Reg. No.

Name :

Code No. 5017

Second Year – March 2017

Time : 2 Hours
Cool-off time : 20 Minutes
Preparatory Time : 5 Minutes

Part – III

BIOLOGY

Maximum : 60 Scores

General Instructions to Candidates :

- There is a 'cool-off time' of 10 minutes each for Botany and Zoology in addition to the writing time of 1 hour each. Further there is '5 minutes' 'Preparatory Time' at the end of the Botany Examination and before the commencement of Zoology Examination.
- You are not allowed to write your answers nor to discuss anything with others during the 'cool-off time' and 'Preparatory Time'.
- Use the 'cool-off time' to get familiar with questions and to plan your answers.
- Read questions carefully before answering.
- All questions are compulsory and only internal choice is allowed.
- When you select a question, all the sub-questions must be answered from the same question itself.
- 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.

നിർദ്ദേശങ്ങൾ :

- നിർദ്ദിഷ്ട സമയത്തിന് പുറമെ ബോട്ടണിയ്ക്കും സുവോളജിക്കും 10 മിനിറ്റ് വീതം 'കൂൾ ഓഫ് ടൈം' ഉണ്ടായിരിക്കും. കൂടാതെ ബോട്ടണി പരീക്ഷയ്ക്കുശേഷം സുവോളജി പരീക്ഷ തുടങ്ങുന്നതിനുമുമ്പ് '5 മിനിറ്റ്' തയ്യാറെടുപ്പുകൾ നടത്തുന്നതിനായി നൽകുന്നതാണ്. ഈ വേളകളിൽ ചോദ്യങ്ങൾക്ക് ഉത്തരം എഴുതാനോ, മറ്റുള്ളവരുമായി ആശയവിനിമയം നടത്താനോ പാടില്ല.
- ഉത്തരങ്ങൾ എഴുതുന്നതിന് മുമ്പ് ചോദ്യങ്ങൾ ശ്രദ്ധാപൂർവ്വം വായിക്കണം.
- എല്ലാ ചോദ്യങ്ങൾക്കും ഉത്തരം എഴുതണം.
- ഒരു ചോദ്യനമ്പർ ഉത്തരമെഴുതാൻ തെരഞ്ഞെടുത്തു കഴിഞ്ഞാൽ ഉപചോദ്യങ്ങളും അതേ ചോദ്യനമ്പരിൽ നിന്ന് തന്നെ തെരഞ്ഞെടുക്കേണ്ടതാണ്.
- കണക്ക് കൂട്ടലുകൾ, ചിത്രങ്ങൾ, ഗ്രാഫുകൾ എന്നിവ ഉത്തരപേപ്പറിൽ തന്നെ ഉണ്ടായിരിക്കണം.
- ചോദ്യങ്ങൾ മലയാളത്തിലും നൽകിയിട്ടുണ്ട്.
- ആവശ്യമുള്ള സ്ഥലത്ത് സമവാക്യങ്ങൾ കൊടുക്കണം.
- പ്രോഗ്രാമുകൾ ചെയ്യാനാകാത്ത കാൽക്കുലേറ്ററുകൾ ഒഴികെയുള്ള ഒരു ഇലക്ട്രോണിക് ഉപകരണവും പരീക്ഷാഹാളിൽ ഉപയോഗിക്കുവാൻ പാടില്ല.

PART – A
BOTANY

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

Cool-off time : 10 Minutes

1. A date palm seed discovered during archeological investigation retained viability even after 10000 years. The retention of viability is due to the state of inactivity of embryo called _____. **(Score : 1)**

2. The plant in which adventitious buds along the margin of leaves give rise to new plants is

   (a) Water Hyacinth

   (b) Agave

   (c) Bryophyllum

   (d) Dahlia **(Score : 1)**

3. Match the following varieties with their respective crops :

	Variety		Crop
(a)	Pusa Swarnim	(i)	Chilly
(b)	Pusa Snowball	(ii)	Bhindi
(c)	Pusa Sawani	(iii)	Cauliflower
(d)	Pusa Sadabahar	(iv)	Brassica

(Scores : ½ × 4 = 2)

4. Sequences of base pairs in DNA that reads the same on both the strands when the orientation of reading is kept the same are called _____ sequences. **(Score : 1)**

5. When the pollen is transferred from anther to the stigma of the same flower, the pollination is called autogamy.

   (a) Cleistogamous flowers are invariably autogamous. Explain. **(Score : 1)**

   (b) Geitonogamy is functionally cross pollination, but genetically similar to autogamy. Justify the statement **(Score : 1)**

6. The thick protective covering of the fruit is known as _____. **(Score : 1)**

7. Match the following :

(a)	Antigen-antibody reaction	(i)	ADA deficiency
(b)	α-lactalbumin	(ii)	Emphysema
(c)	α-1-antitrypsin	(iii)	Rosie
(d)	Gene therapy	(iv)	ELISA

(Scores : ½ × 4 = 2)

8. Insulin getting assembled into a mature form was the major challenge in commercial insulin production by rDNA technology. How did Eli Nilly Company found a solution to this problem ?
(Scores : 2)

9. In a given habitat, the maximum number possible for a species is called _____ of that species in that habitat.
(Score : 1)

10. A common cause of deforestation is slash and burn agriculture.
(a) What is the common name attributed to such type of cultivation ? **(Score : 1)**
(b) Explain how this type of cultivation is practised ? **(Score : 1)**

11. (A) Different types of population interaction has been observed in a population.
Write the types of interaction observed among the following species :

Species A	Species B	Type of Interaction
Orchid Ophrys	Bees	_____
Cattle	Cattle Egret	_____
Sea Anemone	Clown Fish	_____
Ticks	Dogs	_____
Cuscuta	Hedge Plant	_____
Tiger	Deer	_____

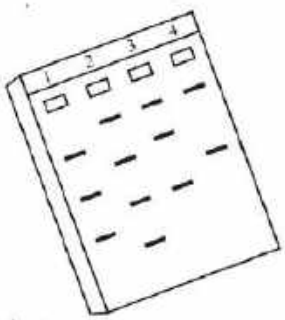
(Scores : ½ × 6 = 3)

OR

(B) Organisms other than human beings manage or adapt to stressful conditions by adopting different mechanisms. Explain any three mechanisms adopted by them to maintain the internal environment.
(Scores : 3)

12. Breeding crops with the objective of increased nutritional quality is called _____.
(Score : 1)

13. (A) The following photograph shows the result of a technique showing the separation of DNA.



(a) Name the technique.
(b) How the separated DNA is visualized ?
(c) DNA fragments of size 500 bp, 1600 bp and 2000 bp are separated by this process. Which fragment will migrate fast. Why ? **(Scores : 1 × 3 = 3)**

OR

(B) Different methods have been suggested to introduce alien DNA into host cells. Give and explain any three methods adopted for this purpose. **(Scores : 1 × 3 = 3)**

14. The different stages of primary succession in water are represented below. Fill the gaps that are unfilled.
(a) Phytoplankton
(b) _____
(c) Submerged free floating plant stage
(d) _____
(e) _____
(f) Shrub stage
(g) _____ **(Scores : ½ × 4 = 2)**

15. Particulate matter in polluted air is removed by the application of electrostatic precipitator. Explain the working principle of electrostatic precipitator. **(Scores : 2)**

16. Nature has mechanisms to promote outbreeding in plants. Explain any two mechanisms existing in plants to promote outbreeding. **(Scores : 2)**

17. An ecosystem consist of the following population :
Phytoplankton
Man
Fish
Zooplankton
Draw a food chain denoting each trophic level. **(Scores : ½ × 4 = 2)**

PART – B

ZOOLOGY

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

Cool-off time : 10 Minutes

1. The following table shows the F_2 generation of a dihybrid cross. Identify the 'Phenotype' with homozygous recessive genotype. Find out A : B : C : D.

No.	Phenotype	No. of offspring (F_2 gen.)
1	A	21
2	B	7
3	C	63
4	D	21

(Scores : 2)

2. Z-values of a frugivorous bat species are given below. Which value is not applicable to continents ?

   (1) 0.6

   (2) 0.65

   (3) 0.20

   (4) 0.68 **(Score : 1)**

3. Distinguish *in situ* conservation from *ex situ* conservation with one example each.

(Scores : 2)

4. Which of the following pairs of STDs is completely curable ?

   (1) HIV, Hepatitis-B

   (2) Hepatitis-B, Gonorrhoea

   (3) Syphilis, Gonorrhoea

   (4) Chlamydomonas, genital-herpes **(Score : 1)**

5. Which of the following do not have similar sex chromosomes ? (Homogametic)

(1) Human female

(2) Drosophila female

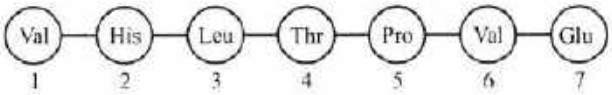
(3) Bird female

(4) Bird male **(Score : 1)**

6. Feeding _____ in the first few days is essential for preventing infections in a newly born baby. **(Score : 1)**

7. LH and FSH are gonadotrophins. Distinguish their roles in males and females. **(Scores : 2)**

8. Examine the following fragment of beta globin chain in human haemoglobin and identify the hereditary disease with reason.



(Scores : 2)

9. A population of 208 people of MN blood group was sampled and it was found that 119 were MM group, 76 MN group and 13 NN group. Answer the following questions :

(a) Determine the gene frequencies of M and N alleles in the population.

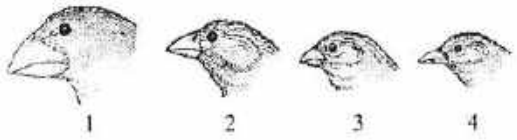
(b) How does the above frequencies affect evolution ? **(Scores : 3)**

OR

Examine the pictures of Darwin's Finches given below and answer the following questions :

(a) What phenomenon in evolution is represented in the picture ?

(b) Explain the phenomenon with the help of an additional example.



10. What are the advantages of biofertilizers over chemical fertilizers ? Give an example for biofertilizer. **(Scores : 2)**

11. What is ART ? Categorize the following ARTs based on their applications in male sterility and female sterility :

GIFT, AI **(Scores : 2)**

12. Which of the following sets of gases were used in Miller's experiment ?

(1) CH_4, NO_2, H_2O, CO_2

(2) NH_3, CH_3, H_2O, H_2

(3) H_2, CH_4, NH_3, H_2O

(4) H_2O, N, CH_4, H_2 **(Score : 1)**

13. Which of the following combinations do not apply to DNA ?

(a) Deoxyribose, Guanine

(b) Ribose, Adenine

(c) Deoxyribose, Uracil

(d) Guanine, Thymine

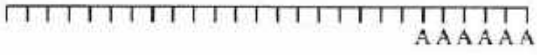
(1) (a) and (b)

(2) (b) and (c)

(3) (c) and (d)

(4) (a) and (d) **(Score : 1)**

14. Examine the diagram of mRNA given below. Mark the 5' and 3' ends of the mRNA by giving reasons.



(Scores : 2)

15. A small fragment of skin of a different person was extracted from the nails of a murdered person. This fragment of skin led the crime investigators to the murderer. Based on this incident answer the following questions :

(1) What technique was used by the investigators ?

(2) What is the procedure involved in this technique ? **(Scores : 3)**

OR

In an E. coli culture lactose is used as food instead of glucose. If so, answer the following questions :

(1) How do the bacteria respond to the above situation at genetic level ?

(2) If lactose is removed from the medium what will happen ?

16. Morphine is said to be an abused drug. Discriminate the terms 'use' and 'abuse' of drugs based on this example. **(Scores : 2)**

17. Differentiate Active immunity from Passive immunity. Give an example for Passive immunity. **(Scores : 2)**