PRE-BOARD EXAMINATION-2020-21

SUBJECT - BIOLOGY

Class: XII (CBSE) **Total Marks: 80**

Date……. **Time: 3 hrs.**

General Instructions:

i. All questions are compulsory.

ii. The question paper has four sections: Section A, Section B, Section C and Section D. There are 33 questions in the question paper.

iii. Section–A has 14 questions of 1 mark each and 02 case-based questions of 4 marks each. Section–B has 9 questions of 2 marks each. Section–C has 5 questions of 3 marks each and Section–D has 3 questions of 5 marks each.

iv. 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.

v. Wherever necessary, neat and properly labeled diagrams should be drawn.

SECTION-A

1. Predict the effect if, the codon UAU coding for an amino acid at the 25th position of a polypeptide of 50 amino acids, is mutated to UAA. 1

2. Differentiate between aneuploidy and polyploidy. 1

3. How does pollination take place in water hyacinth and water lily? 1

4. Name the glands that contribute to human seminal plasma. 1

5. A snapdragon plant with violet flowers was crossed with another such plant with white flowers. The F1 progeny obtained had pink flowers. Explain, in brief, the inheritance pattern seen in offspring's of F1 generation? 1

6. Name the commonly used vector for cloning genes into higher organisms. 1

7. Why does endosperm development precede embryo development? 1

8. Which of the three forests- Temperate, Mangroves and Tropical Evergreen is more vulnerable to invasion by outside animals and plants? 1

9. **Assertion:** Primary transcripts in eukaryotes are nonfunctional. 1
Reason: Methyl guanosine triphosphate is attached to 5' – end of hnRNA.
a. Both assertion and reason are true, and reason is the correct explanation of assertion.
b. Both assertion and reason are true, but reason is not the correct explanation of assertion.
c. Assertion is true, but reason is false.
d. Both assertion and reason are false.

OR

Assertion: An organism with lethal mutation may not even develop beyond the zygote stage.
Reason: All types of gene mutations are lethal.

a. Both assertion and reason are true, and the reason is the correct explanation of assertion.
b. Both assertion and reason are true, but the reason is not the correct explanation of the assertion.
c. Assertion is true, but reason is false.
d. Both assertion and reason are false

10. How many meiotic divisions are required to produce 76 seeds in a Guava fruit? 1

11. **Assertion:** E. coli having pBR322 with DNA insert at BamHI site cannot grow in medium containing tetracycline. 1
Reason: Recognition site for Bam HI is present in tetR region of pBR322.
a. Both assertion and reason are true, and the reason is the correct explanation of the assertion.
b. Both assertion and reason are true, but the reason is not the correct explanation of the assertion.
c. Assertion is true, but reason is false.
d. Both assertion and reason are false

12. Differentiate between pro-insulin and mature insulin. 1

13. **Assertion:** In Ophrys one petal of the flower bears an uncanny resemblance to the female bee. 1
Reason: Two closely related species competing for the same resource can coexist simultaneously.
a. Both assertion and reason are true, and the reason is the correct explanation of the assertion.
b. Both assertion and reason are true, but the reason is not the correct explanation of the assertion.
c. Assertion is true, but reason is false.
d. Both assertion and reason are false

14. Read the following and answer any four questions from 14(i) to 14(v) given below: 4
Sickle cell anemia is a genetic disorder where the body produces an abnormal hemoglobin called hemoglobin S. Red blood cells are normally flexible and round, but when the hemoglobin is defective, blood cells take on a "sickle" or crescent shape. Sickle cell anemia is caused by mutations in a gene called HBB. It is an inherited blood disorder that occurs if both the maternal and paternal copies of the HBB gene are defective. In other words, if an individual receives just one copy of the defective HBB gene, either from mother or father, then the individual has no sickle cell anemia but has what is called "sickle cell trait". People with sickle cell trait usually do not have any symptoms or problems but they can pass the mutated gene onto their children. There are three inheritance scenarios that can lead to a child having sickle cell anemia: - Both parents have sickle cell trait - One parent has sickle cell anemia and the other has sickle cell trait - Both parents have sickle cell anemia

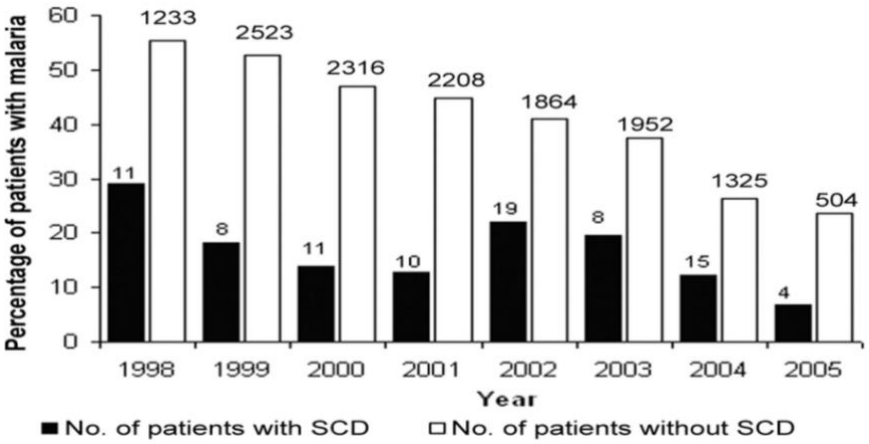
i. Sickle cell anemia is a/ an _____ disease.
a. X linked
b. autosomal dominant
c. autosomal recessive
d. Y linked

ii. If both parents have sickle cell trait, then there is _____of the child having sickle cell anemia. a. 25 % risk b. 50 % risk c. 75% risk d. No risk
a. 25 % risk
b. 50 % risk

c. 75% risk
d. No risk

iii. If one parent has sickle cell anemia and the other has sickle cell trait, there is _____that their children will have sickle cell anemia and _____will have sickle cell trait.
a. 25 % risk, 75% risk
b. 50 % risk, 50% risk
c. 75% risk, 25% risk
d. No risk

iv.



The following statements are drawn as conclusions from the above data (Kenya).

I. Patients with SCD (Sickle Cell Disease) are less likely to be infected with malaria.
II. Patients with SCD (Sickle Cell Disease) are more likely to be infected with malaria.
III. Over the years the percentage of people infected with malaria has been decreasing.
IV. Year 2000 saw the largest percentage difference between malaria patients with and without SCD.

Choose from below the correct alternative.
a. only I is true
b. I and IV are true
c. III and II are true
d. I and III are true

v. If both parents have sickle cell trait, then there is _____of the child having sickle cell trait.
a. 25 % risk
b. 50 % risk
c. 75% risk
d. No risk

15. Read the following and answer any four questions from 15(i) to 15(v) given below: 4

Ecological Indicators The presence of dragonflies can reveal changes in the water ecosystems more quickly than studying other animals or plants. In fact, from the nymph to the adult stage, the dragonfly has a significant, positive ecological impact. Dragonfly eggs are laid and hatched in or near water, so their lives impact both water and land ecosystems. Once hatched, dragonfly nymphs can breathe underwater which enables them to eat mosquito larvae, other aquatic insects and worms, and even small aquatic vertebrates like tadpoles and small fish and in the air. Adult dragonflies capture and eat adult mosquitoes. Community wide mosquito control programs that spray insecticides to kill adult mosquitoes also kill dragonflies.

i. The approach to biological control includes:
a. Import and release of an insect pest to a new area to provide hosts for natural enemies

b. Import and release of natural enemies from the native home of an alien insect pest that has invaded a new area
c. Preservation of natural enemies (predators & parasitoids) that are already established in an area
d. Use of insecticides to reduce alien insect pests to establish new equilibrium position.

ii. Two diseases less likely to occur in a region with plenty of dragonflies are_____
a. Yellow fever and amoebic dysentery
b. Malaria and Yellow fever
c. Anthrax and typhoid
d. Cholera and typhoid

iii. Dragonflies indicate positive ecological impact as
a. The presence of dragonflies indicates polluted water.
b. Dragonfly nymphs selectively eat mosquito larvae.
c. They help to decrease the probability of diseases spread by vectors.
d. Dragonfly do not cause any harm to beneficial species.

iv. The most effective stages in the life cycle of dragonfly that eradicate mosquitoes are
a. Larvae and Adult
b. Caterpillar and Adult
c. Nymph and Adult
d. Pupa and Adult

v. **Assertion:** Releasing dragonflies in areas where there is an outbreak of malarial diseases can be an environment friendly method of control.
Reason: Dragon flies are dominant species and will not allow mosquitoes to reproduce
a. Both assertion and reason are true, and the reason is the correct explanation of the assertion.
b. Both assertion and reason are true, but the reason is not the correct explanation of the assertion.
c. Assertion is true, but reason is false.
d. Both assertion and reason are false

16. **Assertion:** Lactational amenorrhea is a natural method of contraception 1
Reason: Ovulation does not take place during the period of intense lactation following childbirth
a. Both assertion and reason are true, and the reason is the correct explanation of the assertion.
b. Both assertion and reason are true, but the reason is not the correct explanation of the assertion.
c. Assertion is true, but reason is false.
d. Both assertion and reason are false

SECTION-B

17. What are the two core technologies that enabled the birth of modern biotechnology? 2

OR

What is meant by continuous culture system? What is its advantage?

18. State the composition and principle of oral pills as a contraceptive measure taking the example of Saheli. 2

19. Karyotype of a child shows trisomy of chromosome number 21. Identify the disorder and state the symptoms which are likely to be exhibited in this case. 2

20. Explain four advantages of mycorrhizal association to plants. 2

21. Explain the method to increase the competency of the bacterial cell membrane to take up recombinant DNA? 2

OR

What are bioreactors? How are large volumes of cultures maintained and processed in them?

22. Define interference competition. Give one example that supports competitive exclusion occurring in nature. 2

23. Explain the role of enzymes in the extraction of DNA from Rhizopus in its purest form. 2

24. Explain how advanced ex-situ conservation techniques assist in preserving threatened species of plants and animals. 2

25. What are sticky ends? State their significance in recombination DNA technology. 2

OR

Explain the procedure by which PCR aids in early detection of cancer.

SECTION-C

26. a. In pBR322, foreign DNA has to be introduced in tet^R region. From the restriction enzymes given below, which one should be used and why: 3
PvuI, EcoRI, BamHI
b.Give reasons, why the other two enzymes cannot be used.

27. Read the following base sequence of a certain DNA strand and answer the questions that follow: 3

A	A	G	A	A	T	T	C	A	A
T	T	C	T	T	A	A	G	T	T

a. What is called a palindrome sequence of DNA?
b. Write the palindrome nucleotide sequence shown in the DNA strand given and mention the enzyme that will recognize such a sequence.
c. State the significance of enzymes that identify palindrome nucleotide sequences.

28. Bring out the difference between alpha-thalassemia and beta-thalassemia. 3

29. Describe any three methods of vectorless transfer of rDNA into host cells. 3

30. A child is born with a hereditary disease, suggest the possible corrective method for it. Illustrate by giving a specific example. 3

OR

Give reasons for the following:
a. Very small animals are rarely found in polar regions.
b. Mammals from colder climate generally have shorter ear and limbs.
c. Initially we feel nausea and fatigue when we reach a high altitude such as Rohtang Pass and then, gradually, we feel normal.

SECTION-D

31. A segment of DNA, GCC AGG GGG ATG was translated into an oligopeptide arginine – serine – proline - tyrosine 5

i. Write the codons for these four amino acids.

ii. If the first adenine in the DNA segment is substituted by guanine.

a. What will be the mRNA transcribed by it?

b. What will be the sequence of amino acids in the new oligopeptide?

c. Write the anticodons for these amino acids.

OR

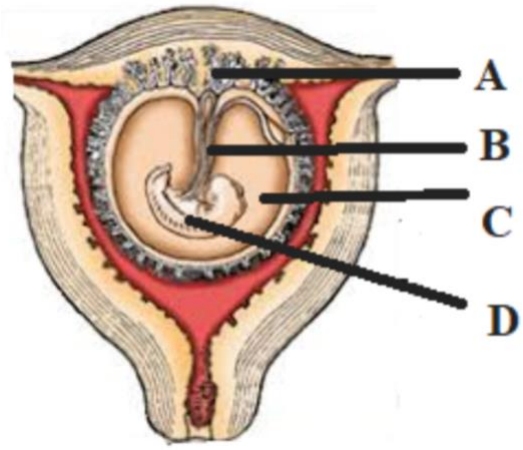
a. Why should biological control of pests and pathogens be preferred to the conventional use of chemical pesticides?

b. Explain how the following microbes act as biocontrol agents?

i. Bacillus thuringiensis

ii. Nucleopolyhedrovirus

32. The following figure shows a fetus within the uterus. On the basis of the given figure, answer the questions that follow: 5



(a) In the above figure, choose and name the correct part (A, B, C or D) that act as a temporary endocrine gland and substantiate your answer. Why is it also called the functional junction?
(b) Mention the role of B in the development of the embryo.
(c) Name the fluid surrounding the developing embryo. How is it misused for sex-determination?

OR

Identify and name the disease in which the patient's cells lose the property of contact inhibition. State its possible causes and explain any three methods to accurately detect the pathological and physiological changes that take place due to the disease in living tissues.

33. Evaluate the suitability of DNA and RNA as genetic material and justify the suitability of the one that is preferred as an ideal genetic material. 5

OR

Explain the mechanism of DNA replication as suggested by Watson and Crick.
