BIOLOGY

Time : 3 hrs **Max. Marks : 70**

General Instructions :

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

SECTION-A

1. Match the items in column I with those in column II and chose the correct answer : **[1]**

	Column–I		Column–II
(1)	Funicle	(a)	Small opening of ovule.
(2)	Integuments	(b)	Stalk of ovule.
(3)	Chalaza	(c)	Protective envelopes of ovule.
(4)	Hilum	(d)	Junction part of ovule and stalk.
(5)	Micropyle	(e)	Basal part of the ovule.

(A) 1 – b; 2 – c; 3 – e; 4 – d; 5 – a (B) 1 – a; 2 – c; 3 – b; 4 – d; 5 – e

(C) 1 – b; 2 – c; 3 – a; 4 – d; 5 – e (D) 1 – b; 2 – d; 3 – e; 4 – a; 5 – c

2. Endosperm is completely consumed by the developing embryo in :- **[1]**

(A) pea and groundnut (B) maize and castor

(C) castor and groundnut (D) maize and pea

3. Genetic code is :- **[1]**

(A) triplet, universal, ambiguous and degenerate.

(B) triplet, universal, unambiguous and nondegenerate.

(C) triplet, universal, unambiguous and degenerate.

(D) triplet, universal, ambiguous and non-degenerate.

4. If a mother and her child belong to blood group O. What blood group could the father not belong to: **[1]**

(A) AB (B) O (C) A (D) B

5. Inheritance of blood group is a condition of :- **[1]**

(I) Codominace (II) Incomplete dominance

(III) Multiple allelism (IV) Dominance

(A) I, II (B) II, IV

(C) I, III and IV (D) II, III

6. In a population of 1000 individuals 360 belong to genotype AA, 480 to Aa and the remaining 160 to aa. Based on this data, the frequency of allele A in the population is :- **[1]**

(A) 0.4 (B) 0.5 (C) 0.6 (D) 0.7

7. Which of the following is true with respect to AUG? **[1]**

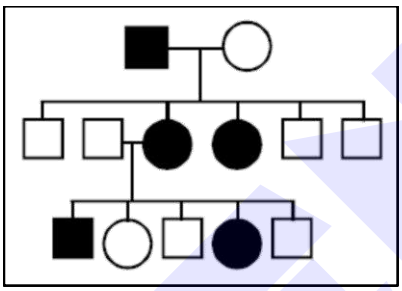
(A) It codes for methionine only

(B) It is an initiator codon

(C) It codes for methionine in both prokaryotes and eukaryotes

(D) All of these

8. Given below is a pedigree chart showing the inheritance of a certain sex-linked trait in humans. The trait traced in the above pedigree chart is :- **[1]**



(A) dominant X - linked (B) recessive X-linked

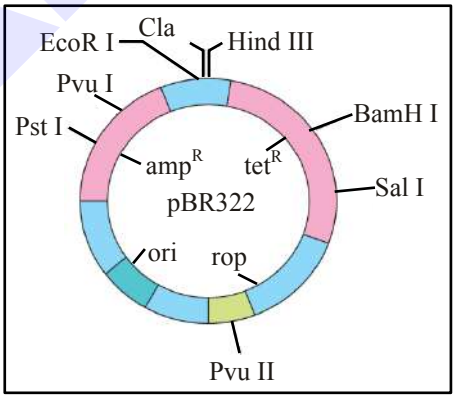
(C) dominant Y – linked (D) recessive Y-linked

9. Grafted kidney can be rejected in a patient due to :- **[1]**

(A) Cell mediated immune response (B) Passive immune response

(C) Innate immune response (D) Humoral immune response

10. The figure below is the diagrammatic representation of the *E.Coli* vector pBR322. Which one of the given options correctly identifies its certain component (s)? **[1]**



(A) ori - original restriction enzyme

(B) rop-reduced osmotic pressure

(C) Hind III, EcoRI - selectable markers

(D) amp^R, tet^R - antibiotic resistance genes

11. What is correct about insulin? **[1]**

(A) Two short polypeptide chains.

(B) Polypeptide chains are linked together by disulphide bridges.

(C) In mammals insulin is synthesized as a prohormone.

(D) All of the above

12. Among the following where do you think the process of decomposition would be the fastest? **[1]**

(A) Tropical rain forest (B) Antarctic.

(C) Dry arid region. (D) Alpine region.

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 :** The endosperm of angiosperm is generally diploid (2n). **[1]**

Reason : It develops from primary endosperm nucleus formed by fusion of haploid male gamete and diploid secondary nucleus.

14. **Assertion :** 5' to 3' strand of the DNA molecules is discontinuous. **[1]**

Reason : The replication of lagging strand generates small polynucleotide fragments called Okazaki fragments.

15. **Assertion :** Opioids help to enhance respiratory activity. **[1]**

Reason : Opioids are the drugs, which bind to specific opioid receptors present in the central nervous system and gastrointestinal tract.

16. **Assertion :** Plasmids are single stranded extrachromosomal DNA. **[1]**

Reason : Plasmids are found in prokaryotic cells.

SECTION-B

17. Where are fimbriae present in a human female reproductive system? Give their function. **[2]**

18. Explain the dual function of AUG codon. Give the sequence of bases it is transcribed from and its anticodon. **[2]**

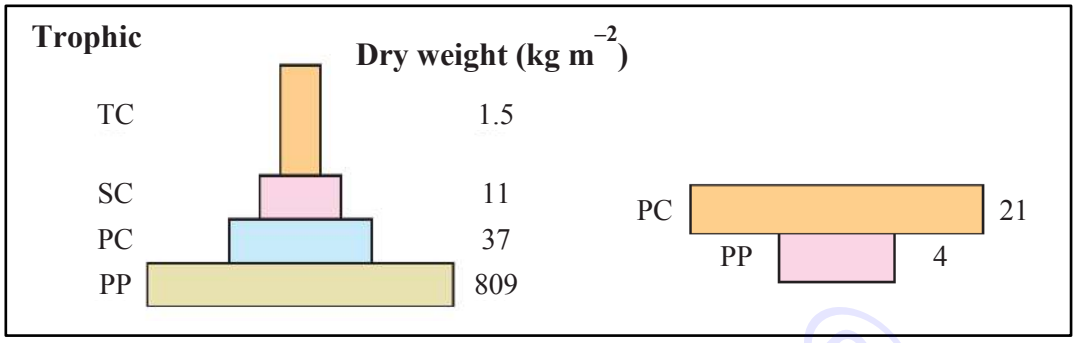
19. Name the host and the site where the following occur in the life cycle of a malarial parasite: **[2]**

(a) Formation of gametocytes

(b) Fusion of gametocytes

20. What are recombinant proteins? How do bioreactors help in their production? **[2]**

21. Compare the two ecological pyramids of biomass given below and explain the situations in which this is possible. Also, construct an ideal pyramid of energy, if 1,000,000 joules of sunlight is available. **[2]**

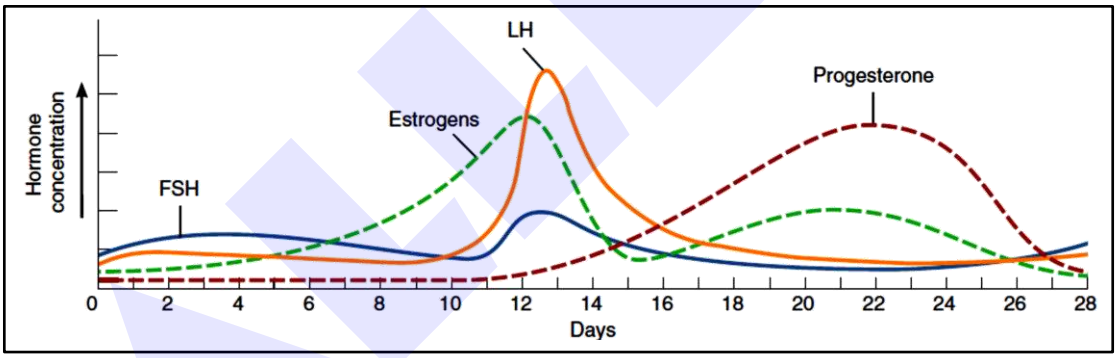


OR

Name the type of food chains responsible for the flow of larger fraction of energy in an aquatic and a terrestrial ecosystem, respectively. Mention one difference between the two food chains.

SECTION-C

22.



Read the graph given above showing the levels of ovarian hormones during menstruation and correlate the uterine events that take place according to the hormonal levels on. **[3]**

(i) 6-15 days

(ii) 16-25 days

(iii) 26-28 days (if the ovum is not fertilized)

23. When and where do chorionic villi appear in humans? State their functions. **[3]**

24. A women has certain queries as listed below, before starting with contraceptive pills. Answer them.

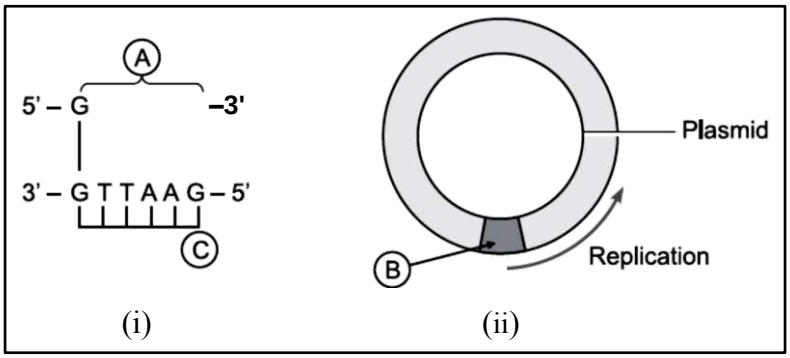
(a) What do contraceptive pills contain and how do they act as contraceptives? **[3]**

(b) What schedule should be followed for taking these pills?

25. Evolution is a change in gene frequencies in a population in response to changes in the environment in a time scale of years and not centuries. Justify this statement with reference to DDT. How does the theory of Hugo de Vries support this? **[3]**

26. Name the two different categories of microbes naturally occurring in sewage water. **[3]** Explain their role in cleaning sewage water into usable water.

27. (a) Identify A and B illustrations in the following : **[3]**



(b) Write the term given to A and C and why?

(c) Expand PCR. Mention its importance in biotechnology.

OR

Name and explain the techniques used in the separation and isolation of DNA fragments to be used in recombinant DNA technology.

28. A particular species of wild cat is endangered. In order to save them from extinction, which is a desirable approach in situ or ex situ? Justify your answer and explain the difference between the two approaches. **[3]**

SECTION-D

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

29. Insulin is a hormone created by your pancreas that controls the amount of glucose in your blood stream at any given moment. It also helps store glucose in your liver, fat and muscles. Finally, it regulates your body's metabolism of carbohydrates, fat and protein. **[4]**

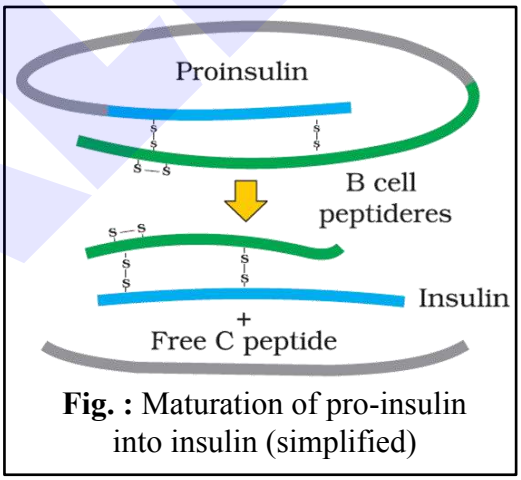


Fig. : Maturation of pro-insulin into insulin (simplified)

(a) Name the source from which insulin was extracted earlier. Why is this insulin no more in use by diabetic people?

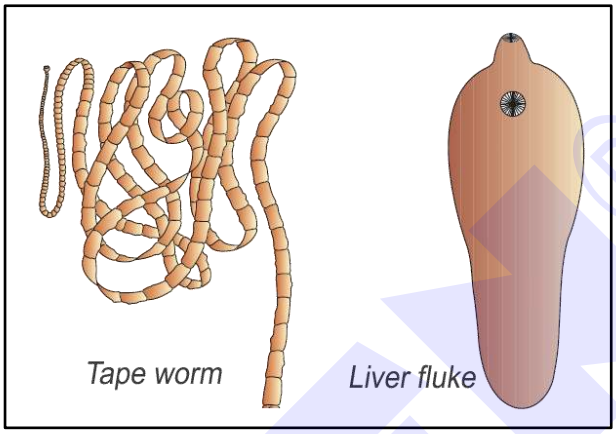
(b) Name the technique used by the Eli Lilly company to formation of insulin.

OR

Name two genetically modified hormones :

(c) Mention the chemical change that proinsulin undergoes, to be able to act as mature insulin.

30. Considering that the parasitic mode of life ensures free lodging and meals, it is not surprising that parasitism has evolved in so many taxonomic groups from plants to higher vertebrates. Many parasites have evolved to be host-specific (they can parasitise only a single species of host) in such a way that both host and the parasite tend to co-evolve; that is, if the host evolves special mechanisms for rejecting or resisting the parasite, the parasite has to evolve mechanisms to counteract and neutralize them, in order to be successful with the same host species. In accordance with their life styles, parasites evolved special adaptations such as the loss of unnecessary sense organs, presence of adhesive organs or suckers to cling on to the host, loss of digestive system and high reproductive capacity. **[4]**



(a) How is Cuscuta adapted to be a parasitic plant?
(b) Explain parasitism with the help of one example of each.

OR

Explain why female mosquito is not considered a parasite, although it needs our blood for reproduction?

(c) Explain brood parasitism with the help of an example.

SECTION-E

31. Analyse the table and suggest the name of suitable contraceptive. **[5]**

S.No	Device	Use of mode	Function
1	Vaults		
2	Lippes loop		
3	*Saheli*		
4	Coitus interruptus		
5	Vasectomy		

OR

Answer the following question.

S.No	Method	Process
1	Amniocentesis	
2	*In vitro* fertilisation	
3	Medical Termination Of Pregnancy	
4	Periodic abstinence	
5	IUI – intra-uterine insemination	

32. How to detect cancer? What are a few approaches to treat cancer ? **[5]**

OR

Discuss the role of lymphoid organs in the immune response. Explain the different types of lymphoid organs giving two examples of each type in humans.

33. (a) A garden pea plant bearing terminal, violet flowers, when crossed with another pea plant bearing axial, violet flowers, produced axial, violet flower and axial, white flowers in the ratio of 3 : 1. Work out the cross showing the genotypes of the parent pea plants and their progeny.

(b) Name and state the law that can be derived from this cross and not from a monohybrid cross. **[5]**

OR

(a) Describe the process of synthesis of fully functional mRNA in a eukaryotic cell.

(b) How is this process of mRNA synthesis different from that in prokaryotes?