual partners
(c) Sharing infected needles
(b) Transfusion of contaminated blood
(d) All of these

6. Plasmid used to construct the first recombinant DNA was isolated from which bacterium species?
(a) Escherichia coli
(c) Agrobacterium tumefaciens
(b) Salmonella typhimurium
(d) Thermus aquaticus

7. Match column I with column II and select the correct option from the given codes.
(a) A-(iv), B-(i), C-(iii), D-(ii)
(b) A-(i), B-(iii), C-(ii), D-(iv)
(c) A-(ii), B-(i), C-(iii), D-(iv)
(d) A-(iv), B-(ii), C-(i), D-(iii)

8. The density of a population in a given habitat during a given period, fluctuates due to changes in certain basic processes. On this basis, fill up boxes A and B in the given flow chart with

correct option.



(a) A- Natality, B - Mortality
(b) A-Immigration, B - Emigration
(c) A- Natality, B - Immigration
(d) Both (a) and (b)

9. Microbes are used in
I. primary treatment of sewage
II. secondary treatment of sewage
III. anaerobic sludge digesters
IV. production of biogas.
Choose the correct option.
(a) I, II and III
(b) I, III and IV
(c) II, III and IV
(d) I, II, III and IV
(d) Amylase

10. Which enzyme helps in removing oil stains from clothes?
(a) Streptokinase
(b) Trypsin
(c) Lipase
(d) Amylase

11. The given table shows differences between spermatogenesis and spermiogenesis. Select the incorrect option.

	Spermatogenesis	Spermiogenesis
(a)	Process of formation of spermatozoa.	Process of differentiation of spermatozoon from a spermatid.
(b)	It changes a haploid structure into another haploid structure.	It involves conversion of a diploid structure into haploid structure.
(c)	Growth and divisions occur.	Divisions and growth are absent.
(d)	A spermatogonium forms four spermatozoa.	A spermatid forms a single spermatozoon.

12. Primary endosperm nucleus (PEN) is formed by the fusion of
(a) 2 polar nuclei + 1 synergid cell nucleus
(b) 1 polar nucleus + 1 antipodal cell nucleus + 1 synergid cell nucleus
(c) 2 polar nuclei + 1 male gamete nucleus
(d) 2 antipodal cell nuclei + 1 male gamete nucleus.

Question No. 13 to 16 consist of two statements - Assertion (A) and Reason (R). Answer these questions selecting the appropriate option given below:
(a) Both A and R are true and R is the correct explanation of A.
(b) Both A and R are true and R is not the correct explanation of A.
(c) A is true but R is false.
(d) A is false but R is true.

13. Assertion: Tropical regions have got a long evolutionary time for species diversification as compared to temperate regions.
Reason: Temperate regions have undergone frequent glaciations in the past whereas tropical regions have remained relatively undisturbed for millions of years.

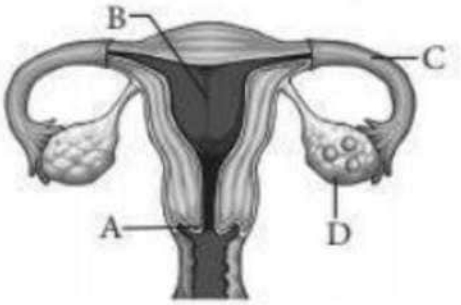
14. Assertion: Temperature and soil moisture are the important climatic factors that regulate the process of decomposition.
Reason: Warm and moist environment favours decomposition whereas low temperature and anaerobiosis inhibit decomposition.

15. Assertion: Emigration is outward movement of some individuals from local population.
Reason: Emigration is caused by occurrence of deficiencies and calamities.

16. Assertion: Vigorous contraction of the uterus at the end of pregnancy causes expulsion of the fetus.
Reason: The stimulatory reflex between the uterine contraction and oxytocin secretion results in weakening contractions.

SECTION – B

17. Refer to the given figure of human female reproductive system and answer the following questions.



(a) Write the function of part labelled as C?
(b) What is ovulation? Which of the labelled part is involved in this process?

18. Differentiate between male and female heterogamety.

19. A student on a school picnic to a park on a windy day started sneezing and having difficulty in breathing on reaching the park. The teacher enquired whether the student was allergic to something.
(a) What is an allergy?
(b) Write the two unique characteristics of the system involved in the response observed in the student.

20. How are the desirable DNA sequences cut?

21. "It is possible that a species may occupy more than one trophic level in an ecosystem at the same time". Explain with the help of one example.

OR

Why is earthworm considered a farmer's friend? Explain humification and mineralisation occurring in a decomposition cycle.

SECTION-C

22. Explain the process of microsporogenesis in angiosperms.

23. Which chromosomes carry the mutant genes causing thalassemia in humans? What are the problems caused by these mutant genes?

24. "Biotechnology is used to develop pest-resistant varieties of cotton plants". Given reason.

25. (a) How many kinds of phenotypes would you expect in F_2 generation in a monohybrid cross exhibiting co-dominance?
(b) How co-dominance is different from dominance?

26. How is 'oogenesis' markedly different from 'spermatogenesis' with respect to the growth till puberty in the humans?

OR

Name the pituitary hormones involved in the process of spermatogenesis. State their function.

27. (a) How can you measure population density of a habitat?
(b) Mention the essential information that can be obtained by studying the population density of an organism.

28. How does the HIV breakdown the immune system of the AIDS patient?

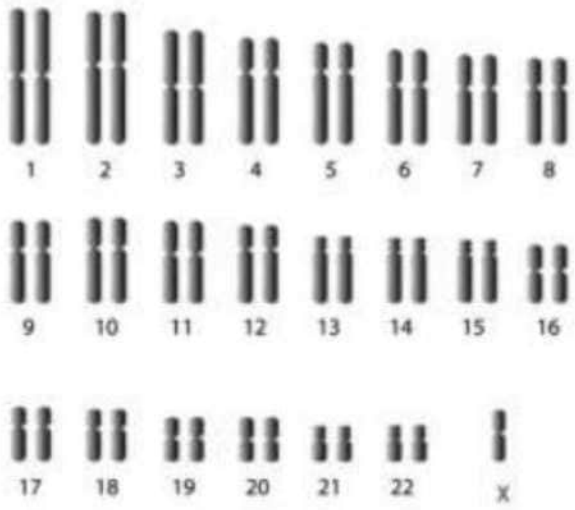
SECTION – D

Q. No. 29 and 30 are case based questions. Each question has 3 subparts with internal choice in one subpart.

29. A person gave blood at a blood donation camp where the nurse recklessly injected used syringe. After that, he suffered from bouts of fever, diarrhoea and weight loss and experienced weakness. The levels of helper T-lymphocytes and interferons showed significant change. Doctor suggested he was suffering from severe viral infection.
(a) Name the diagnostic test for the given condition.

OR

Name the virus and enzyme responsible for its replication.
(b) Mention two measures for preventing this viral infection.
(c) Name the cells of immune system of body that are affected by this infection. Also, mention its role.
30. Given below shows karyotype of a child who is suffering from a sex chromosomal abnormality which occurs during failure of segregation of chromatids during cell division cycle. This results in the gain or loss of a chromosome (s), called aneuploidy.



(a) Name the type of aneuploidy shown in this disease.
(b) Write the chromosomal complement of the child.
(c) How does sex chromosomal abnormality occurred in the child?

OR

Mention the diagnostic features of the disease.

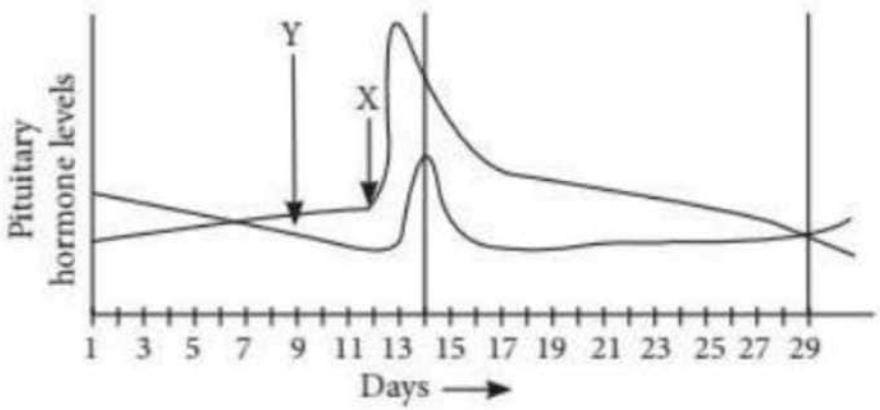
SECTION-E

31. Give reasons why:
(a) DNA cannot pass into a host cell through the cell membrane.
(b) Proteases are added during isolation of DNA for genetic engineering.
(c) Single recognition site is preferred in a vector.
(d) Maintainance of sterile conditions in biotechnological processes.
(e) Genes encoding resistance to antibiotics considered as useful selectable markers for E.coli cloning vector.

OR

Causative agents of HIV-AIDS and COVID-19 belong to the same group of viruses. To diagnose and amplify the genetic material for further study of COVID-19 virus, 'RT-PCR' test is carried out.
(a) What does RT-PCR' stand for?
(b) Explain the various steps of PCR technique.

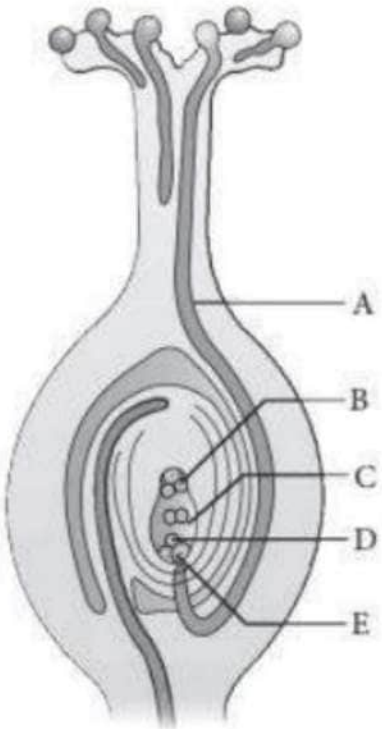
32. Study the graph given below and answer the questions that follow.



(i) Name the hormones 'X' and 'Y'.
(ii) Identify, the ovarian phases during given days of menstrual cycle.
(a) 6th-13th day of the cycle.
(b) 14th day of the cycle.
(c) 15th-28th day of the cycle.
(iii) Explain the ovarian phases (a), (b) and (c) under the influence of hormones 'X' and 'Y.

OR

Refer the given below figure and answer the questions that follows:



(i) What phenomenon is represented in the above given figure?
(ii) What is the path of entry of pollen tube?
(iii) Label the parts marked as A to E.
(iv) What will happen after entering of pollen into one of the synergids?

33. An experiment 'X' provided evidence in support of 'Y. In this experiment, four gases were circulated -
A 'B', 'C', and 'D' in an air tight apparatus and electrical discharge from electrodes was passed at 800°C. The mixture of gases were passed through a condenser. After a week, the chemical composition of the liquid inside the apparatus was analysed. The results provided evidence through which 'Y' was more or less accepted.
(i) Identify gases A, B, C, D.
(ii) Which theory of origin of life is supported by the above experiment?
(iii) Draw a diagrammatic representation of experiment X.
(iv) What does A, B, C and D together produced in the experiment X?

OR

Explain three different ways in which natural selection can affect the frequency of a heritable trait in a population

SOLUTIONS

1. (c) According to Chargaff's rule, the amount of adenine is always equal to that of thymine and the amount of guanine is always equal to that of cytosine, i.e., A = T and G = C. Also, the purines and pyrimidines are always in equal amounts, i.e., A+ G = T+C. Now, given dsDNA has 20% cytosine and hence guanine will also be 20%. So, A+ T must be 60%. Therefore, percentage of adenine would be 60/2 = 30%. Describes

2. (d): Plant H is formed by fusion of gametes yR and YR and hence has the genotype YYRR. Plant N is formed by fusion of gametes YR and yR and hence will have the same genotype as plant H i.e., YYRR.

3. (d) Hardy-Weinberg principle a theoretical situation in which a population is undergoing no evolutionary change. It states that allele frequencies in a population are stable and constant from generation to generation. There are five factors that affect Hardy-Weinberg Principle. These are mutation, gene flow, genetic drift, genetic recombination and natural selection pressure.

4. (a) Different age groups have different reproductive capabilities. Pre-reproductive individuals are the young individuals which will enter the reproductive age after some time. They are the potential source of increase in population. Reproductive individuals are the ones which are actually adding new members to the population.

5. (d)

6. (b) The first recombinant DNA was constructed by Stanley Cohen and Herbert Boyer in 1972. They cut the piece of DNA from a plasmid carrying antibiotic resistance gene in the bacterium Salmonella typhimurium and linked it to the plasmid of Escherichia coli.

7. (a)

8. (d) Natality and immigration add to the population density. Mortality and emigration decrease the population density.

9. (c) Primary treatment is the physical removal of large and small particles from sewage. Secondary treatment of the liquid effluent from the primary setting-tank is purely a biological treatment involving microbial activity.
In the anaerobic sludge digesters, heterotrophic microbes anaerobically digest organic matter of sludge. They produce mixture of gases such as methane, hydrogen sulphide and CO_2, which form the biogas.

10. (c) A large number of microorganisms are capable of using natural oils and fats as carbon source for their growth. The enzyme responsible for this work is known as lipases. Some

microorganisms like Candida cylindracae, Candida rugosa, Aspergillus niger etc. have been reported for extracellular lipase production. This microbial lipases are used to remove oil stains from clothes.

11. (b) Spermatogenesis involves conversion of a diploid structure (spermatogonia) into haploid structures (spermatozoa). Spermiogenesis changes a haploid structure (spermatid) into another haploid structure (spermatozoon).

12. (c): During the event of double fertilisation in angiosperms, the second male gamete fuses with the two haploid polar nuclei or diploid secondary nucleus of the central cell to form a triploid primary endosperm nucleus (PEN). This second fertilisation is called vegetative fertilisation.

13. (a): Speciation is a function of time. Temperate regions have undergone frequent glaciations in the past, due to which many species had been killed. However, tropical latitudes have remained relatively undisturbed for millions of years and thus, had a long evolutionary time for species diversification.

14. (a)

15. (a)

16. (c): Vigorous contraction of the uterus at the end of pregnancy causes parturition. Parturition is induced by a complex neuroendocrine mechanism. Oxytocin acts on the uterine muscle and causes stronger uterine contractions, which in turn stimulates further secretion of oxytocin. The stimulatory reflex between the uterine contraction and oxytocin secretion continues resulting in stronger and stronger contractions.

17. (a) Part C (Fallopian tube) conveys the ovum from the ovary (D) to the uterus. Fertilisation of the ovum generally takes place in the upper portion of part C.

(b) The release of secondary oocyte from the ovary
(D) is called ovulation.

18. The type of sex determination mechanism shown in female XX with male XY is called male heterogamety because male produces two different types of gametes, e.g., Drosophila. The type of sex determination mechanism shown in female ZW with male ZZ is female heterogamety because female produces two different types of gametes, e.g., birds.

19. (a) Allergy is a hypersensitive response to foreign substances, coming in contact with or entering the body. It is characterised by sneezing, watery eyes, difficulty in breathing, etc.
(b) Two unique characteristics of system involved in allergic response are:

(i) The body will produce IgE antibodies.
(ii) The body will release chemicals like histamine and serotonin from the mast cells.

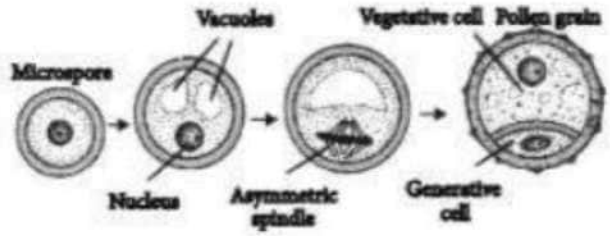
20. Desirable DNA sequences are cut by the use of enzyme restriction endonuclease. When restriction enzymes cut the strand of DNA a little away from the centre of the palindromic sites, between the same two bases on the opposite strands, it leaves single stranded portions at the ends. This forms overhanging stretches called sticky ends on each strand. They are called sticky as they form hydrogen bonds with their complementary cut counterparts. The stickiness of the ends facilitates the action of the enzyme DNA ligase. called sticky as they form hydrogen bonds with their complementary cut counterparts. The stickiness of the ends facilitates the action of the enzyme DNA ligase.

21. In an ecosystem, a species may occupy more than one trophic level simultaneously. As the trophic level represents a functional level, not a species as such. A species may occupy more than one trophic level in the same ecosystem at the same time, for example, a sparrow is a primary consumer when it eat seeds, fruits, etc. and a secondary consumer when it eats insects and worms.

OR

Earthworms are called farmer's friend because they help in fragmentation of detritus, i.e., breakdown of complex organic matter and loosening of the
soil. Humification and mineralisation occur during decomposition in the soil. Humification is the process of formation of highly resistant, dark coloured amorphous substance called humus from detritus or organic remains. Mineralisation is the release of inorganic substances, both non-mineral and minerals from organic matter.

22. In an anther, each cell of the sporogenous tissue is a potential pollen or microspore mother cell (PMC). Each PMC divides by meiosis to form a microspore tetrad. This process is called microsporogenesis. The microspores as they 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. The hard outer layer called the exine is made up of sporopollenin and the inner wall of pollen grain is called intine. When the pollen grain is mature it contains two cells the vegetative and the generative cell. Different stages of microsporogenesis are shown below:



23. Thalassemia is an autosomal, recessive inherited disorder. The defect can occur due to mutation or deletion of the genes controlling the formation of globin chains (commonly a and B) of haemoglobin. a thalassemia is caused by the defective formation of a-globin which is controlled by two genes HBA, and HBA, present on chromosome 16. The mutant gene cause anaemia, jaundice, hepatosplenomegaly and bone changes. All the defective alleles kill the fetus resulting in still birth or death soon after delivery. ß thalassemia is caused due to decreased synthesis of ß globin. The defect is due to alleles of HBB gene present on chromosome 11. It results in severe
haemolytic anaemia, hepatosplenomegaly, cardiac enlargement and skeletal deformities.

24. Two genes crylAc and cryllAb control cotton bollworms. These two genes were isolated from Bacillus thuringiensis and incorporated into cotton plant. The genetically modified plant is called Bt cotton as it contains Bt toxin genes. The bacterium Bacillus thuringiensis produces Bt toxin proteins as inactive protoxins. When the insect larvae (lepidopterans) ingest any plant part, toxin becomes active in the alkaline pH of the gut and kills the insect pests. That is how Bt cotton attains resistance against bollworm.

25. (a) Three types of phenotypes are obtained in a monohybrid cross exhibiting co-dominance. E.g., coat colour in cattle. In F_2 generation, three types of phenotypes were obtained - red, roan and white coat colour.
(b) Differences between dominance and co-dominance are as follows:

	Dominance	Co-dominance
(i)	F_1 is similar to the dominant parent.	F_1 is different from either of the two parents.
(ii)	In F_1 hybrid, the dominant trait is completely expressed.	In F_1 hybird, both the alleles express themselves independently.

26. In spermatogenesis, the growth phase is very short. The spermatogonium actively grows into a larger primary spermatocyte and primary spermatocyte completes the first meiotic division leading to formation of two equal secondary spermatocytes (n). Secondary

spermatocytes undergo second meiotic division to produce spermatid and spermatids transformed into spermatozoa (sperms). In oogenesis, the growth phase is very long. It may extend over many years. The oogonium grows into a large primary oocyte. It then gets surrounded by a layer of granulosa cells to form primary follicle. A large number of these follicles degenerate during the period from birth to puberty. So, at puberty only 60,000 - 80,000 primary follicles are left in each ovary.

OR

Pituitary gland secretes two hormones, FSH and LH. LH acts on Leydig's cells of the testes to secrete testosterone. FSH acts on sertoli cells of the seminiferous tubules of the testes to secrete androgen binding protein (ABP) which concentrates testosterone in seminiferous tubules. FSH acts on spermatogonia to stimulate sperm production.

27. (a) Population density means number of individuals present per unit area or per unit volume of the environment in which the population exists.
We can find out population density of a habitat by determining the population size. The different methods to study population size are as follows:
(i) Quadrat method: It is a method which involves the use of square of particular dimension to measure number of organisms. For example the number of Parthenium plants in a given area can be measured using the quadrat method.
(ii) Direct observation: It involves counting of organisms. For example, in order to determine the number of bacteria growing in a petri dish, their colonies are counted.
(iii) Indirect method: The number of fishes caught per trap gives the measure of their total density in a given water body.
(b) Population has attributes that individual organisms do not. These include birth rate, death rate, sex ratio and age distribution. The proportion of different age groups of males and females in a population is often presented graphically as age pyramid; its shape indicates whether a population is
stationary, growing or declining. Ecological effects of any factor on a population are generally reflected in its size (population density), which may be expressed in different ways (numbers, biomass, percent cover, etc.) depending on the species. The size of the population tells us a lot about its status. By studying the population of an organism, we can also know how population grows through births and immigration and declines through deaths and emigration.

28. Macrophages act as HIV factory in humans. Events that occur in infected cells are:
(i) After the entrance of the virus into the body of the person, the virus enters into macrophages where RNA genome of the virus replicates to form viral DNA with the help of reverse transcriptase enzyme.

(ii) Viral DNA gets incorporated into the host cell's DNA and directs the infected cells to produce viruses.
(iii) Simultaneously HIV virus enters into helper T lymphocytes where it replicates and produces more viruses. This is repeated so that the number of helper T lymphocytes decreases in the body of the infected person.
(iv) Due to decrease in the number of helper T lymphocytes in the body, the person starts suffering from infections and gets immune deficiency as he/ she is unable to protect himself/herself against these infections.

29. (a) AIDS can be diagnosed by enzyme linked immuno sorbent assay (ELISA).

OR

HIV is a member of a group of viruses called retrovirus which have an envelope enclosing the RNA genome. Reverse transcriptase catalyses replication of viral RNA to viral DNA in host cell.
(b) (i) Ensuring the use of only fresh needles or syringe.
(ii) Screening blood before transfusion.
(c) HIV attacks helper T-lymphocytes, (also called CD4 cell, i.e., cluster of differentiation), due to which there is reduction in their number. Helper T-cells stimulate antibody production by B cells. This result in loss of natural defence against viral infection.

30. (a) Given karyotype shows Turner syndrome which occurs due to monosomy (2n-1).
(b) Genotype of the child is 44 + XO i.e., 2n = 45 chromosomes.
(c) Turner syndrome occurs by the union of an allosome free egg (22 + O) and a normal X sperm or a normal egg and an allosome free sperm (22 + 0). Thus, the individual has 2n = 45 chromosomes (44+ XO) instead of 46.

OR

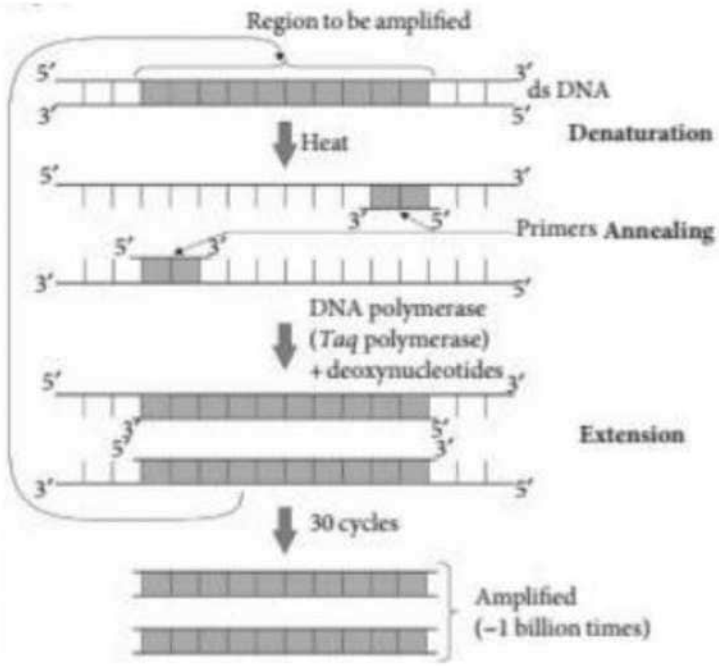
Diagnostic features of Turner's syndrome are: Underdevelop ovaries and breasts, small uterus, absence of menstruation, short stature, webbed neck, cardiovascular abnormalities, abnormal intelligence.

31. (a) DNA is a hydrophilic molecule, so it cannot pass into a host cell through cell membrane. The cell membrane consists of lipid bilayers that are generally impermeable to hydrophilic molecules.
(b) DNA is interwined with proteins like histones and RNA. To obtain purified DNA, proteases are added during isolation of DNA which convert proteins into amino acids. The purified DNA finally precipitates out after the addition of chilled ethanol.

(c) In order to link the alien DNA, the vector needs to have very few, preferably single recognition sites for the commonly used restriction enzymes. Presence of more than one recognition sites within the vector will generate several fragments, which will complicate the gene cloning process.
(d) Sterile conditions enable growth of only the desired microbe/eukaryotic cell in large quantities for the biotechnological products like antibiotics, enzymes, etc.
(e) Genes encoding resistance to antibiotics are considered useful selectable markers for E. coli cloning vector because they help in selecting transformant cell from non-transformant ones.

OR

(a) RT-PCR stands for Reverse transcriptase - Polymerase chain reaction.
(b) The various steps of polymerase chain reaction are:
(i) Denaturation: The target DNA is heated to a high temperature of 92-94°C resulting in the separation of its two strands. Each single strand of the DNA then acts as a template for DNA synthesis. primers hybridise to form each of the single stranded template DNA, since the sequence of the primer is complementary to the 3′ end of the template DNA.
(iii) Extension of primer: The Taq DNA polymerase synthesises the DNA region between the primers, using DNTPs (deoxynucleoside triphosphate) and Mg2+

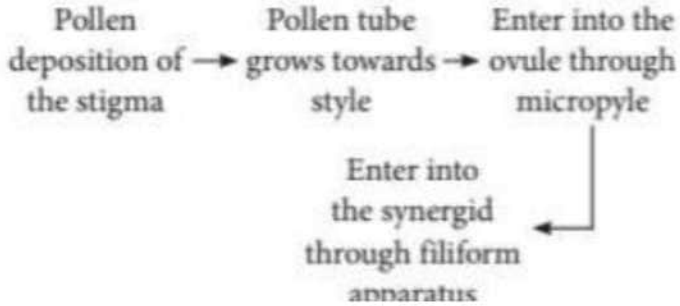


32. (1) Hormone 'X' is luteinising hormone (LH) and 'Y' is follicle stimulating hormone (FSH).
(ii) (a) Follicular phase (proliferative phase)
(b) Ovulatory phase (release of ovum)

(c) Luteal phase (secretory phase)
(iii) (a) Follicular phase-FSH is secreted by the anterior pituitary, that stimulates the ovarian follicle to secrete estrogen, which stimulates the proliferation of the endometrium of the uterine wall.
(b) Ovulatory phase - Both LH and FSH attain a peak level in the middle of cycle (about 14th day). Rapid secretion of LH leading to its maximum level during the mid-cycle is called LH surge. It induces rupture of Graafian follicle and thereby the release of ovum (ovulation). Due to these events, this phase is termed as ovulatory phase of menstrual cycle.
(c) Luteal phase - The remaining cells of ovarian follicles are stimulated by the LH to develop corpus luteum. The corpus luteum secretes large amount of progesterone, which is essential for the maintenance of endometrium. This is known as luteal phase.

OR

(i) The given figure represents L.S. of pistil showing
(ii) The path of entry of pollen tube is as follows:

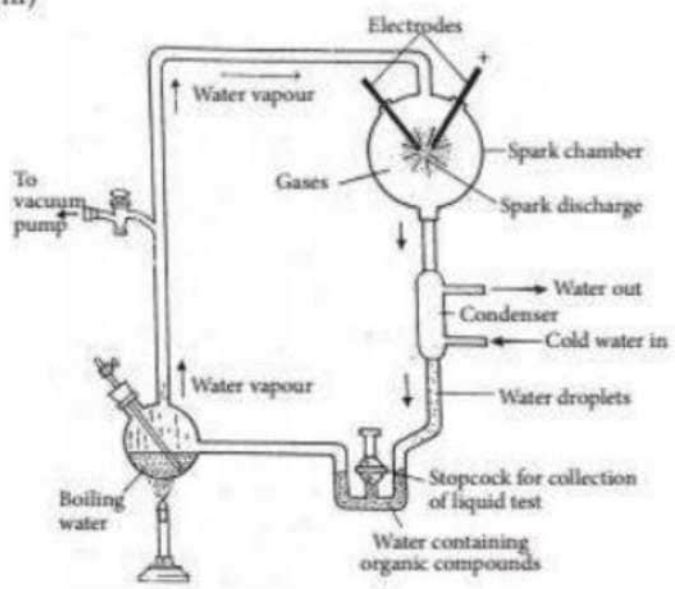


(iii) A- Pollen tube, B - Antipodal, C - Polar nuclei, D-Egg cell, E-Synergid.
(iv) After entering of pollen tube into one of the synergids, the pollen tube releases the two male gametes into the cytoplasm of the synergid. One of the male gametes moves towards the egg cell and fuses with its nucleus thus completing the syngamy (generative fertilisation). This results in the formation of a diploid cell, the zygote. The other male gamete moves towards the two polar nuclei located in the central cell and fuses with them to produce a triploid primary endosperm nucleus (PEN). As this involves the fusion of three haploid nuclei it is termed triple fusion (vegetative fertilisation).

33. (1) Gases A, B, C and D could be methane (CH_4) ammonia (NH_3), hydrogen (H) and water vapour (H_2O).
(ii) (c) Miller's experiment (X) that supported Oparin-Haldane theory which states that the life originated on early earth through physico-chemical processes of atoms combining to form molecules. These molecules in turn reacting to produce inorganic and organic compounds. Organic compounds interacting to produce all types of macromolecules which organised to

form the first living system or cells.

(iii)



(iv) A, B, C and D together produces amino acids within a variety of organic compound in Miller's and Urey experiment (X).

OR

Natural selection can produce three different types of results and hence is divided into following three types:

(i) Stabilising selection: This type of selection favours average sized individuals while eliminates small sized individuals. It reduces variation and hence does not promote evolutionary change. However, it maintains the mean value from generation to generation. If we draw a graphical curve of population, it is bell- shaped. For example, there is an optimum wing length for a hawk of a particular size with a certain mode of life in a given environment. Stabilising selection, operating through differences in breeding potential, will eliminate those hawks with wing spans larger or smaller than this optimum length.

(ii) Directional selection: In this selection, the population changes towards one particular direction. It is a progressive selection. It favours small or large- sized individuals and more individuals of that type will be present in next generation. The mean size of the population changes. For example - evolution of DDT resistant mosquitoes, industrial melanism in peppered moth, etc.

(iii) Disruptive selection: This type of selection simultaneously favours individuals at both extremes of the distribution curve. As a result, two peaks in distribution of a trait are produced. It is rare in occurrence but important for evolutionary changes.