

## CLASS XII : SAMPLE QUESTION PAPER - 2

### SUBJECT: BIOLOGY (044)

Time Allowed: 3 Hours

Maximum Marks: 70

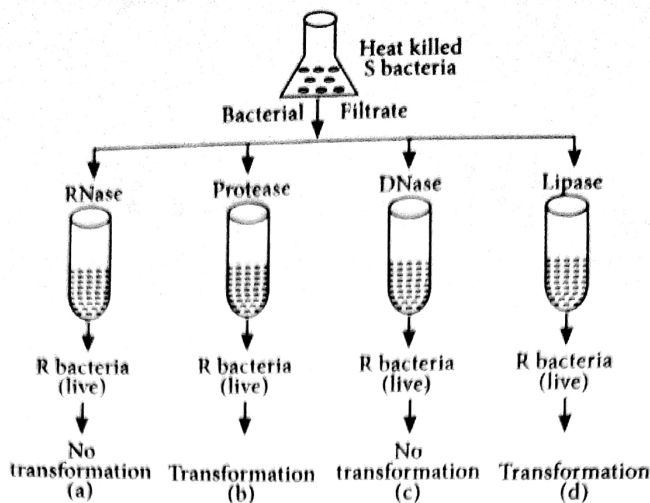
#### General instructions:

1. All questions are compulsory.
2. The question paper has five sections and 33 questions.
3. Section–A has 16 questions of 1 mark each.
4. Section–B has 5 questions of 2 marks each.
5. Section– C has 7 questions of 3 marks each.
6. Section– D has 2 case-based questions of 4 marks each.
7. Section–E has 3 questions of 5 marks each.
8. 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.
9. Wherever necessary, neat and properly labeled diagrams should be drawn.

#### SECTION — A

**Q. No. 1 to 12 are multiple choice questions. Only one of the choices is correct. Select and write the correct choice as well as the answer to these questions.**

1. The source organ and function of hormone FSH are
  - (a) anterior pituitary, corpus luteum formation
  - (b) posterior pituitary, Graafian follicle formation
  - (c) anterior pituitary, follicular formation
  - (d) hypothalamus, primary oocyte formation.
2. Which one of the following is not found in a female gametophyte of an angiosperm?
  - (a) Germ pore
  - (b) Synergids
  - (c) Filiform apparatus
  - (d) Central cell
3. Total number of nucleotide sequences of DNA that codes for a hormone is 1530. The proportion of different bases in the sequence is found to be adenine = 34%, guanine = 19%, cytosine = 23%, thymine = 19%. Applying Chargaff's rule, what conclusion can be drawn?
  - (a) It is a double stranded circular DNA.
  - (b) It is a single stranded DNA.
  - (c) It is a double stranded linear DNA.
  - (d) It is a single stranded DNA coiled on histones.
4. Given below are the illustration of the different steps of experiments conducted by MacLeod, Mc Carty and Avery to find the chemical nature of the 'transforming principle' as DNA. Select the option that incorrectly depicts the step of the experiment.



5. Rishabh with blood group A and Neha with blood group B have a child with blood group O. What would be the possible genotypes of parents and the child? Choose the correct option.

Rishabh	Neha	Child
(a) $I^B i$	$I^A i$	$I^A i$
(b) $I^A i$	$I^B i$	$ii$
(c) $I^A I^A$	$I^B I^B$	$ii$
(d) $I^B I^B$	$I^A I^A$	$I^B i$

6. 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) Phenylalanine, Methionine                      (b) Cysteine, Glycine  
 (c) Alanine, Proline                                      (d) Serine, Valine

7. True-breeding red-eyed *Drosophila* flies with plain thorax were crossed with pink-eyed flies with striped thorax.

Red eye                      Pink eye  
 plain thorax    ×    striped thorax

The  $F_1$  flies were then test crossed against the double recessive.

The following  $F_2$  generation resulted from the cross:

80	16	12	92
Red eye	Red eye	Pink eye	Pink eye
Plain thorax	Striped thorax	Plain thorax	Striped thorax

What percentage number of recombinants resulted from the test cross?

- (a) 12                      (b) 14                      (c) 16                      (d) 28

8. In a transcription unit in DNA the 'I' is located towards 3' end of the 'II' strand and it usually defines the end of the process of transcription.

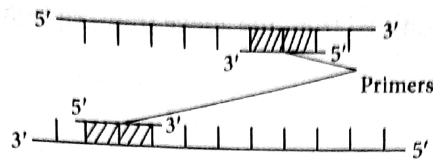
Choose the correct I and II from the options given below.

- (a) Terminator, coding                                      (b) Promoter, template  
 (c) rho factor, template                                      (d) sigma factor, coding

9. Due to which of the following organisms, yield of rice is increased?

- (a) *Sesbania*    (b) *Bacillus popilliae*  
 (c) *Anabaena*    (d) *Bacillus subtilis*

10. At a particular locus, frequency of allele 'A' is 0.6 and that of allele 'a' is 0.4. What would be the frequency of heterozygotes in a random mating population at equilibrium?  
 (a) 0.36 (b) 0.16 (c) 0.24 (d) 0.48
11. At what possible temperature does the given step of gene amplification take place?



- (a) 55°C (b) 95°C (c) 90°C (d) 105°C
12. Choose the correct statement regarding activated sludge.  
 (a) It is formed during primary sewage treatment.  
 (b) It possesses flocs of decomposer microbes.  
 (c) It does not require aeration.  
 (d) No decomposition takes place during formation of activated sludge.

**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)** : The terminal end of hypocotyl is radicle.  
**Reason (R)** : Hypocotyl is the part of embryonal axis in between cotyledonary node and radicle.
14. **Assertion (A)** : Lactose in *lac* operon is promoter gene.  
**Reason (R)** : Lactose inactivates the repressor gene.
15. **Assertion (A)** : A small part of activated sludge is used as inoculum in aeration tank.  
**Reason (R)** : Activated sludge contains a number of aerobic heterotrophic microbes.
16. **Assertion (A)** : Alkaline phosphatase prevents sealing or joining of the cohesive cleaved ends of vector.  
**Reason (R)** : Alkaline phosphatase digests the 5' phosphate group from 5' end of vector.

## SECTION - B

17. (a) State from where do the signals for parturition originate in human females.  
 (b) Why is parturition called a neuro-endocrine mechanism?

OR

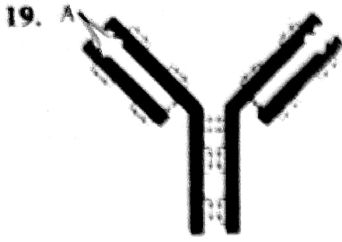
- (a) List the three hormones produced in women only during pregnancy.  
 (b) What happens to the levels of estrogen and progesterone during pregnancy?
18. (a) Look at the above sequence and mention the events A, B and C.  
 (b) What does central dogma state in molecular biology? How does it differ in some viruses?

OR

- (a) Construct a complete transcription unit with promoter and terminator on the basis of the hypothetical template strand given below:



- (b) Write the RNA strand transcribed from the above transcription unit along with its polarity.



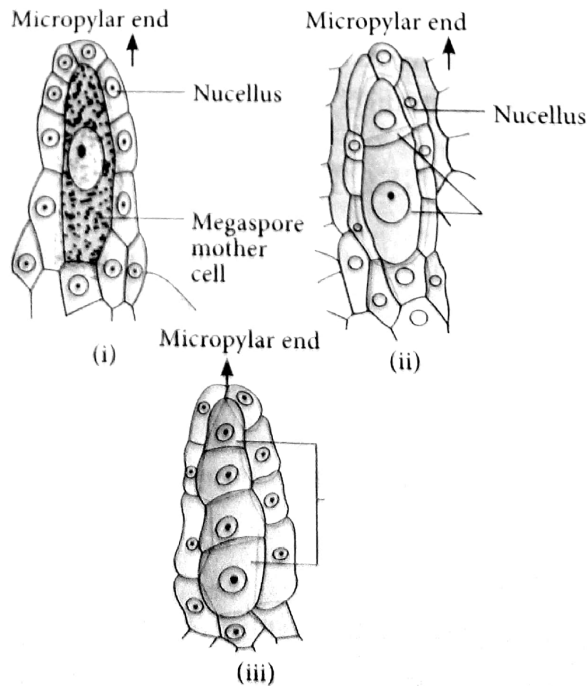
- (a) Identify the molecule shown above and the site labelled 'A'.  
 (b) Why is this molecule referred to as  $H_2L_2$ ? Explain.
20. Non-viral and non-vector methods are sometimes used to transfer genes or alien DNA into a plant cell. Explain one such method used in genetic engineering.
21. (a) Draw a pyramid of numbers where a large number of insects are feeding on the leaves of a tree. What is the shape of this pyramid?  
 (b) Will the pyramid of energy be also of the same shape in this situation? Give reason for your response.

OR

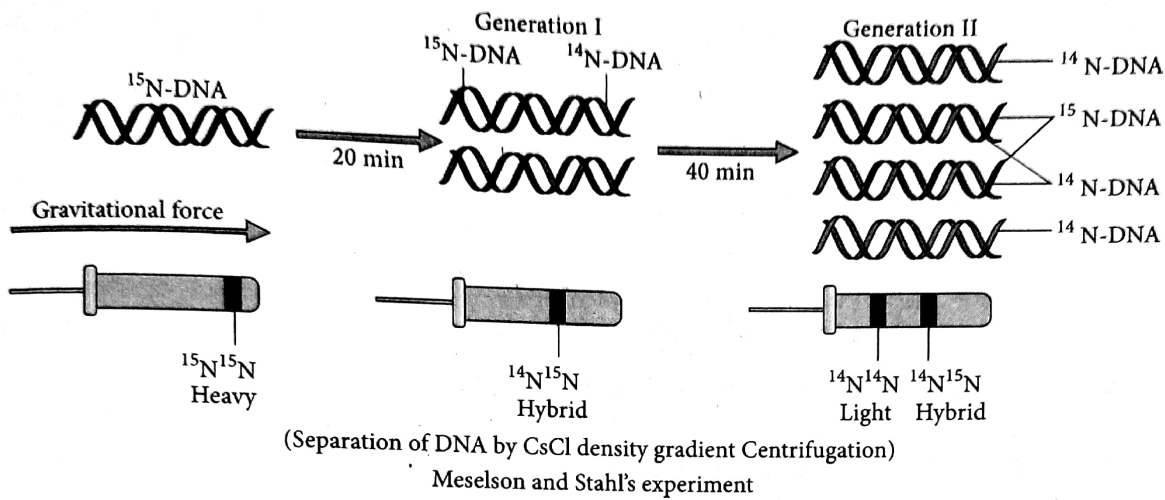
- (a) If the plants produce 1000 units of energy. How much would be the amount of energy at the level of secondary consumers?  
 (b) In grazing food chain, plants fix solar energy and make their food. How do decomposers get their food in detritus food chain?

### SECTION - C

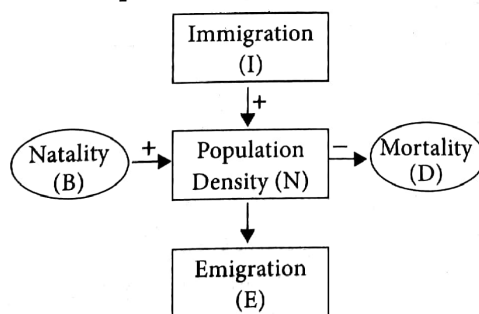
22. Study the figures given below of the development of megaspore in an angiosperm and answer the questions that follow:



- (a) Describe the developmental events in the nucellus of the ovule. What is this type of development of megaspore referred to as ?
- (b) Describe the structure of a typical female gametophyte of a flowering plant.
23. Name the three different parts of a human sperm and write their involvement in the process of fertilisation.
24. Answer the following questions based on experiment depicted in the given figure.



- (a) Write the name of the chemical substance used as the only source of nitrogen in the experiment.
- (b) Why did they allow the synthesis of the light and the heavy DNA molecules in the organism?
- (c) Write the conclusion the scientists arrived at, at the end of the experiment.
25. Following are the features of genetic codes. What does each one indicate?  
Stop codon; Unambiguous codon; Degenerate codon; Universal codon.
26. Secondary treatment of the sewage is also called biological treatment. Justify this statement and explain the process.
27. Name and describe the technique that helps in separating the DNA fragments formed by the use of restriction endonuclease.
28. (a) Study the given flow chart and complete the equation that follows by identifying 1, 2, 3 and 4.

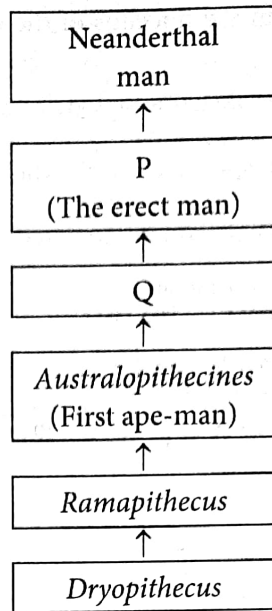


$$N_{t+1} = N_t + \{(1 + 2) - (3 + 4)\}$$

- (b) Mention the different ways by which the population density of different species can be measured.

## SECTION - D

29. Human evolution is a lengthy evolutionary process within the history of primates. Refer to the given flow chart showing stages of evolutionary history of man and answer the following questions.



(a) What could be 'P' here? Mention the location of its fossils.

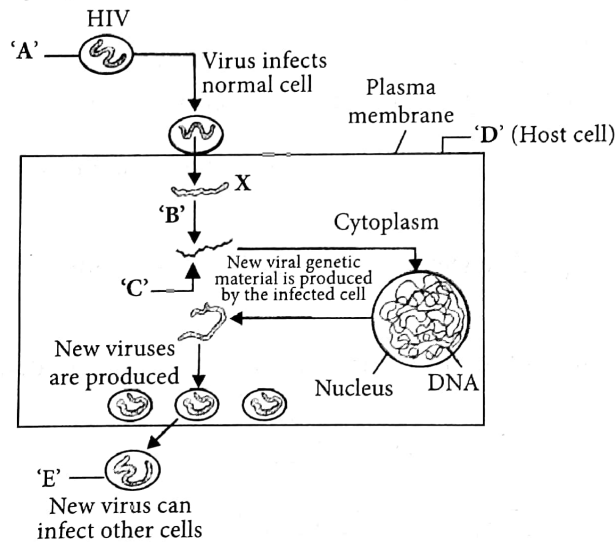
OR

What was the cranial capacity of P and Q?

(b) Mention few differences between P and Neanderthal man.

(c) Give a short note on 'Q'.

30. Study the diagram showing replication of HIV in humans and answer the following questions accordingly.



(a) Identify 'A' and mention the chemical nature of its coat.

(b) Identify 'B' and 'C'. Define the incubation period for the disease caused by 'A'.

(c) Mention the name of the host cell 'D' the HIV attacks first when it enters into the human body.

OR

Name the cells 'E' that new viruses subsequently attack.

## SECTION - E

31. (a) List any two reasons other than physical and congenital disorders for causing infertility in couples.  
 (b) Explain how IVF as a technique helped childless couples in having children.  
 (c) Compare GIFT and ICSI.

OR

(i) Give reasons.

- (a) Most zygotes in angiosperms divide only after certain amount of endosperm is formed.
- (b) Bean seeds are exalbuminous and maize seeds are albuminous.
- (c) Micropyle remains as a small pore in the seed coat of a seed.

(ii) Briefly explain "co-evolution of flower and its pollinator species"

32. Explain the application of rDNA technology to produce insulin.

OR

Give a schematic representation of gene therapy.

33. Explain *in situ* conservation. Discuss briefly about the two *in situ* conservation methods used for biodiversity conservation.

OR

Can you think of a scientific explanation, besides analogy used by Paul Ehrlich, for the direct relationship between diversity and stability of an ecosystem?