General Instructions :

Read the following instructions very carefully and strictly follow them :

(i) Question paper comprises five sections – A, B, C, D and E.

(ii) There are 27 questions in the question paper. All questions are compulsory.

(iii) Section A – Questions no. 1 to 5 are multiple choice questions, carrying 1 mark each.

(iv) Section B – Questions no. 6 to 12 are short-answer questions type-I, carrying 2 marks each.

(v) Section C – Questions no. 13 to 21 are short-answer questions type-II, carrying 3 marks each.

(vi) Section D – Questions no. 22 to 24 are short-answer questions type-III, carrying 3 marks each.

(vii) Section E – Questions no. 25 to 27 are long-answer questions, carrying 5 marks each.

(viii) Answers should be brief and to the point .

(ix) There is no overall choice in the question paper. However, an internal choice has been provided in two questions of 1 mark, one question of 2 marks, two questions of 3 marks and three questions of 5 marks. Only one of the choices in such questions have to be attempted.

(x) The diagrams drawn should be neat, proportionate and properly labelled, wherever necessary.

(xi) In addition to this, separate instructions are given with each section and question, wherever necessary.

SECTION A

1. Meselson and Stahl carried out centrifugation in $CsCl_2$ density gradient to separate : 1

(A) DNA from RNA

(B) DNA from protein

(C) The normal DNA from ^{15}N-DNA

(D) DNA from tRNA

2. Self-pollination is fully e nsured if 1

(A) the flower is bisexual.

(B) the style is longer than the filament.

(C) the flower is cleistogamous.

(D) the time of pistil and anther maturity is different.

OR

Zoospores are the reproductive units to carry asexual reproduction in 1

(A) Chlamydomonas

(B) Spirogyra

(C) Yeast

(D) Rhizopus

3. Micropropagation can be achieved by 1

(A) Self-pollination

(B) Asexual reproduction

(C) Tissue culture

(D) Vegetative propagation

OR

The microbes commonly used in kitchens are 1

(A) Lactobacillus and Yeast

(B) Penicillium and Yeast

(C) Microspora and E. coli

(D) Rhizopus and Lactobacillus

4. The main barrier that prevents the entry of micro-organisms into our body is 1

(A) Antibodies

(B) Macrophages

(C) Monocytes

(D) Skin

5. Nematode specific genes were introduced into the tobacco host plant using a vector 1

(A) pBR 322

(B) Plasmid

(C) Bacteriophage

(D) Agrobacterium

SECTION B

6. Given below is one of the strands of a DNA segment :

3 TACGTACGTA CGTACG 5

(a) Write its complementary strand.

(b) Write a possible RNA strand that can be transcribed from the above DNA molecule formed. 2

7. Wings of birds and wings of butterflies contribute to locomotion. Explain the type of evolution such organs are a result of. 2

8. It is often observed that the chances of a person suffering from measles in his or her lifetime are low if he or she has suffered from the disease in their early childhood. Justify the statement . 2

9. List the three hormones produced in women only during pregnancy. What happens to the levels of estrogen and progesterone during pregnancy ? 2

10. A student on a field trip suddenly felt breathlessness and started to sneeze very badly. Name this response and explain what it is due to. 2

11. With the help of a suitable example, explain how cross-breeding is carried out in developing a new breed in animals. 2

12. Name the genus of baculovirus that acts as a biological control agent in spite of being a pathogen. Justify by giving three reasons that make it an excellent candidate for the job. 2

OR

"Micro -organisms play an important role for the biological treatment of sewage." Justify. 2

SECTION C

13. Draw a schematic transverse section of a mature anther of an angiosperm. Label its epidermis, middle layers, tapetum, endothecium, sporogenous tissue and the connective. 3

14. Differentiate between wind pollinated and insect pollinated flowers. 3

15. Generally it is observed that human males suffer from hemophilia more than human females, who rarely suffer from it. Explain giving reasons. 3

OR

F_1 progeny of pea plant bearing violet flowers and snapdragon plant bearing red flowers were selfed to produce their respective F_2 progeny. Compare the phenotypes, the genotypes and the pattern of inheritance of their respective F_2 progeny. 3

16. Explain the changes that milk undergoes when suitable starter/inoculum is added to it. How does the end product formed prove to be beneficial for human health ? 3

17. Alien species invasion has been a threat to biodiversity. Justify with the help of a suitable example. List any other three causes responsible for such a loss. 3

18. Study the table given below and identify a, b, c, d, e and f : 3

Crops	Variety	Resi stance to disease
a	Pusa sadabahar	b
c	d	White rust
e	Himgiri	f

OR

What is plant breeding ? Explain the two steps involved in classical plant breeding. 3

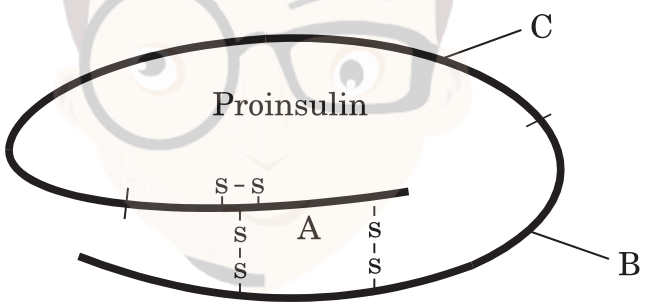
19. Explain the three steps carried out in the formation of recombinant DNA using the enzyme EcoRI. 3

20. Name any two natural cloning vectors. Give reasons that make them act as cloning vectors. Write the two characteristics the engineered vectors are made to possess. 3

21. Explain the difference between commensalism and mutualism types of interactions, with the help of a suitable example of each. 3

SECTION D

22. Insulin in the human body is secreted by pancreas as prohormone/proinsulin. The schematic polypetide structure of proinsulin is given below. This proinsulin needs to undergo processing before it becomes functional in the body. Answer the questions that follow :

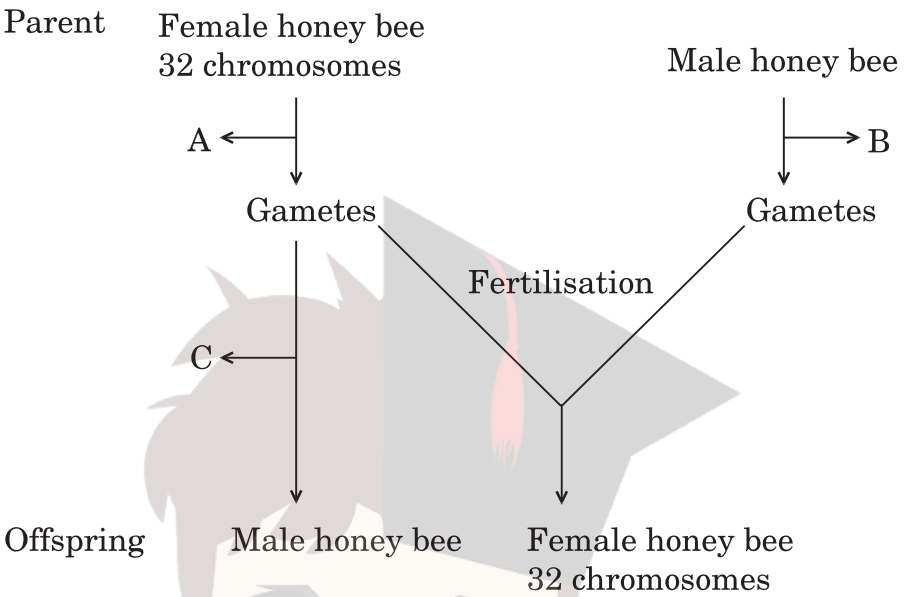


(a) State the change the proinsulin undegoes at the time of its processing to become functional.

(b) Name the technique the American company Eli Lilly used for the commercial production of human insulin.

(c) How are the two polypeptides of a functional insulin chemically held together ? 3

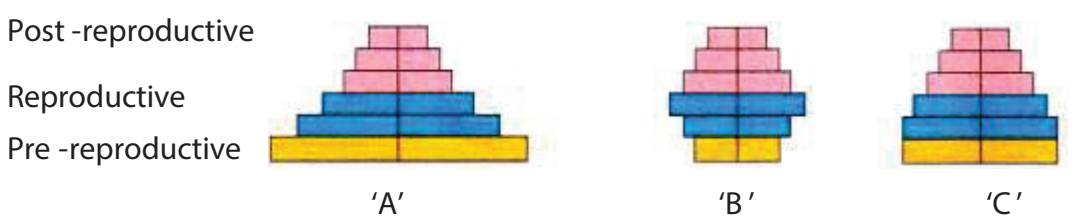
23. The cytological observations made in a number of insects led to the development of the concept of genetic/chromosomal basis of sex-determination mechanism. Honey bee is an interesting example to study the mechanism of sex-determination. Study the schematic cross between the male and the female honey bees given below and answer the questions that follow :



(a) Identify the cell divisions 'A' and 'B' that lead to gamete formation in female and male honey bees respectively.

(b) Name the process 'C' that leads to the development of male honey bee (drone). 3

24. Study the a ge pyramids 'A', 'B' and 'C' of the human population given below and answer the questions that follow :



(a) Identify pyramids 'B' and 'C'.

(b) Write the basis on which the above pyramids are plotted. 3

SECTION E

25. (a) IVF is a very popular method these days that is helping childless couples to bear a child. Describe the different steps that are carried out in this technique.

(b) Would you consider Gamete Intrafallopian Transfer (GIFT) as an IVF ? Give a reason in support of your answer. 5

OR

(a) Draw a sectional view of a human ovary and label primary follicle, tertiary follicle, Graafian follicle and corpus luteum in it.

(b) Name the gonadotropins and explain their role in oogenesis and the release of ova. 5

26. Describe the experiment carried out by Hershey and C hase. Write the conclusion they arrived at. 5

OR

(a) Describe the observations made on collection of white winged moths and dark winged moths in England between the years 1850 and 1920. What did these observations lead to ?

(b) How is the use of herbicides, pesticides and antibiotics by humans for various purposes, comparable with the observations made on moths in the above question ? What is this type of phenomenon called ? 5

27. Describe the model of phosphorus cycle in the terrestrial ecosystem. 5

OR

Describe the DDT biomagnification occurring in an a quatic food chain. State the negative effects the process has on the organisms at the last trophic level of the food chain. 5

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