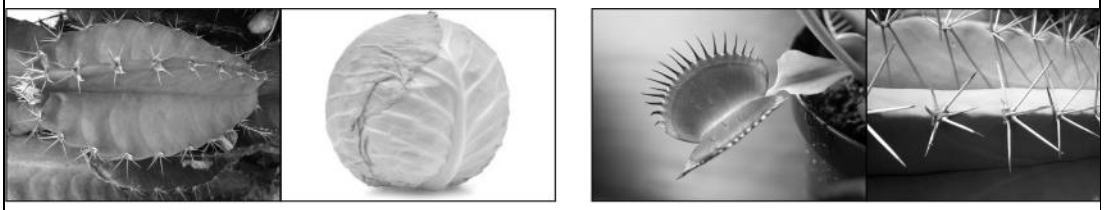
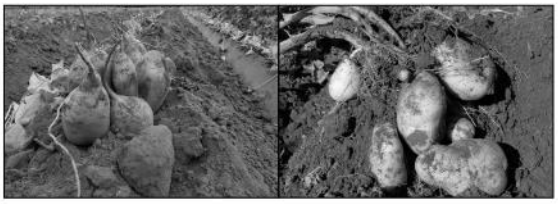
Practice Questions
Session 2022-23
Class XII
BIOLOGY (044)

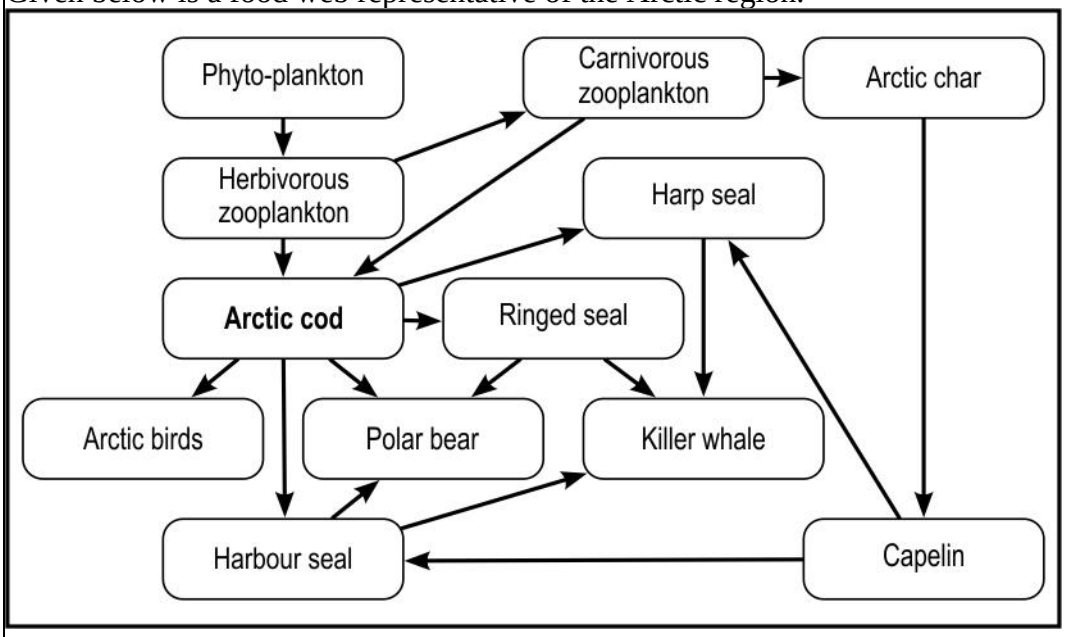
Max. Marks: 70 **Time Allowed: 3 hours**

General Instructions:

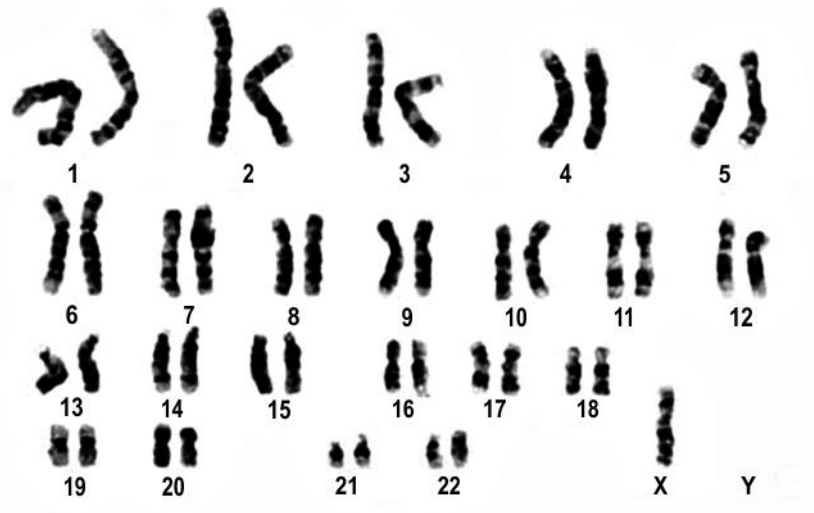
(i) All questions are compulsory.
(ii) The question paper has five sections and 33 questions. All questions are compulsory.
(iii) Section–A has 16 questions of 1 mark each; Section–B has 5 questions of 2 marks each; Section– C has 7 questions of 3 marks each; Section– D has 2 case-based questions of 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 labelled diagrams should be drawn.*

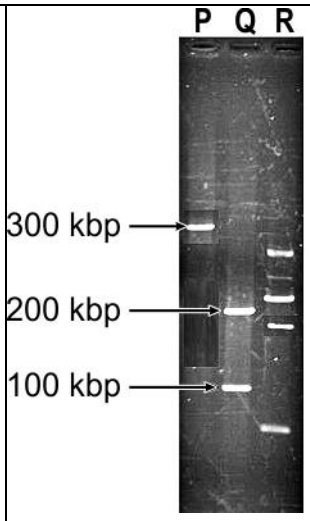
SECTION A		
Q. No	**Question**	**Marks**
1	Birth control tablets in females, popularly referred to as pills, prevent pregnancy by _____. A. delaying menstruation B. inhibiting ovulation and implantation C. suppressing sperm motility and fertility D. blocking the entry of sperms during coitus	1
2	Which of the following statements is/are correct about ZIFT and GIFT as methods of helping conception in cases of infertility? P) ZIFT can help where the female is unable to form a viable ovum. Q) ZIFT uses methods of in vitro fertilisation. R) GIFT involves the injection of one's own ovum into the body. S) GIFT uses in vivo fertilisation method. A. only P B. only P and R C. only Q, R and S D. all - P, Q, R and S	1
3	A DNA sequence consisted of 20% adenine nucleotides. What would be the percentage of cytosine nucleotides in the same DNA sequence? A. 20% B. 30% C. 60% D. 80%	1

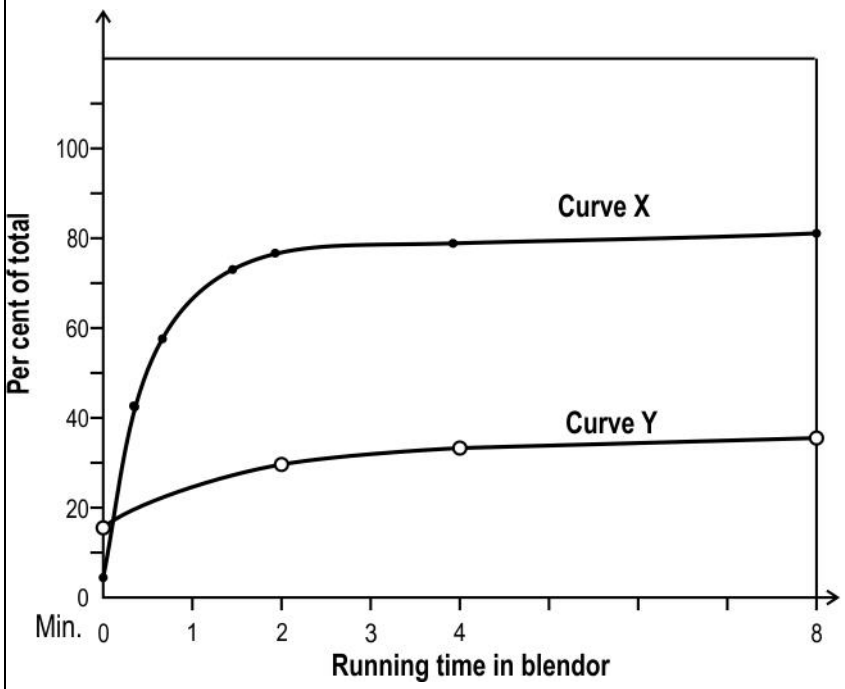
4	Comparative anatomy and morphology studies deepened the understanding of evolution. The presence of analogous and homologous structures provides important evidence in the favour of evolution. Which of the following is/are examples of **HOMOLOGOUS** structures found in plants?  Fleshy part of cactus Cabbage vegetable **P** Jaws of venus flytrap Spines on cacti **Q**  Sweet potato Potato **R** A. only Q B. only R C. only P and Q D. only Q and R	1
5	In certain diseased conditions such as pneumonia, the fingernails of an individual turn blue. What could be the reason for this? A. blood does not reach fingernails due to an increase in fat content around the fingernails B. nails become cold due to a decrease in fat content around the fingernails C. reduced levels of oxygen in the blood D. increase in oxygen levels in the blood	1
6	In which of the following diseases is/are the parasites transmitted to a healthy individual through the bite of a female mosquito? P) malaria Q) ascariasis R) filariasis A. only P	1

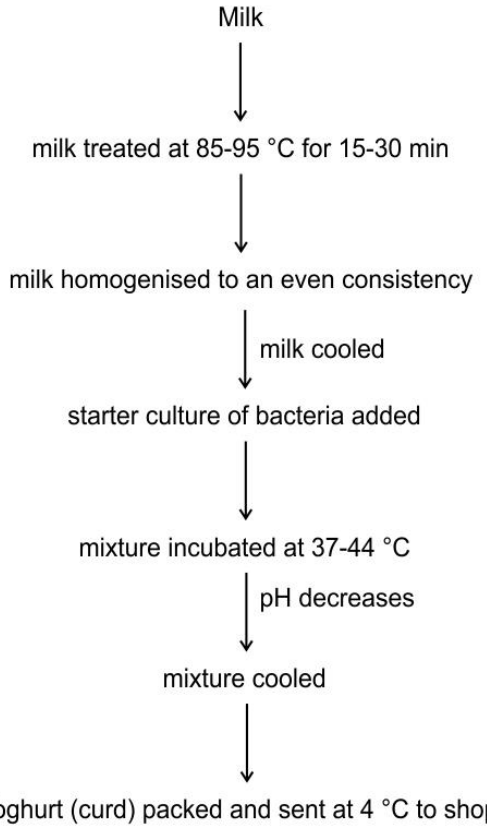
	B. only P and Q C. only P and R D. all - P, Q and R	
7	A substrate is the surface on which an organism lives or survives on. Which of the following acts as the substrate that provides energy in a detritus food chain? A. sunlight B. green plants C. decomposers D. dead organic matter	1
8	Given below are two statements about polymerase chain reactions. P) It mimics DNA replication that happens in a cell. Q) It cannot be used to amplify RNA molecules. Which of these is/are TRUE? A. only P B. only Q C. both P and Q D. neither P nor Q	1
9	Given below is a food web representative of the Arctic region.  Increasing temperatures have been causing changes in the ocean ecosystem. These changes have caused the population of Arctic cod to decline rapidly.	1

	Which of the following statement/s is/are most likely to be TRUE based on this information? P) The population of arctic birds will increase. Q) The ringed seal will slowly become extinct. R) The harbour seal will be dependent on capelins alone. A. only P B. only R C. only Q and R D. all - P, Q and R	
10	In which of the following is competition MOST LIKELY to occur? P) related species in the same environment Q) related species in different environments R) unrelated species in the same environment S) unrelated species in different environments A. only P and Q B. only P and R C. only Q and S D. only P, Q and R	1
11	Which of the following is most likely to be true about the percentage of energy received by a horse and a crow from the producers in different food chains? **Horse** / **Crow** P: always the same / always the same Q: always the same / can be different R: can be different / always the same S: can be different / can be different A. P B. Q C. R D. S	1
12	A stable community is usually resistant to invasion by alien species. Which of the following would NOT be affected in a stable community due to this resistance? A. species richness B. productivity C. co-extinction D. total biomass	1

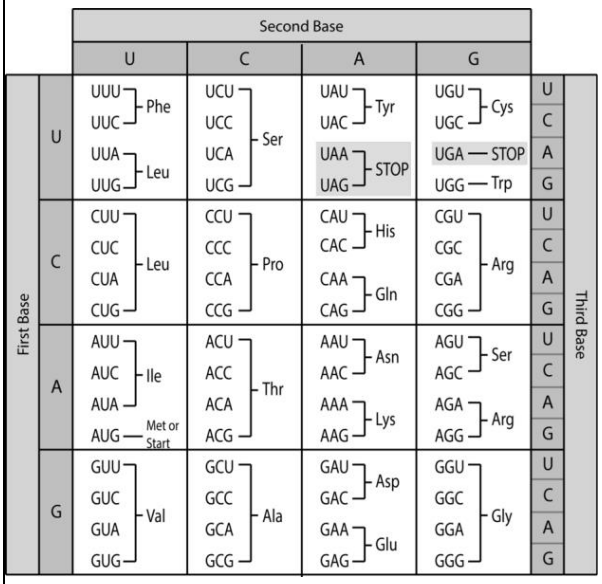
Question No. 13 to 16 consist of two statements – Assertion (A) and Reason (R). Answer these questions selecting the appropriate option given below: A. Both A and R are true and R is the correct explanation of A. B. Both A and R are true and R is not the correct explanation of A. C. A is true but R is false. D. A is False but R is true.		
13	Assertion (A): Apomixis and parthenocarpy are both asexual modes of reproduction. Reason (R): Seeds are not produced in both apomixis and parthenocarpy.	1
14	Assertion (A): A colour-blind father will always have a colour-blind son. Reason (R): Genes causing colour blindness are passed through a sex chromosome.	1
15	Assertion (A): Gene therapy is a method of treating a disorder but cannot cure it. Reason (R): Cells are drawn from a patient and the functional gene is introduced into these cells and transferred back to the patient.	1
16	Assertion (A): In the absence of a predator, the prey population growth will always be exponential. Reason (R): Exponential growth is when the resources and the environment allow an organism to realise fully its innate potential to grow in numbers.	1
SECTION B		
17	Given below is the karyotype of an individual.  (a) What are the characteristic reproductive and physical features of such an individual? (b) What is the category of such disorders called? How is it caused?	2
18	Nidhi performed gel electrophoresis after treating one vector with restriction enzymes. She added one mixture in well Q and another mixture in well R. Given below is an image of the results.	2

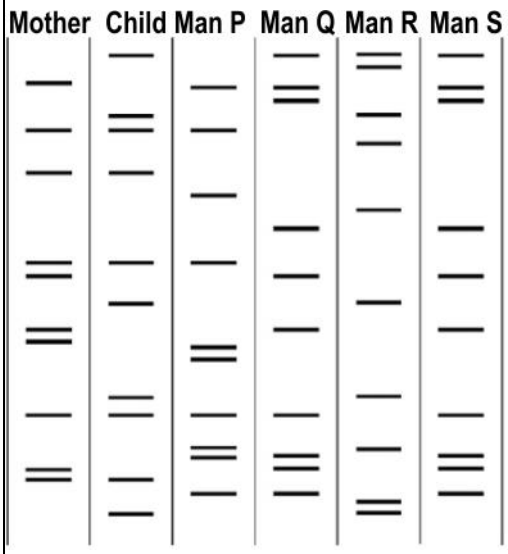
	 (a) What can be concluded about the mixtures loaded in wells P and Q? (b) What is the likely reason that the fragments in wells Q and R are different?	
19	In a patient, a mass of cells removed from the liver was found to be producing large amounts of the enzyme pepsin. In the same patient, a tumor was found in the stomach. (a) What property of a tumor can be identified based on the statements above? Give a reason to support your answer. (b) What are tumors exhibiting the property identified in (a) called? (c) How will the tumors identified in (b) affect liver cells?	2
20	As reported by numerous medical sources, Reema Sandhu, is an account manager, lives in Bracknell, Berkshire, with husband and young son. She was diagnosed with multiple sclerosis in November 2015 after burning her face on a lamp. Multiple sclerosis is the most common demyelinating disease in which the insulating covers of nerve cells in the brain and spinal cord are damaged. This damage disrupts the ability of parts of the nervous system to transmit signals. As per reports, she regained much of her brain function including her vision through stem cell therapy. (a) Which part of Reema's body could these stem cells have been sourced from? (b) Why would stem cell therapy have helped Reema?	2
21	Biomass is expressed in terms of dry weight and / or fresh weight. Which of the weights is more accurate as a unit of standing crop? Justify your answer with a reason. **OR** Marshy areas often consist of hard outer coverings as detritus that are remains of organisms such as crabs. State TWO reasons why decomposition would be limited in such areas.	2
SECTION C		
22	(a) Explain why non-occurrence of menstrual cycle could be indicative of pregnancy. (b) The menstrual cycle can be divided into 4 phases: menstrual phase, follicular	3

	phase, ovulation phase, luteal phase. During the follicular phase, hormones like FSH and LH are released in good amounts. State TWO events that are triggered by LH.	
23	Outbreeding helps in the maintenance of an organism's ability to survive and perpetuate its genetic material. This is termed as biological fitness. (a) What is the term used to signify reduction of such biological fitness? (b) Explain one method of outbreeding devised by plants that requires a chemical intervention by the reproductive apparatus of a plant.	3
24	Hershey and Chase performed several experiments to find the chemical nature of the genetic material that is present in all organisms. The graph below shows the results of one such experiment. It tracks the amount of ^{32}P and ^{35}S found in the supernatant after the bacterial cell suspension was agitated in a blender. The Y-axis represents the percentage of radioactivity from ^{32}P and ^{35}S each as compared to all radioactivity detected in the supernatant.  *[Source: Hershey A.D., Chase M. Independent functions of viral protein and nucleic acid in growth of bacteriophage. J Gen Physiol. 1952 May;36(1):39-56.]* (a) What did Hershey and Chase want to verify using this experiment? (b) What do curves X and Y represent? Give a reason to support your answer.	3
25	In a population of 1000 individuals, 25% of individuals show the phenotype for sickle cell anaemia (genotype - ss). (a) Assuming the population meets Hardy-Weinberg equilibrium, how many individuals would be carriers of the sickle cell allele but will not show the sickle cell phenotype? (b) Can the Hardy-Weinberg principle be used to predict the frequency of the presence of the sickle cell allele in a sperm cell? Why or why not?	3

26	AIDS is a disease caused by the Human Immunodeficiency Virus (HIV) and, over time, this causes an individual to become immuno-deficient. The virus attaches itself to an animal cell where the viral genome replicates and produces more virus particles. (a) Drugs that exist to treat AIDS are only partially effective. What process, after a virus has infected an animal cell, are these drugs most likely to target? Give a reason to support your answer. (b) Why is the integration of the viral genome with the host genome important for the virus to form new virus particles? (c) ELISA is a test commonly used in the detection of an HIV infection. State one situation in which a false negative result can be obtained. **OR** The primary effluent in the treatment of sewage is sent to tanks for secondary treatment in the presence of aerobic bacteria. (a) How would the BOD of the effluent be affected if anaerobic bacteria are used for secondary treatment? (b) Name one condition that should be maintained in a sludge digester where biogas is produced. (c) The slurry formed after biogas production is recommended as manure for plants. Which nutrients will the slurry be rich in and why?	3
27	Given below is the step-by-step process in the formation of yoghurt (curd) in a bioreactor.  	3

	(a) Why does the pH start decreasing a while after the mixture is incubated at 37-44 °C? (b) From the flowchart, identify two systems that the bioreactor would have. Give a reason to support your answer.	
28	Latitudinal gradients have an impact on species diversity. While species diversity is highest at the tropics and lowest at the poles, loss of biodiversity also is highest in the tropics and lowest at the poles. (a) Mention ONE possible reason for the low species diversity at the poles. (b) Mention ONE possible reason for loss of biodiversity being higher in the tropics. (c) How have humans used temperature conditions to conserve biodiversity in *ex situ* conditions?	3
SECTION D		
Q.no 29 and 30 are case based questions. Each question has subparts with internal choice in one subpart.		
29	In maize, the trait for the purple kernel (P) is dominant over the yellow kernel (p). A plant with purple kernels is crossed with another plant with yellow kernels and produces 2 offspring with purple kernels and 2 offspring with yellow kernels. (a) What is the genotype of the parental maize plants? (b) Draw a Punnett square to depict the cross between the two offspring with purple kernels. (c) Identify the genotypic and phenotypic ratios obtained from the cross in (b). **OR** (c) Describe a method that can definitely help with the identification of an unknown genotype of a plant with purple kernels.	4
30	In the late 18th century, smallpox was a widely spreading disease causing the death of several affected individuals in Britain. Edward Jenner, who pioneered the concept of vaccination, inoculated matter from the cowpox lesions of a dairymaid into an 8-year-old boy. Post-inoculation, the boy developed a mild fever, loss of appetite and discomfort but was better after a few days. Next, he was inoculated with matter from a smallpox lesion and he did not develop any disease. (a) What form of immunity, now known, did Edward Jenner provide the boy with? Give a reason to support your answer. (b) Describe the form/s of immunity that is provided when an individual is vaccinated/immunised? Use an appropriate example/s to justify your answer. **OR** (b) Which form of immunization does not generate a memory response? Give a reason to support your answer.	4
SECTION E		
31	Papaya is a widely cultivated crop in several regions. However, its production was limited by papaya ringspot disease which is caused by the Papaya ringspot virus (PRSV). Papaya plants infected by PRSV show symptoms of yellowing,	5

	discolouration of leaves and 'ringspots' on the fruit. PRSV belongs to the genus Potyvirus which has a single-stranded RNA as its genetic material. (a) Explain the step-by-step process to inhibit the viral RNA from surviving in the papaya plants thus creating disease-resistance varieties of papaya. (b) Name the biotechnological process described in (a) and give a reason why it is the appropriate process to be used in this case. **OR** Growth hormone injection treatment is prescribed for children who have been diagnosed with growth hormone (GH) deficiency and other conditions causing short stature and insufficient growth. This hormone is produced by the pituitary gland in humans so the gene for this hormone was isolated from the pituitary gland and introduced into phGH407 vectors for production. However, a problem with this was that the protein so produced was 26 amino acids longer than the active growth hormone (24 amino acids long) and so this method could not be used. (a) Given that the amino acid sequence of the active growth hormone was known, use a diagram to explain how human growth hormone could be produced outside the body. (b) The vector consists of a *lac* gene which codes for the enzyme β-galactosidase. Describe how this gene can help with the selection of colonies containing the transgene.	
32	Given below is a DNA sequence and the genetic code. Answer the questions based on these, assuming no post-transcriptional or post-translations modifications will take place. - TACATGCCGTACTGTACC -  (a) Write the nucleotide sequence that will be obtained on transcription of this DNA sequence. (b) Will translation of this sequence take place? Give a reason to support your	5

	answer. (c) What is the amino acid sequence that will be formed? Identify the sequence of the first tRNA. (d) If the first guanine base in the DNA sequence gets replaced by thymine, how will the amino acid sequence change? (e) Name and describe the mutation that occurred in (d). **OR** The image below shows the DNA profile of four men, a mother and her child.  (a) Which man is most probably the father of the child? Give a reason to support your answer. (b) Which technique, commonly used in forensic studies such as paternal testing, is depicted in the image? (c) What is the basic principle that the technique identified in (b) is based on? (d) What is the most likely relationship, if any, between men Q and S? Justify your answer.	
33	Angiosperms such as pea plants undergo double fertilisation. The male gametophyte has a simple structure while the female gametophyte has a much more complex structure with multiple supporting cells in it. (a) What is/are the product/s of double fertilisation? (b) If you are given a pea pod, how can you identify the product/s of double fertilisation in it? (c) How does a structural difference help each gametophyte perform its functions better? **OR** Gametogenesis is the process of production of gametes. In males, it is spermatogenesis and in females it is oogenesis. The cells in the germline that undergo meiosis, primary spermatocytes or primary oocytes, are derived from the zygote by a long series of mitosis before the onset of the two meiotic cycles to form	5

	the mature gametes. Testosterone is an androgen that plays an important role in the formation and release of sperm from the seminiferous tubules. (a) What is the count of chromosomes after the first and second meiotic divisions in the formation of sperms? Give a reason to support your answer. (b) In an individual with low testosterone levels - (i) which process in spermatogenesis is likely to not happen? (ii) if the semen sample of such an individual is collected, what is likely to be observed? (c) What is likely to happen to the polar bodies formed after each meiotic cycle in oogenesis? Give a reason to support your answer.	