

Reg. No.

Code No. 5017

Name : ..

Time : 2 Hours

Cool-off time : 20 Minutes

Preparatory Time : 5 Minutes

Second Year – March 2017

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 ബോട്ടണിയിലും 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 ചോദ്യനമ്പറിൽ 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 : $\frac{1}{2} \times 4 = 2$)**
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 : $\frac{1}{2} \times 4 = 2$)

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 : $\frac{1}{2} \times 6 = 3$)

OR

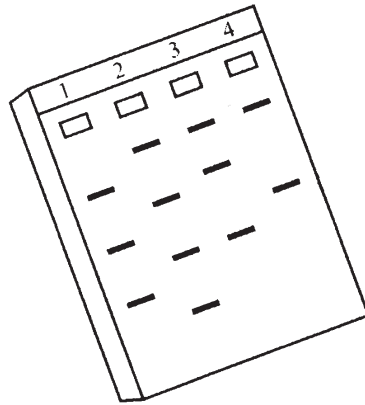
(B) Organisms other than human beings manage or adapt to stressful conditions by adopting different mechanisms. Explain any three mechanisms adopted by them to maintain the internal environment.

(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 F₂ 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

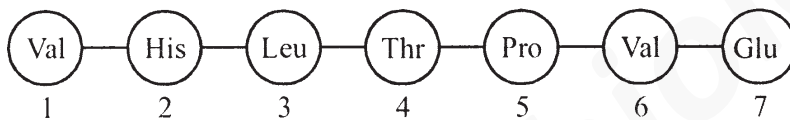
(Score : 1)

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.



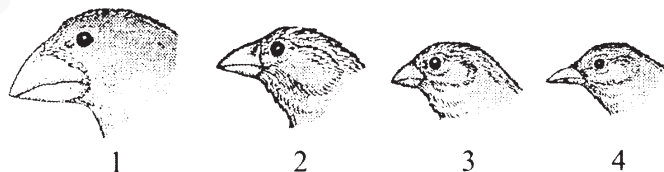
(Scores : 2)

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) CH₄, NO₂, H₂O, CO₂

(2) NH₃, CH₃, H₂O, H₂

(3) H₂, CH₄, NH₃, H₂O

(4) H₂O, N, CH₄, H₂

(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)**
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SECOND YEAR HIGHER SECONDARY EXAMINATION MARCH 2017

FINALIZED SCHEME FOR VALUATION

PART III :BIOLOGY- Part A. BOTANY Code No: 5017

Max.Score:30

Qn.No		VALUE POINTS	Score	Total
1		Dormancy/Quiscent/ Seed viability	1	1
2		c) Bryophyllum	1	1
3		a)Pusa Swarnim iv) Brassica b)Pusa Snowball iii) Cauliflower c)Pusa Sawani ii) Bhindi d)Pusa Sadabahar i)Chilli OR Any two correct pairs give full score 2	½x4	2
4		Palindromic nucleotides/ Palindrome/ Palindromic sequence	1	1
5	a	Flowers do not open at all, the anthers and stigma lie close to each other, when the anther dehisce in the flower buds pollen grains come in contact with the stigma, there is no chance of cross-pollen landing on the stigma.(Any one of the above response)	1	1
	b	Geitonogamy is functionally cross pollination by pollinating agent/ pollination between different flowers of same plant. Genetically similar to autogamy - because pollen grains come from the same plant/ pollination between different flowers of same plant	½ ½	1

6		Pericarp/Any wall layer of pericarp	1	1
7		<p>a) Antigen-antibody reaction (iv)ELISA</p> <p>b) α-lactalbumin (iii) Rosie</p> <p>c) α-1-antitrypsin (ii)Emphysema</p> <p>d) Gene therapy (i) ADA deficiency</p>	$\frac{1}{2} \times 4$	2
8		<p>Eli Lilly company prepared two DNA sequences corresponding to A and B chains of human insulin, introduced them in plasmids of E.coli to produce insulin chains A and B. Chains A and B were produced separately, extracted and combined by creating disulfide bonds to form human mature insulin. Any two points give full score 2.</p> <p>OR Diagrammatic sketch showing the preparation of recombinant insulin.</p>	1+1	2
9		Carrying capacity/ (K)	1	1
10	a	Jhum cultivation	1	1
	b	<p>Farmers cut down the trees of the forest and burn the plant remains.</p> <p>The ash is used as a fertilizer and the land is used for farming or cattle grazing. After cultivation the area is left for several years for reforestation. Any two points give full score 1</p>	1	1

11	A	<ul style="list-style-type: none"> • Pseudocopulation/Sexual deceit/ Mutualism/Symbiosis/Mutualistic co-evolution • Commensalism/mutualism • Commensalism • Parasitism • Parasitism • Predation <p>(Name / type of interaction (beneficial, detrimental, neutral)/ symbol for its interaction/its explanation give full score 3)</p> <p>OR</p>	$\frac{1}{2} \times 6$	3
	OR B	<ul style="list-style-type: none"> • Conform , regulate, partial regulate, migrate, suspend. Any three other adaptations among plants or animals give full score 3 / Diagrammatic representation showing conformers, regulators and partial regulators give full score. 	OR 1x3	OR 3
12		Biofortification	1	1
13.A	a	Gel electrophoresis	1	3
	b	Staining the DNA with ethidium bromide followed by exposure to UV radiation/ Bright orange coloured bands of DNA can be seen in a ethidium bromide stained gel exposed to UV light.	1	

	c)	500bp DNA fragments separate according to their size/smaller fragments move farther. (give 1 Score without the answer of first part - c) (if correct response of any two questions give full score3)	½ ½	
	OR B	OR • <u>Microinjection/</u> Recombinant DNA is directly injected into the nucleus of an animal cell. • <u>Biolistics/ Gene gun</u> Plant cells are bombarded with high velocity micro-particles of gold or tungsten coated with DNA . • <u>Disarmed pathogen vectors/</u> which when allowed to infect the cell and transfer the recombinant DNA into the host. • Competent host/its explanation • Use vector like plasmid, bacteriophage, reterovirus etc (Any two methods of the above give full score 3)	OR 1 1 1	OR
14		b)Submerged plant stage/rooted submerged plants	½ x4	2

	<p>d)Reed- swamp stage</p> <p>e)Marsh –meadow stage</p> <p>g)forest/trees</p> <p>or</p> <p>a)Phytoplanktons</p> <p>b)rooted –submerged plants</p> <p>c)rooted floating angiosperms</p> <p>d)free floating plants</p> <p>e)reed –swamp</p> <p>f)marsh-meadow</p> <p>g)scrub/shrub</p> <p>h)trees/forest</p> <p>Any four correct sequential stages of hydrosere except phytoplankton give full score 2</p>		
15	<p>Electrostatic precipitator has electrode wires that are maintained at several thousand volts which produce a corona that releases electrons.</p> <p>These electrons attach to dust particles giving them a net negative charge.</p> <p>The collecting plates are grounded and attract the charged dust particles.</p> <p>The velocity of air between the plates must be low enough to allow the dust to fall. Any two points give</p>	1+1	2

		full score 2		
16		<ul style="list-style-type: none"> • The pollen release and stigma receptivity are not synchronised/ Either the pollen is released before the stigma become receptive (or) stigma become receptive much before the release of pollen. • The anther and stigma are placed at different positions so that the pollen cannot come in contact with the stigma of the same flower. • Self- incompatibility / This is the genetic mechanism prevents self pollen from the same flower or other flowers of the same plant from fertilizing the ovules by inhibiting pollen germination or pollen tube growth in the pistil. • Unisexuality / Production of unisexual flowers – male flowers with stamens /staminate flower and female flowers with pistil /pistillate flowers. • Monoecious / Both the male & female flowers are present on the same plant . • Dioecious / Male & Female flowers are present on different plants.(Any two of the above responses give full score) 	1+1	2

17	<p>Man 4th trophic level ↑ Fish 3rd trophic level ↑ Zooplankton 2nd trophic level ↑ Phytoplankton 1st trophic level</p> <p>Any two correct sequence with or without TL give 1 score</p>	$\frac{1}{2} \times 4$	2
	Total Score	30	30

SUBJECT : ZOOLOGY

CODE. NO: 5017 B

Qn No	Sub Qns	Answer Key/Value Points	Score	Total
1	•	<p>Homozygous recessive phenotype is b¹/i⁷</p> <p>A : B : C : D = 3 : 1 : 9 : 3</p> <p>or</p> <p>21 : 7 : 63 : 21</p> <p>or</p> <p>9 : 3 : 3 : 1</p>	1	2
2		3 or 0.20	1	1
3		<p>in situ - conservation in natural habitat</p> <p>eg - National park / wild life sanctuary / Biosphere reserves (any one eg)</p> <p>ex situ - conservation in man made/artificial habitats</p> <p>eg: Zoological park / botanical garden / wild life safari park (or any other eg)</p>	1/2 1/2 1/2 1/2	2
4		3 or Syphilis, Gonorrhoea. or any attempt	1	1
5		3 or Bird female or any attempt	1	1
6		Colostrum / Breast milk / Mother's milk	1	1


1/5

Qn No	Sub Qns	Answer Key Value Points	Score	Total
7		<p>LH</p> <p>Male - Act on Leydig cells / stimulate the secretion of androgen / stimulate spermatogenesis (any one point)</p> <p>Female - Rupture of graffian follicle / induce ovulation / maintains corpus luteum (any one point)</p> <p>FSH</p> <p>Male - Acts on Sertoli cells, spermatogenesis, spermiogenesis (any one)</p> <p>Female - growth and development of ovarian follicles or ovulation (any one)</p>	<p>1/2</p> <p>1/2</p> <p>1/2</p>	<p>2</p>
8		<p>Disease - Sickle cell Anaemia.</p> <p>Reason - Replacement of glu with valine at 6th position or point mutation / Substitution / GAG to GUG</p>	<p>1</p> <p>1</p>	<p>2</p>

2/5

Qn No	Sub Qns	Answer Key/Value Points	Score	Total
9	a	Frequency of M - 0.75 Frequency of N - 0.25	1/2	3
	b	The frequencies follow Hardy-Weinberg equilibrium - so no evolution	1/2	
		or		3
	a	Adaptive radiation Explanation	1 1/2	
	b.	Additional example	1/2	
		or any attempt give full marks		
10		Prevents pollution / Improves soil structure and function. (any two) Bacteria / Fungi or any other example	1 1	2
11		Assisted Reproductive Technologies or any correct definition GIFT - Female AI - Male	1 1	2

3/5

Qn No	Sub Qns	Answer Key/Value Points	Score	Total
12		2 or NH ₃ , CH ₃ , H ₂ O, H ₂ .	1	1
13		b and c or 2	1	1
14		 <p>Reason - Poly adenylation is always at the 3' end</p> <p>or</p> <p>any other attempt give full score</p>	1 1	2
15	1 2	<p>DNA finger printing</p> <p>any four relevant steps</p> <p>or</p> <p>Operon concept</p> <p>Lac operon - diagram or explanation</p> <p>Switching off / stopping</p>	1 2 1 1 1	3
16		<p>morphine</p> <p>Use - Pain killer / Sedative (for medical purpose)</p>	1	

4/5

Qn No	Sub Qns	Answer Key/Value Points	Score	Total
		abuse - (not for medical purpose) as narcotic drug / produce temporary euphoria (any one point)	1	2
17		<u>Active Immunity</u> Antibodies produced by self / long lasting / slow non specific eg: Vaccination (any one)	1	2
		<u>Passive Immunity</u> Antibodies inoculated / lasts for short period / specific Takes time eg: Antitoxin / anti venom (any one)	1	

5/5