

Class XII  
Biology (044) Theory

Time: 3 Hours

Maximum Marks: 70

**General Instructions:**

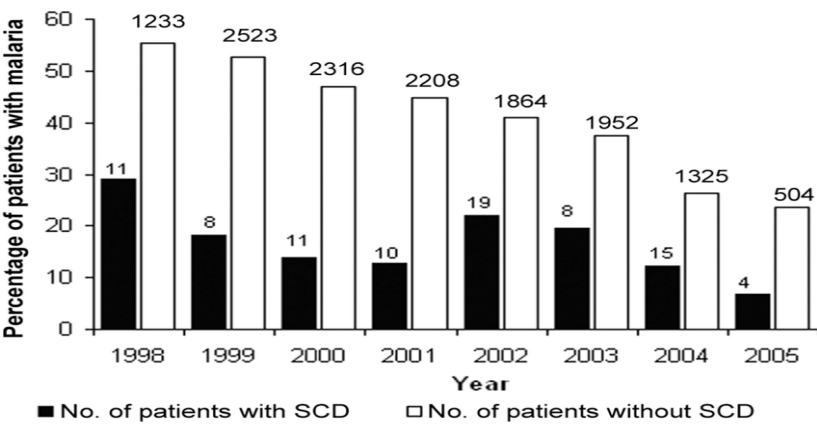
- (i) All questions are compulsory.
- (ii) The question paper has four sections: Section A, Section B, Section C and Section D. There are 33 questions in the question paper.
- (iii) Section–A has 14 questions of 1 mark each and 02 case-based questions. Section–B has 9 questions of 2 marks each. Section–C 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 |  |       |
|-----------|--|-------|
|           | Questions  | Marks |
| 1.        | Why does endosperm development precede embryo development?   | 1     |
| 2.        | How many meiotic divisions are required to produce 76 seeds in a Guava fruit?  | 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 offsprings of F1 generation? | 1     |
| 6.        | Differentiate between aneuploidy and polyploidy.   | 1     |
| 7.        | Predict the effect if, the codon UAU coding for an amino acid at the 25 <sup>th</sup> position of a polypeptide of 50 amino acids, is mutated to UAA.  | 1     |
| 8.        | Differentiate between pro-insulin and mature insulin.  | 1     |
| 9.        | Name the commonly used vector for cloning genes into higher organisms.   | 1     |
| 10.       | Which of the three forests- Temperate, Mangroves and Tropical Evergreen is more vulnerable to invasion by outside animals and plants?  | 1     |

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| 11. | <p><b>Assertion:</b> Primary transcripts in eukaryotes are nonfunctional.</p> <p><b>Reason:</b> Methyl guanosine triphosphate is attached to 5' – end of hnRNA.</p> <ol style="list-style-type: none"> <li>Both assertion and reason are true, and reason is the correct explanation of assertion.</li> <li>Both assertion and reason are true, but reason is not the correct explanation of assertion.</li> <li>Assertion is true but reason is false.</li> <li>Both assertion and reason are false.</li> </ol> <p style="text-align: center;"><b>OR</b></p> <p><b>Assertion:</b> An organism with lethal mutation may not even develop beyond the zygote stage.</p> <p><b>Reason:</b> All types of gene mutations are lethal.</p> <ol style="list-style-type: none"> <li>Both assertion and reason are true, and the reason is the correct explanation of the assertion.</li> <li>Both assertion and reason are true, but the reason is not the correct explanation of the assertion.</li> <li>Assertion is true but reason is false.</li> <li>Both assertion and reason are false</li> </ol> | 1 |
| 12. | <p><b>Assertion:</b> <i>E. coli</i> having pBR322 with DNA insert at BamHI site cannot grow in medium containing tetracycline.</p> <p><b>Reason:</b> Recognition site for Bam HI is present in tet<sup>R</sup> region of pBR322.</p> <ol style="list-style-type: none"> <li>Both assertion and reason are true, and the reason is the correct explanation of the assertion.</li> <li>Both assertion and reason are true, but the reason is not the correct explanation of the assertion.</li> <li>Assertion is true but reason is false.</li> <li>Both assertion and reason are false</li> </ol>  | 1 |
| 13. | <p><b>Assertion:</b> A community with more species is more stable than that with less species.</p> <p><b>Reason:</b> More the number of species, lesser the variation in the total biomass production year after year.</p> <ol style="list-style-type: none"> <li>Both assertion and reason are true, and the reason is the correct explanation of the assertion.</li> <li>Both assertion and reason are true, but the reason is not the correct explanation of the assertion.</li> <li>Assertion is true but reason is false.</li> <li>Both assertion and reason are false</li> </ol>  | 1 |

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| 14. | <p><b>Assertion:</b> In <i>Ophrys</i> one petal of the flower bears an uncanny resemblance to the female bee.</p> <p><b>Reason:</b> Two closely related species competing for the same resource can coexist simultaneously.</p> <ol style="list-style-type: none"> <li>Both assertion and reason are true, and the reason is the correct explanation of the assertion.</li> <li>Both assertion and reason are true, but the reason is not the correct explanation of the assertion.</li> <li>Assertion is true but reason is false.</li> <li>Both assertion and reason are false</li> </ol>   | 1 |
| 15. | <p><i>Read the following and answer any <b>four</b> questions from 15(i) to 15(v) given below:</i></p> <p><b>Ecological Indicators</b></p> <p>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.</p> <p>Community wide mosquito control programs that spray insecticides to kill adult mosquitoes also kill dragonflies.</p> | 4 |
| i.  | <p>The approach to biological control includes:</p> <ol style="list-style-type: none"> <li>Import and release of an insect pest to a new area to provide hosts for natural enemies</li> <li>Import and release of natural enemies from the native home of an alien insect pest that has invaded a new area</li> <li>Preservation of natural enemies (predators &amp; parasitoids) that are already established in an area</li> <li>Use of insecticides to reduce alien insect pests to establish new equilibrium position.</li> </ol>   |   |
| ii. | <p>Two diseases less likely to occur in a region with plenty of dragonflies are _____</p> <ol style="list-style-type: none"> <li>Yellow fever and amoebic dysentery</li> <li>Malaria and Yellow fever</li> <li>Anthrax and typhoid</li> <li>Cholera and typhoid</li> </ol>  |   |

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| iii. | <p>Dragonflies indicate positive ecological impact as-</p> <ol style="list-style-type: none"> <li>The presence of dragonflies indicates polluted water.</li> <li>Dragonfly nymphs selectively eat mosquito larvae.</li> <li>They help to decrease the probability of diseases spread by vectors.</li> <li>Dragonfly do not cause any harm to beneficial species.</li> </ol>   |   |
| iv.  | <p>The most effective stages in the life cycle of dragonfly that eradicate mosquitoes are-</p> <ol style="list-style-type: none"> <li>Larvae and Adult</li> <li>Caterpillar and Adult</li> <li>Nymph and Adult</li> <li>Pupa and Adult</li> </ol>   |   |
| v.   | <p><b>Assertion:</b> Releasing dragonflies in areas where there is an outbreak of malarial diseases can be an environment friendly method of control.</p> <p><b>Reason:</b> Dragon flies are dominant species and will not allow mosquitoes to reproduce</p> <ol style="list-style-type: none"> <li>Both assertion and reason are true, and the reason is the correct explanation of the assertion.</li> <li>Both assertion and reason are true, but the reason is not the correct explanation of the assertion.</li> <li>Assertion is true but reason is false.</li> <li>Both assertion and reason are false</li> </ol>  |   |
| 16.  | <p><i>Read the following and answer any <b>four</b> questions from 16(i) to 16(v) given below:</i></p> <p>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.</p> <p>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:</p> <ul style="list-style-type: none"> <li>- Both parents have sickle cell trait</li> <li>- One parent has sickle cell anemia and the other has sickle cell trait</li> <li>- Both parents have sickle cell anemia</li> </ul> | 4 |

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| i.   | Sickle cell anemia is a/ an _____ disease.<br>a. X linked<br>b. autosomal dominant<br>c. autosomal recessive<br>d. Y linked   |  |
| ii.  | If both parents have sickle cell trait, then there is _____ of the child having sickle cell anemia.<br>a. 25 % risk<br>b. 50 % risk<br>c. 75% risk<br>d. No risk  |  |
| iii. | If both parents have sickle cell trait, then there is _____ of the child having sickle cell trait.<br>a. 25 % risk<br>b. 50 % risk<br>c. 75% risk<br>d. No risk   |  |
| iv.  | 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.<br>a. 25 % risk, 75% risk<br>b. 50 % risk, 50% risk<br>c. 75% risk, 25% risk<br>d. No risk |  |
| v.   |  <p>The following statements are drawn as conclusions from the above data (Kenya).</p> <p>I. Patients with SCD (Sickle Cell Disease) are less likely to be infected with malaria.</p>   |  |

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|  | <p>II. Patients with SCD (Sickle Cell Disease) are more likely to be infected with malaria.</p> <p>III. Over the years the percentage of people infected with malaria has been decreasing.</p> <p>IV. Year 2000 saw the largest percentage difference between malaria patients with and without SCD.</p> <p>Choose from below the correct alternative.</p> <p>a. only I is true</p> <p>b. I and IV are true</p> <p>c. III and II are true</p> <p>d. I and III are true</p> |  |
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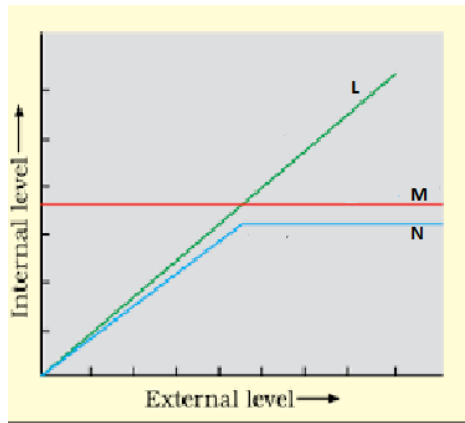
**SECTION – B**

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| 17. | State the composition and principle of oral pills as a contraceptive measure taking the example of Saheli.   | 2 |
| 18. | 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 |
| 19. | Explain four advantages of mycorrhizal association to plants.  | 2 |
| 20. | Explain the method to increase the competency of the bacterial cell membrane to take up recombinant DNA?<br><br><b>OR</b><br>What are bioreactors? How are large volumes of cultures maintained and processed in them? | 2 |
| 21. | Explain the role of enzymes in the extraction of DNA from <i>Rhizopus</i> in its purest form.  | 2 |
| 22. | What are sticky ends? State their significance in recombination DNA technology.<br><br><b>OR</b><br>Explain the procedure by which PCR aids in early detection of cancer.  | 2 |
| 23. | Explain how advanced ex-situ conservation techniques assist in preserving threatened species of plants and animals.  | 2 |
| 24. | Define interference competition. Give one example that supports competitive exclusion occurring in nature.   | 2 |
| 25. | The Tropical regions are likely to have more biological diversity than the Temperate ones. Give two reasons to justify the statement.  | 2 |

**SECTION – C**

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| 26. | A fully developed foetus initiates its delivery from the mother's womb. Justify the statement.  | 3 |
| 27. | How would you find out the genotype of a pea plant with violet flowers? Explain with the help of Punnett's square showing crosses.  | 3 |
| 28. | Define flocs and state their importance in biological treatment of waste water.   | 3 |
| 29. | A farmer noticed that nematode infection in tobacco plants has resulted in the reduction in the yield. Suggest a strategy which provides cellular defense for providing resistance to this pest. Explain the technique. | 3 |

30. The graph given below represents three categories of organismic responses - L, M and N to cope with stressful conditions. Identify the categories L and M.



Given below are examples of some of the activities performed by animals. Categorise these activities into the appropriate kind of the organismic response (L, M or N) as shown in the graph with reasons.

- i. In summers we sweat profusely.
- ii. Sometimes desert lizards bask in the sun and sometimes they move into shade.

**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.

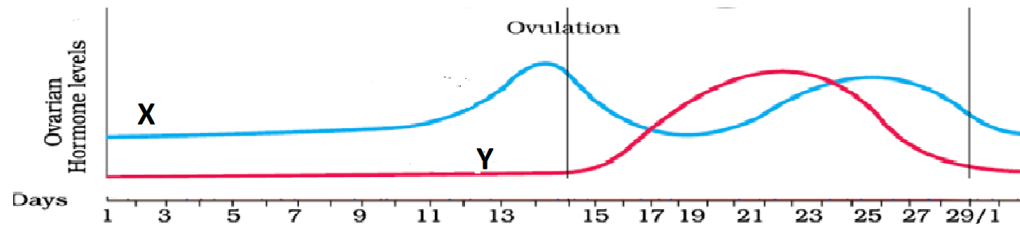
### SECTION - D

31.

Study the graph given below related with menstrual cycle in females:

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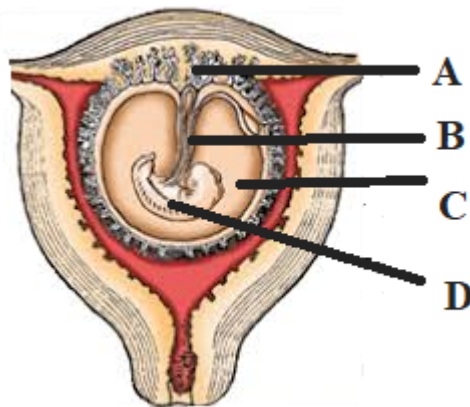
- a. Identify ovarian hormones X and Y mentioned in the graph and specify their source.



- b. Correlate and describe the uterine events that take place according to the ovarian hormone levels X and Y mentioned in the graph on -
- i. 6 – 15 days
  - ii. 16 – 25 days
  - iii. 26 – 28 days (when ovum is not fertilized)

**OR**

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



- (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?



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| 32. | <p>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.</p> <p style="text-align: center;"><b>OR</b></p> <p>Explain the mechanism of DNA replication as suggested by Watson and Crick.</p>  | 5 |
| 33. | <p>Identify and name the disease in which the patient's cells lose the property of contact inhibition. State its possible causes and explain any <u>three</u> methods to accurately detect the pathological and physiological changes that take place due to the disease in living tissues.</p> <p style="text-align: center;"><b>OR</b></p> <p>A patient had tested positive to ELISA Test. Identify the disease and the pathogen responsible, give reasons for the reduced/ weak immunity of the patient and trace the path, spread and effects of this pathogen in the human body.</p> | 5 |

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