

2. When the wrong type of pollen falls on the stigma of a flower, during the process of pollination, what decision does the pistil take ?
- (A) Accepts the pollen
 - (B) Rejects the pollen
 - (C) Dissolves the pollen
 - (D) Modifies the pollen
3. Which one of the following options is the work of Oswald Avery, Colin MacLeod and Maclyn McCarty ?
- (A) The genetic material is a protein
 - (B) They discovered that DNA alone could transform S-Bacteria to R-Bacteria
 - (C) Proteases affected transformation
 - (D) RNases affected transformation
4. Which one of the following combinations of base pair is present only in RNA ?
- (A) Adenine and Thymine
 - (B) Guanine and Cytosine
 - (C) Uracil and Adenine
 - (D) Thymine and Guanine
5. When glutamic acid changes to valine at the 6th position of the beta globin chain of haemoglobin, it results in a genetic disorder. Choose the option that indicates the correct disorder.
- (A) Thalassemia
 - (B) Phenylketonuria
 - (C) Sickle cell anaemia
 - (D) Haemophilia

6. In the lac operon, which gene is responsible for the production of permease enzyme ?
- (A) *i* gene
 - (B) *z* gene
 - (C) *y* gene
 - (D) *a* gene
7. A person has a short stature with small round head, furrowed tongue and partially open mouth. Select the option indicating the chromosomal disorder.
- (A) Turner's syndrome
 - (B) Klinefelter's syndrome
 - (C) Down's syndrome
 - (D) Dwarfism
8. If a double-stranded DNA has 30% of cytosine, what will be the percentage of adenine in it ?
- (A) 20%
 - (B) 40%
 - (C) 30%
 - (D) 60%
9. Inoculum used for curd formation is rich in which one of the following components ?
- (A) Vitamin B₁₂
 - (B) Lactic acid bacteria
 - (C) Carbon dioxide
 - (D) Cheese

10. Which one of the following reasons is correct for divergent evolution to happen ?

- (A) Adaptation to different needs
- (B) Predator-Prey inter-relationship
- (C) Selection of similar habitat
- (D) Different structures evolving for the same function

11. Restriction enzymes cut the DNA strand at specific recognition sites to form sticky ends. Select the option that describes the sticky ends correctly.

- (A) Long double-stranded stretches of DNA which hang loosely on both sides.
- (B) They are over-hanging stretches of RNA.
- (C) They form hydrogen bonds with their complementary cut counterparts.
- (D) They are sticky at their ends and hence prevent enzyme action.

12. Name one item from the following which involves the use of bacteria :

- (A) Wine
- (B) Penicillin
- (C) Citric acid
- (D) Curd

For Questions number 13 to 16, two statements are given — one labelled as Assertion (A) and the other labelled as Reason (R). Select the correct answer to these questions from the codes (A), (B), (C) and (D) as given below.

- (A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A).
- (B) Both Assertion (A) and Reason (R) are true, but Reason (R) is **not** the correct explanation of the Assertion (A).
- (C) Assertion (A) is true, but Reason (R) is false.
- (D) Assertion (A) is false, but Reason (R) is true.

13. *Assertion (A) :* To isolate DNA from plant cell enzyme chitinase is used.

Reason (R) : Chitinase breaks down the plant cell wall.

14. *Assertion (A) :* Eukaryotic mRNA requires post-transcription processing for formation of functional mRNA.

Reason (R) : Eukaryotic transcripts possess extra non-functional segments called introns.

15. *Assertion (A) :* An increase in BOD indicates that the water is fit for consumption.

Reason (R) : BOD is a measure of the organic matter present in water.

16. *Assertion (A) :* Organisations like GEAC are necessary to monitor GM researches and to test the safety of introducing Genetically Modified organisms for public services.

Reason (R) : GM researches can have unpredictable results which can even be disastrous, when Genetically Modified organisms are introduced into the ecosystem.

SECTION B

17. (a) The male reproductive system functions with the help of hormones. How does GnRH affect the male reproductive system ? 2

OR

- (b) Various glands are present in the body and they play vital roles in the functioning of the body.

Name any two male accessory glands of the male reproductive system. Write one common function of these accessory glands. 2

18. (a) Explain the mechanism of sex-determination in insects like *Drosophila* and Grasshopper. 2

OR

- (b) How does a chromosomal disorder differ from a Mendelian disorder ? Name any two chromosomal disorders. 2

19. There are many methods to control diseases that are spread by insect vectors.

(a) Name any two diseases spread in this manner.

(b) What is the function of fishes like *Gambusia* to control the above diseases ? 2

20. Mention the key tools of Recombinant DNA technology. Write a line about any four of them, giving their function. 2

21. (a) (i) Which organisms capture energy that sustains the entire living world ? What is the source of this energy ?
- (ii) How do ecosystems comply with the Second Law of Thermodynamics ? 2

OR

- (b) “Alien species are highly invasive and are a threat to indigenous species.” Substantiate this statement with the help of any two examples. 2

SECTION C

22. Answer the following questions : 3

- (a) Where do the *Coleoptile* and *Coleorhiza* appear in a monocot seed ?
- (b) What is meant by free nuclear endosperm ? Give an example.
- (c) What are parthenocarpic fruits ? Give an example.

23. Answer the following questions : 3

- (a) Write the specific location of vasa efferentia and vas deferens in the male reproductive system.
- (b) What is a polar body which is formed during oogenesis process in females ? When is it first produced ?
- (c) Write the fate of the Graafian follicle after ovulation.

24. (a) State the dual role of deoxyribonucleoside triphosphates during DNA replication.
- (b) In which phase of the cell cycle does replication of DNA occur in eukaryotes ? What would happen if cell division is not followed after DNA replication ? 2+1=3
25. Describe the process of translation in protein synthesis. 3
26. Explain how *Bacillus thuringiensis* acts as a microbial biocontrol agent. 3
27. Expand the term 'ELISA'. On which principle is the 'ELISA' test based ? Explain the process. 3
28. Answer the following questions : 3
- (a) Name the type of interaction seen between fig tree and wasps.
- (b) Mention the benefits that the female wasps desire from the fig tree from such an interaction.
- (c) Give one example where animal-plant interaction involves 'co-evolution' other than the relationship between fig tree and wasps.

SECTION D

Questions No. 29 and 30 are case-based questions. Each question has 3 sub-questions with internal choice in one sub-question.

- 29.** Read the following passage and answer the questions that follow :

4

There was a massive fire in a market place. As a result many people were injured and burnt beyond recognition.

- (a) When does a requirement like DNA techniques arise ? Which technique may be suggested in the given situation ?
- (b) What is matched between the victims and kin ? Does it help in other ways also ?
- (c) (i) What is 'Satellite DNA' ? What role does it play ?

OR

- (c) (ii) Apart from 'forensic science', how is DNA fingerprinting used ?

- 30.** Read the following passage and answer the questions that follow :

4

It is said that early screening is the key to boosting survival rates in cancer patients.

- (a) Why is early screening so crucial ?
- (b) What preventive measures would reduce the risk of cancer ?

- (c) (i) Write the causes of cancer. What is the name given to these agents ?

OR

- (c) (ii) Differentiate between viral oncogenes and proto-oncogenes ?

SECTION E

- 31.** (a) (i) What is the 'RCH' programme and what is its motive ?
- (ii) Make a list of five steps to implement the programme and to create awareness among the people about reproduction-related aspects.
- (iii) Which test in this field is meant for useful study but is misused by people ? Write the importance of this test.

5

OR

- (b) (i) Write the average duration of human pregnancy. By what name is this period known as ?
- (ii) Explain the terms Menarche and Menopause.
- (iii) Name and explain the sterilisation methods in males and females.

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- 32.** (a) Describe the steps involved in Recombinant DNA technology in a specific sequence.

5

OR

- (b) (i) In Recombinant DNA technology, it is essential to first make the bacterial cells 'competent'. How is this process carried out ?
- (ii) Name and explain the methods by which an alien DNA can be made to enter :
- (I) a plant cell,
- (II) an animal cell.

2+3=5

33. Read the following passage and answer the questions that follow :

- (a) The role of Species Diversity for providing stability to the ecosystem is still not accepted by all ecologists.
- (i) What is meant by 'Stable Community' ?
 - (ii) What are its characteristics ?
 - (iii) Name the ecologist who carried out experiments on the above to provide a tentative answer and also write his findings.

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OR

(b) Answer the following questions :

- (i) Write the role of detritivores and give one example also.
- (ii) Explain 'Catabolism' and 'Humification' – steps of decomposition.
- (iii) Compare the grazing food chain and detritus food chain in the aspect of their :
 - (I) origin, and
 - (II) energy status.

5