SY-4026

Class No. : .....

Name : .....

SECOND YEAR HIGHER SECONDARY
SECOND TERMINAL EXAMINATION, DECEMBER-2025

Part – III

BIOLOGY

(Botany & Zoology)

Maximum : 60 scores

Time : 2 Hours
Cool-off time : 15 Minutes
Preparatory Time : 10 Minutes

General Instructions to Candidates :

- There is a 'Cool-off time' of 15 minutes in addition to the writing time. Further there is a '10 minutes' 'Preparatory Time' at the end of the Botany Examination and before the commencement of Zoology Examination.
- Use the 'Cool-off time' to get familiar with questions and to plan your answers.
- Read questions carefully before answering.
- Read the instructions carefully.
- Calculations, figures and graphs should be shown in the answer sheet itself.
- Malayalam version of the questions is also provided.
- Give equations wherever necessary.
- Electronic devices except non-programmable calculators are not allowed in the Examination Hall.

വിദ്യാർത്ഥികൾക്കുള്ള പൊതുനിർദ്ദേശങ്ങൾ :

- നിർദ്ദിഷ്ട സമയത്തിന് പുറമേ 15 മിനിറ്റ് 'കൂൾ ഓഫ് ടൈം' ഉണ്ടായിരിക്കും. കൂടാതെ ബോട്ടണി പരീക്ഷയ്ക്കുശേഷം സുവോളജി പരീക്ഷ തുടങ്ങുന്നതിനുമുമ്പ് '10 മിനിറ്റ്' തയ്യാറെടുപ്പുകൾ നടത്തുന്നതിനായി നല്കുന്നതാണ്. ഈ വേളകളിൽ ചോദ്യങ്ങൾക്ക് ഉത്തരം എഴുതാനോ, മറ്റുള്ളവരുമായി ആശയ വിനിമയം നടത്താനോ പാടില്ല.
- 'കൂൾ ഓഫ് ടൈം' ചോദ്യങ്ങൾ പരിചയപ്പെടാനും ഉത്തരങ്ങൾ ആസൂത്രണം ചെയ്യാനും ഉപയോഗിക്കുക.
- ഉത്തരങ്ങൾ എഴുതുന്നതിന് മുമ്പ് ചോദ്യങ്ങൾ ശ്രദ്ധാപൂർവ്വം വായിക്കണം.
- നിർദ്ദേശങ്ങൾ മുഴുവനും ശ്രദ്ധാപൂർവ്വം വായിക്കണം.
- കണക്ക് കൂട്ടലുകൾ, ചിത്രങ്ങൾ, ഗ്രാഫുകൾ, എന്നിവ ഉത്തരപേപ്പറിൽ തന്നെ ഉണ്ടായിരിക്കണം.
- ചോദ്യങ്ങൾ മലയാളത്തിലും നല്കിയിട്ടുണ്ട്.
- ആവശ്യമുള്ള സ്ഥലത്ത് സമവാക്യങ്ങൾ കൊടുക്കണം.
- പ്രോഗ്രാമുകൾ ചെയ്യാനാകാത്ത കാൽക്കുലേറ്ററുകൾ ഒഴികെയുള്ള ഒരു ഇലക്ട്രോണിക് ഉപകരണവും പരീക്ഷാഹാളിൽ ഉപയോഗിക്കുവാൻ പാടില്ല.

PART – A

BOTANY

(Maximum : 30 scores) **Time : 1 Hour**

I. Answer any 3 questions from 1 to 5. Each carries 1 score. **(3 × 1 = 3)**

1. Name the enzyme which can cut the double stranded DNA at certain specific sites.

2. After fertilization, the integuments of the ovule develops into _____.

   (a) Endosperm (b) Embryo

   (c) Seed coat (d) Pericarp

3. Golden rice is an example for genetically modified crop. The nutritional value of this rice has been increased by genetic manipulation.

   This genetically modified rice is developed to combat deficiency of which nutrient ?

4. During DNA purification, a chemical is added to precipitate purified DNA as fine threads in the suspension.

   Which is the chemical added to the suspension during DNA purification ?

5. Write scientific term for the following :

   (a) Method of silencing the specific mRNA sequences due to a complementary ds RNA molecule that binds to and prevents translation of the mRNA.

   (b) A collection of method that allows correction of a gene defect that has been diagnosed in a child/embryo.

II. Answer any 9 questions from 6 to 16. Each carries 2 scores. $(9 \times 2 = 18)$

6. (a) What is Genetic Engineering ?

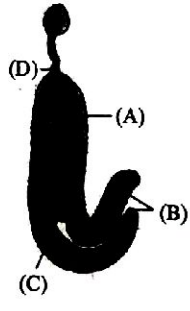
   (b) How does it overcome the limitations of traditional hybridisation ?

7. Predation is usually referred to as a detrimental association.

   (a) State any three positive roles that a predator play in an ecosystem.

   (b) Prey species have evolved various defence mechanisms to lessen the impact of predation. Write any one example from animals.

8. Given below is the diagram of mature embryo :



Label the parts marked as (A), (B), (C), (D).

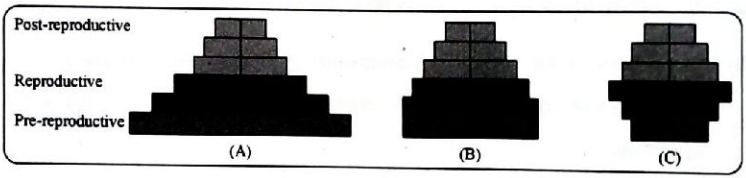
9. Orchids show a bewildering diversity of floral patterns. Many of which have evolved to attract the right pollinator insect and guaranteed pollination.

How does the Mediterranean orchid ophrys ensure guaranteed pollination by bees ?

10. (a) What are the different features that are required to facilitate cloning into a vector ?

(b) Define the term transformation in genetic engineering.

11. The diagram given below represents an age pyramid of human population :



(a) What is age pyramid ?

(b) Based on the diagram, which population is stable, which is expanding and which is declining ?

12. The development of genetically modified cotton plants has significantly reduced the dependence on chemical insecticides and pesticides.

(a) Name a genetically engineered cotton plant exhibiting insect resistance.

(b) Write the source of the insecticidal gene introduced into this crop.

(c) Explain the mechanism of action of the expressed insecticidal protein.

13. The manipulation of living organisms by the human race is an emerging research area. These transgenic animals are beneficials to humans in many ways.

Explain the importance of transgenic animals in the field of health with suitable examples (Any two examples).

14. Competition is an interaction between two or more than two species when they compete for limited resources.

Explain the following terms :

(a) Interference competition

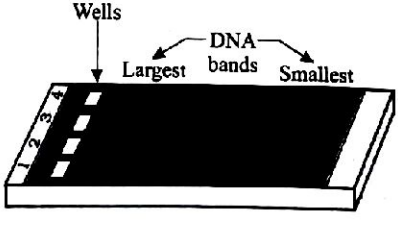
(b) Competitive release

15. Expand the following :

(a) GEAC

(b) GMO

16. Given diagram shows a technique used in biotechnology for the separation of DNA fragments :

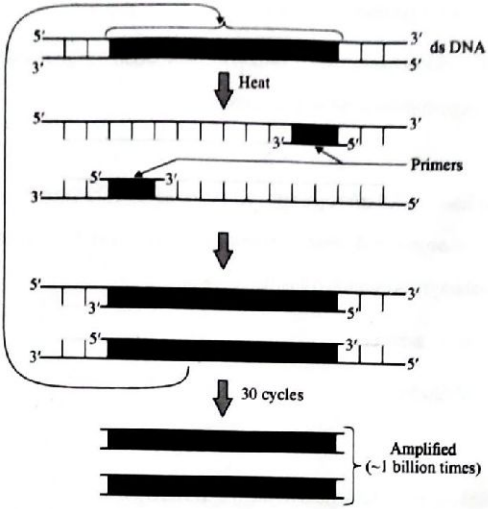


(a) Name the technique.

(b) State the principle behind this technique.

III. Answer any 3 questions from 17 to 20. Each carries 3 scores. **(3 × 3 = 9)**

17. The diagram given below is an important process in biotechnology to make multiple copies of DNA fragments.

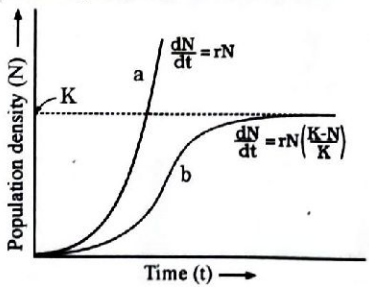


(a) Mention the three steps involved in this process.

(b) Name the DNA polymerase enzyme used in this process.

(c) State the reason for using a thermostable DNA polymerase in this reaction.

18. Given below is a population growth curve :



(a) What does 'r' and 'K' stand for ?

(b) Mention the significance of 'r' in studying population growth.

(c) Name the growth curve a & b.

19. Some of terms related to tissue culture are given below. Define each term :

(a) Explant

(b) Totipotency

(c) Somaclones

20. (a) What is monosporic embryo sac development in Angiosperms ?

(b) Name the cells in the mature embryo sac that are present at the chalazal end.

(c) Name the cell into which pollen tube enters.