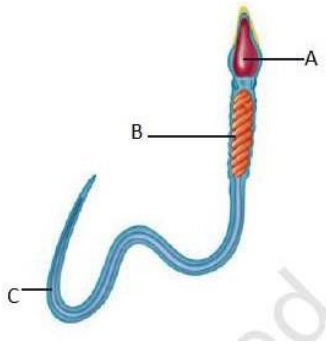
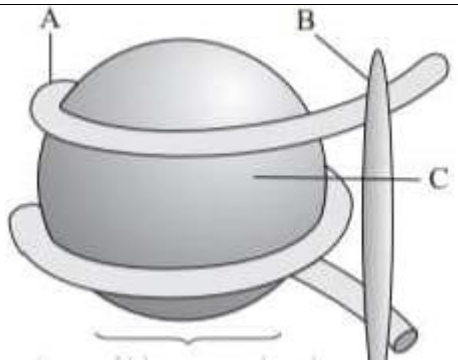
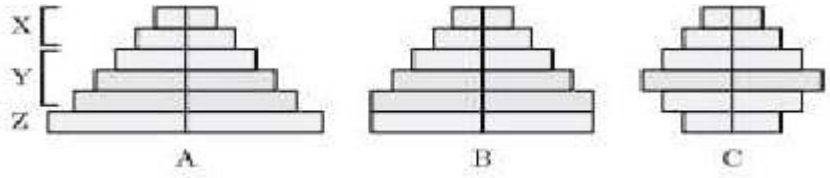
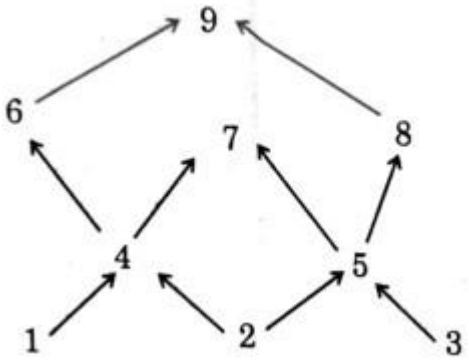
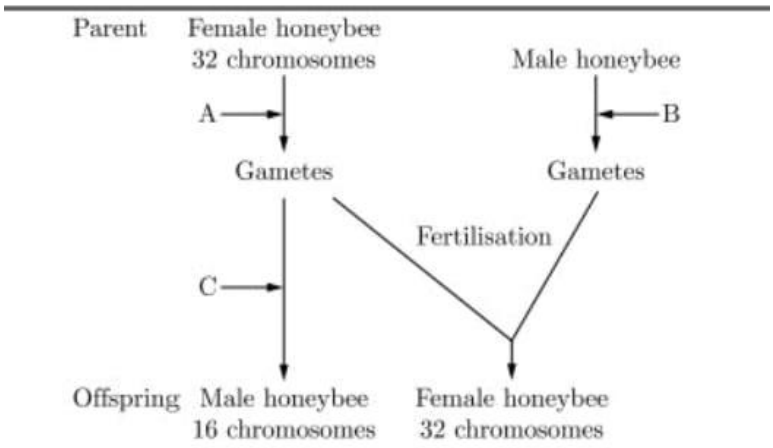
S.NO.	Question	Marks
1	From the statements given below choose the option that are true for a typical female gametophyte of a flowering plant- (i) It is 8-nucleated and 7-celled at maturity. (ii) It is free-nuclear during the development. (iii) It is situated inside the integument but outside the nucellus. (iv) It has an egg apparatus situated at the chalazal end. Choose correct option: (A) (i) and (iv) (B)(ii) and (iii) (C) (i) and (ii) (D)(ii) and (iv)	1
2	Urethral meatus refers to the- (A) Urinogenital duct	1

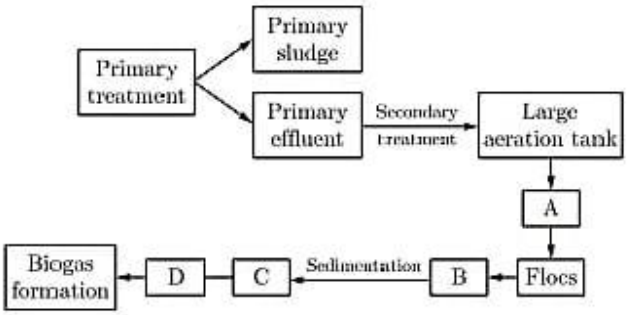
	(B) Opening of vas deferens into urethra (C) External opening of the urinogenital duct (D) Muscles surrounding the urinogenial duct	
3	Which of the followings is example of hormone releasing IUDs? (A) Cu T and Multilobed 375 (B) LNG-20 and Progestasert (C) Lippes loop (D) Both (b) and (c)	1
4	In Sickle Cell Anaemia glutamic acid is replaced by Valine. Which one of the following triplets codes for valine? (A) GGG (B) AAG (C) GAG (D) GUG	1
5	In the F_2 generation of a Mendelian dihybrid cross the number of phenotypes and genotypes are- (A) phenotypes – 4; genotypes – 16 (B) (b)phenotypes – 9; genotypes – 4 (C) (c)phenotypes – 4; genotypes – 8 (D) (d)phenotypes – 4; genotypes – 9	1
6	DNA is a polymer of nucleotides which are linked to each other by 3′→5′ phosphodiester bond. To prevent polymerisation of nucleotides, which of the following modifications would you choose? (A) Replace purine with pyrimidines (B) Remove/replace 3′ OH group in deoxyribose (C) Remove/replace 2′ OH group with some other group in deoxyribose (D) Both 'b' and 'c'	1
7	Given below is a sequence of bases in mRNA of a bacterial cell. Identify the amino acid that would be incorporated at codon position 3 and codon position 5 during the process of its translation. 3' AUCAGGUUUGUGAUGGUACGA 5' (A) Serine, Valine (B) Cysteine, Glycine (C) Phenylalanine, Methionine (D) Alanine, Proline	1

8	For the MN-blood group system, the frequencies of M and N alleles are 0.7 and 0.3, respectively The expected frequency of MN-blood group bearing organisms is likely to be- (A) 42% (B) 49% (C) 9% (D) 58%	1
9	Which type of selection explains industrial melanism observed in moth, Biston bitularia? (A) Stabilising (B) Directional (C) Disruptive () Artificial	1
10	Antiviral substances produced by many vertebrates in response to viral infection for resisting the multiplication of virus is known as- (A) Virion (B) Interferon (C) Antivirin (D) Antigen	1
11	Significance of Heat shock method in bacterial transformation is tofacilitate: (A) Binding of DNA to the cell wall (B) Uptake of DNA through membrane transport proteins. (C) Expression of antibiotic resistance gene (D) All of these	1
12	Silencing of a gene could be achieved through the use of : (A) Short interfering RNA (RNAi) (B) Polymerase chain reaction (PCR) (C) Antisense RNA (D) Both A and C	1
Question No. 13 to 16 consist of two statements – Assertion (A) and Reason (R). Answerthese 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:** Pollen grains from male parent are mostly transferred to the stigma in the female parent by some external agency. **Reason**: This is because the male flowers or male organs have no internal device to reach the female organs in another flower.	1

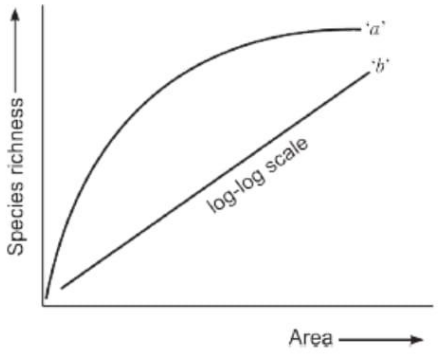
14	**Assertion**: A good example of multiple alleles is ABO blood group system. **Reason**: When IA and IB alleles are present together in ABO blood group system, they both express their own.	1
15	**Assertion**: Restriction enzymes cut the strand of DNA to produce stickyends. **Reason**: Stickiness of the ends facilitates the action of the enzyme DNA polymerase.	1
16	**Assertion**: The tropic level represent a functional level, not a species assuch. **Reason**: A given species may occupy more than one tropic level in the same ecosystem at the same time.	1
	SECTION B	
17	Fruits generally develops from ovary, but in few species thalamus contributes to fruit formation. (a) Name the two categories of fruits. (b) Give one example of each.	2
18	 Above a diagram of human sperm ,mention the importance of A and B in male fertility.	2
19	 i) What is this diagram representing?	2

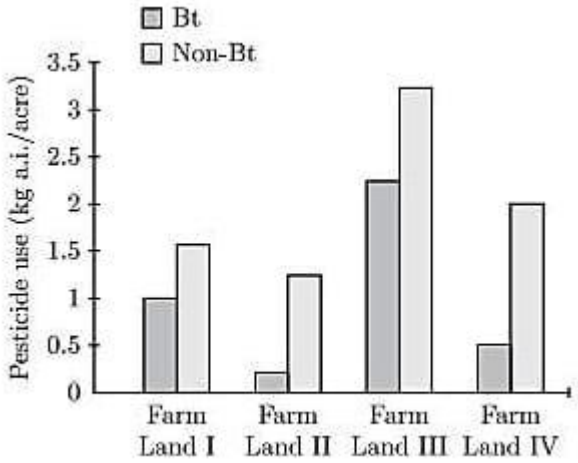
	ii) Name the parts a, b and c.	
20	Name two main steps which are collectively referred to as downstream process. Why is this process significant?	2
21	The given figure shows the different types of age pyramids for human population. (a) What does the parts 'X, 'Y' and 'Z' represent?  (b) Which type of population is represented by pyramids A, B and C? **OR** Given below is a food web that involves nine organisms.  (a) Identify two producers and two carnivores shown in food web. (b) Is it possible to make an ecological pyramid depicting this foodweb? Give reason in support of your answer.	2
	SECTION C	
22	Explain the events in a normal woman during her menstrual cycle on the following days: (a) Ovarian event from 13-15 days (b) Ovarian hormones level from 16 to 23 days (c) Uterine events from 24 to 29 days	3

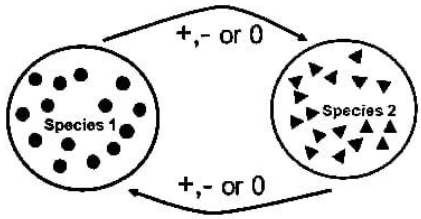
23	'The cytological observations made in a number of insects led to the development of the concept of genetic/ chromosomal basis of sex-determination mechanism. Honeybee is an interesting example to study the mechanism of sex-determination. Study the schematic cross between the male and the female honeybees given below and answer the questions that follow: a) Identify the cell divisions 'A' and 'B' that lead to gamete formation infemale and male honeybees respectively. b) Name the process 'C' that leads to the development of male honeybee (drone). c) Identify the type of sex determination in this case.  	3
24	 a) Write your observations on the variations seen in the Darwin's finches shown above. b) Explain what conclusions did he draw and how.	3

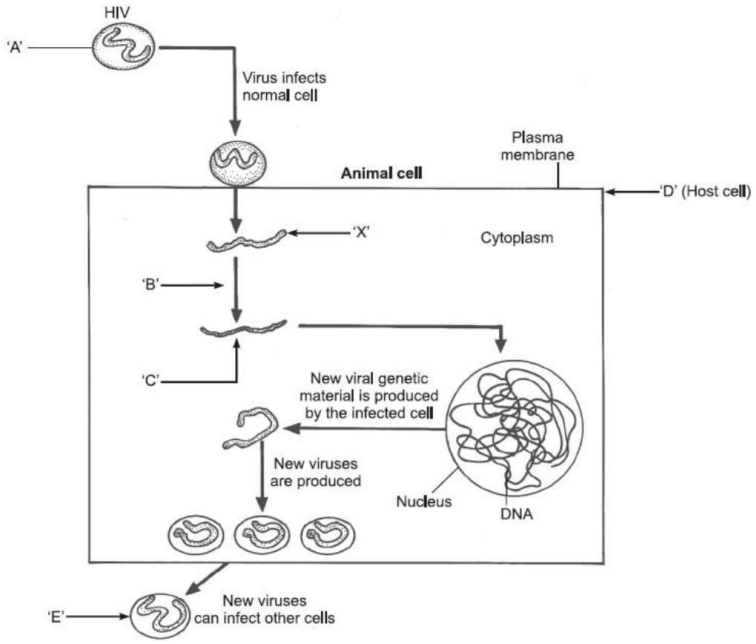
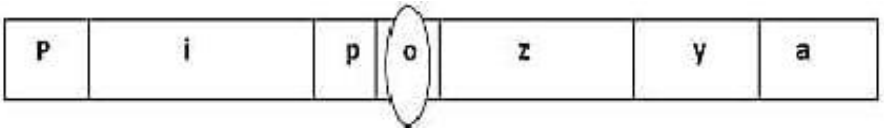
25	Refer to the given below flow chart that shows the sewage treatment. a) Identify A, B, C and D in the given process. b) Explain the process at step D.  	3
26	Identify a, b, c, d, e and f in the given table below:	3

S.No.	Organisms	Bioactive Molecule	Use
1	Monascus purpureus	a	b
2	c	d	Removal of clot from blood vessel
3	e	Cyclosporin-A	f

27	Explain how recombinant DNA technology is used to detect a disease even before any clinical symptom appears? **OR** EcoRI has played very significant role in r-DNA technology. a) Explain the convention for naming EcoRI. b) Write the recognition site of EcoRI. c) What are the cleavage sites of this restrictionendonuclease.	3
28	The following graph shows the species–area relationship. Answer the following questions as directed.  	3

	(a) Name the naturalist who studied the kind of relationship shown in the graph. Write the observations made by him. (b) Write the situations as discovered by the ecologists when the value of 'Z' (slope of the line) lies between (i) 0.1 and 0.2 (ii) 0.6 and 1.2 What does 'Z' stand for? c) When would the slope of the line 'b' become steeper?	
	SECTION D	
Q. No 29 and 30 are case based questions. Each question has subparts with internal choice in one subpart.		
29	GM crops especially Bt crops are known to have higher resistance to pest attacks. To substantiate this an experimental study was conducted in 4 different farmlands growing Bt and non Bt-Cotton crops. The farm lands had the same dimensions, fertility and were under similar climatic conditions. The histogram below shows the usage of pesticides on Bt crops and non-Bt crops in these farm lands.  (A) Which of the above 4 farm lands has successfully applied the concepts of biotechnology to show better management practicesand use of agrochemicals? If you had to cultivate, which crop would you prefer (Bt or Non- Bt) and why? (B) Bt crops are prepared by using the genes isolated from .....bacteria. (C) Cotton bollworms were introduced in another experimental study on the above farm lands wherein no pesticide was used. Explainwhat	4

	effect would a Bt and Non-Bt crop have on the pest. **OR** C. Explain the mechanism by which Bt toxin kills the insets but not the bacterium which possesses the toxin.	
30	The interactions among populations of different species play a major role in regulating population growth and abundance. A species interaction is the effect that a pair of organisms living together in a community have on each other. Interactions range from mutualism, which benefits both species involved. Interaction can be indirect, through intermediaries such as shared resources or common enemies. All of these interactions can beorganized by the effect the species have on each other. , one species can have a positive, a negative or no effect on another species.  1. A process in which organisms succeed to blend with nature and their surroundings. What is it called? 2. How does an organism check the uncontrolled growth of another organism within the biological ecosystem? 3. Why cannot herbivores rely upon *Calotropis* plants? **OR** Define Gause's competitive exclusion principle.	4
	SECTION E	
31	(a) Cancer is one of the most dreaded diseases. Explain 'Contact inhibition' and 'Metastasis' with respect to the disease. (b) Name the group of genes that have been identified in normal cells that could lead to cancer. How do these genes cause cancer?	5

	(c) Name any two techniques that are useful in detecting cancers of internal organs. (d) Why are cancer patients often given α-interferon as part of the treatment? **OR** Study the diagram-  Study the diagram showing replication of HIV in humans and answer the following questions accordingly: (i) Write the chemical nature of the coat 'A'. (ii) Name the enzyme 'B' acting on 'X' to produce molecule 'C'. Name 'C'. (iii) Mention the name of the host cell 'D' the HIV attacks first when it enters into the human body. (iv) Name the two different cells that the new viruses 'E' subsequently attack.	
32.	Observe the representation of genes involved in the lac operon given below:  (a) Identify the region where the repressor protein will attach normally. (b) Under certain conditions repressor is unable to attach at this site. Explain. (c) If repressor fails to attach to the said site what products will be	5

	formed by z, y, and a? (d) Analyse why this kind of regulation is called negative regulation? OR (i) A woman with O blood group marries a man with AB blood group. Work out all the possible phenotypes and genotypes of the progeny. (ii) Describe the kind of dominance in the parents and the progeny in this case.	
33	ART includes all fertility treatments in which either eggs or embryos are handled. (A) Name the techniques which are employed in following cases : a) Transfer of an ovum collected from a donor into the fallopian tube of another female who cannot produce ova but can provide suitable environment for fertilization and development. b) Embryo is formed in laboratory in which sperm is directly injectedinto ovum. c) Semen collected either from husband or a healthy donor is artificially introduced either into vagina or uterus. (B) Differentiate between Vasectomy and Tubectomy. (C) In which case ICSI use for IVF treatment for infertility. **OR** Many elements need to be considered by women, men, or couples at any given point in their lifetimes when choosing the most appropriate contraceptive method. These elements include safety, effectiveness, availability (including accessibility and affordability), and acceptability. 1. Mention any two properties of contraceptive. 2. Lactational Amenorrhea is a method of contraception Justify. What is the maximum effectiveness of this method in terms ofperiod/duration? 3. How non-medicated IUD is different from hormone releasing IUD's? Give examples.	5