

Pre-Board Examination 1- 2019-2020

Sub: BIOLOGY (044)

Class: XII

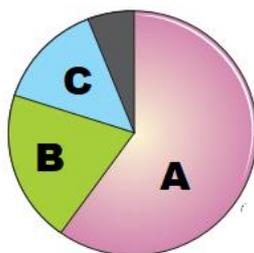
Marks: 70
Time: 3 hrs.

General Instructions:

1. There are a total of 27 questions and five sections in the question paper. All questions are compulsory.
2. Section A contains question numbers 1 to 5, multiple choice questions of one mark each.
Section B contains question numbers 6 to 12, short answer type I questions of two marks each.
Section C contains question numbers 13 to 21, short answer type II questions of three marks each.
Section D contains question number 22 to 24, case-based short answer type questions of three marks each (1+1+1).
Section E contains question numbers 25 to 27, long answer type questions of five marks each.
3. There is no overall choice in the question paper. However, internal choices are provided in two questions of one mark, one question of two marks, two questions of three marks and all three questions of five marks. An examinee is to attempt any one of the questions out of the two given in the question paper with the same question number. Wherever necessary, the diagram drawn should be neat and properly labelled.

SECTION – A

1. The figure below shows the relative contribution of four greenhouse gases to global warming. Identify A, B, and C. 1M
(a) A-CO₂, B-Methane, C-CFC
(b) A-CO₂, B-N₂O, C-Methane
(c) A-CO₂, B-N₂O, C-CFC
(d) A-CFC, B-N₂O, C-Methane



2. Which of the following is wrongly matched in the given table?

SL	MICROBE	PRODUCT	APPLICATION
1.	Trichoderma polysporum	Cyclosporin A	Immunosuppressive agent
2.	Monascus purpureus	Statins	Lowering of blood cholesterol
3.	Streptococcus	Streptokinase	Removal of clot from blood vessels
4.	Clostridium butylicum	Lipase	Removal of stains

(a) 1 (b) 2 (c) 3 (d) 4 1M

3. When does the growth rate of a population following the logistic model equal zero? The logistic model is given as $dN/dt = rN(1-N/K)$. 1M
- When N/K is exactly one.
 - When N nears the carrying capacity of the habitat.
 - When N/K equals zero.
 - When death rate is greater than birth rate.

OR

What type of ecological pyramid would be obtained with the following data?

Secondary consumer: 120 g, Primary consumer: 60 g, Primary producer: 10 g

- (a) Upright pyramid of numbers (b) Pyramid of energy
(c) Inverted pyramid of biomass (d) Upright pyramid of biomass 1M

4. Match the terms in Column I with their description in Column II and choose the correct option.

Column I	Column II
(a) Dominance	(i) Many genes govern a single character.
(b) Codominance	(ii) In a heterozygous organism only one allele expresses itself.
(c) Pleiotropy	(iii) In a heterozygous organism both alleles express themselves fully.
(d) Polygenic	(iv) A single gene influences inheritance many characters.

- (a) a(ii), b(i), c(iv), d(iii) (b) a(ii), b(iii), c(iv), d(i)
(c) a(iv), b(i), c(ii), d(iii) (d) a(iv), b(iii), c(i), d(ii) 1M

OR

Pollen grains can be stored for several years in liquid nitrogen having a temperature of

- (a) -196°C (b) -80°C (c) -120°C (d) -160°C

5. If there are 999 bases in an RNA that codes for a protein with 333 amino acids, and the base at position 901 is deleted such that the length of the RNA becomes 998 bases, how many codons will be altered? 1M

- (a) 1 (b) 11 (c) 33 (d) 333

SECTION B

6. (a) If N is the population density at time t , then what would be its density at time $(t+1)$? Give the formula.

(b) In a barn there were 30 rats. 5 more rats enter the barn and 6 out of the total rats were eaten by the cats. If 8 rats were born during the time period under consideration and 7 rats left the barn, find out the resultant population at time $(t+1)$ by using formula. 2M

7. Besides acting as 'conduits' for energy transfer across trophic levels, predators play other important roles. Justify 2M

8. Three water samples namely river water, untreated sewage water and secondary effluent discharged from a sewage treatment plant were subjected to BOD test. The samples were labelled A, B and C; but the laboratory attendant did not note which was which. The BOD values of the three samples A, B and C were recorded as 20mg/L, 8mg/L, and 400mg/L, respectively. Which sample of the water is most polluted? Can you assign the correct label to each assuming the river water is relatively clean and why? 2M

9. During an excavation assignment, scientists collected pollen grains of a plant preserved in deeper layers of soil. Analyse the properties of pollen grains which help in the fossilization. 2M

10. (a) The map distance in certain organisms between gene A and B is 4 units, B and C is 2 units and between C and D is 8 units. Which one of these gene pairs

will show more recombination frequency? Give reasons in support of your answer. (b) Mention two additional complexities in eukaryotic transcription.

OR

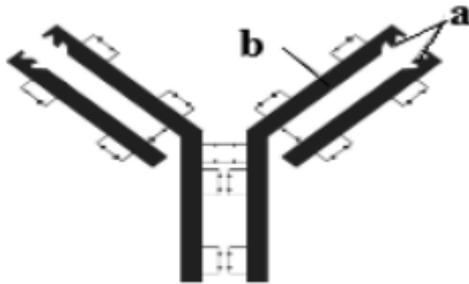
(a) A segment of DNA molecule comprises of 546 nucleotides. How many cytosine nucleotides would be present in it if the number of adenine nucleotides is 96?

(b) Differentiate repetitive DNA and satellite DNA. 2M

11. A person is born with a hereditary disease with a weakened immune system due to deficiency of an enzyme. Suggest a technique for complete cure for this disease, identify the deficient enzyme and explain the technique used for cure.

2M

12. The figure given below represents a molecule present in the body of a mammal.



- Name the parts labelled 'a' and 'b' in the molecule shown above.
- Name the type of cells that produce this molecule.
- Lifestyle diseases are increasing alarmingly in India. We are also dealing with large scale malnutrition in the population. Suggest a process by which we can address both these problems. 2M

SECTION C

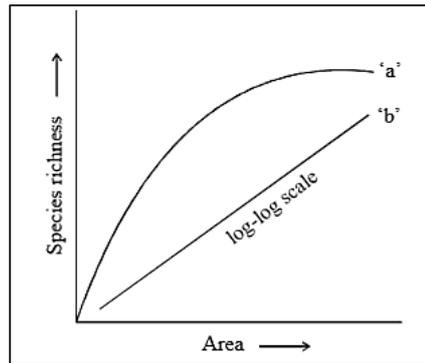
13. a) Construct a complete transcription unit with promoter and terminator on the basis of the hypothetical template strand given below:



b) Write the RNA strand transcribed from the above transcription unit along with its polarity.

(c) Mention two events in which DNA is unzipped. (1+1+1)3M

14. The following graph shows the species-area relationship. Answer the following question as directed.



- Name the naturalist who studied the kind of relationship shown in the graph. Write the observation made by him.
- Write the situations as discovered by the ecologists when the value of 'Z' (slope of the line) lies between (a) 0.1 and 0.2 (b) 0.6 and 1.2
- What does 'Z' stand for?
- When would the slope of the line 'b' become steeper? 3M

15. (a) Name the tropical sugar cane variety grown in South India. How has it helped in improving the sugar cane quality grown in North India?

(b) Identify 'a', 'b' and 'c' in the following table:

(c) As a biologist suggest a technique to a dairy farmer for increasing the yield of herd size of cattle in a short time.

Sl.No	CROP	VARIETY	INSECT PESTS
1.	Brassica	Pusa Gaurav	(a)
2.	Flat bean	Pusa Sem2 Pusa Sem 3	(b)
3.	(c)	Pusa sawani & Pusa A 4	Shoot and fruit borer

3M

- Draw pyramid of biomass in Grass land ecosystem and pond ecosystem
- Healthy ecosystems are the base of wide range of ecosystem services. Justify.
- Under which condition would a particular stage in the process of succession revert back to an earlier stage.

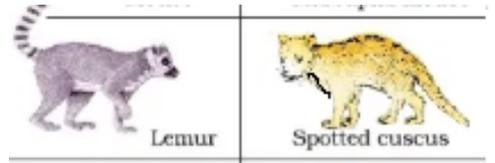
OR

- a) Draw a pyramid of numbers of a situation where a large population of insects feed upon a very big tree. The insects in turn, are eaten by small birds which in turn are fed upon by big birds.
- b) Differentiate giving reason, between the pyramid of biomass of the above situation and the pyramid of numbers that have drawn.
- c) Explain primary succession on rocks. 3M

17. When a snapdragon plant bearing pink colour flower was selfed, it was found that, 69 plants were having red colored flowers. What would be the number of plants bearing pink flower and white flower. Show with the help of Punnett square. Identity the principle of inheritance involved in this experiment.

(1+1½+½) M

18. Refer to the figure given below and answer the questions that follow:



- a) Explain the process by which spotted cuscus evolved.
- b) Name the process that has resulted in evolution of lemur and another similar animal such as Spotted cuscus.
- c) Compare and contrast the two animals shown? 1+1+1

OR

Briefly describe the process of translation with labelled diagram.

19. (a) Draw the figure of vector pBR322 and label the following:

- A) Origin of replication B) Ampicillin resistance site
- C) Tetracycline resistance site D) Bam H1 restriction site

(b) Identify the significance of Origin of replication 3M

20. Give reason: -

- a) A liverwort plant is unable to complete its life cycle in a dry environment.
- b) Number of male gametes produced is much more than the female gametes produced.
- c) Organisms exhibiting external fertilization show great synchrony between the sexes and release a large number of gametes into surrounding medium.

d) You are conducting artificial hybridization on papaya and potato. Which one of them would require the step of emasculation and why? However, for both you will use the process of bagging. Justify giving one reason. 3M

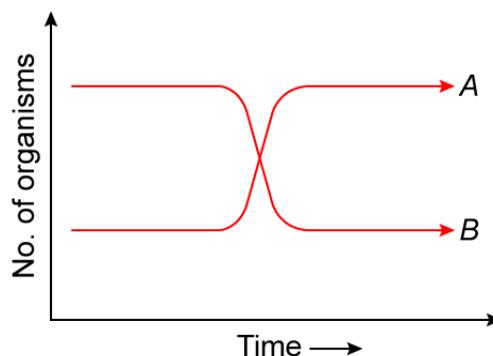
21. (a) Cow dung and water is mixed, and this slurry is fed into the biogas plant for digestion by microbes. The person performing the process shares that there is no need to provide any inoculum for it. Give reason. What is the role of microbes at the source? Under which condition will they be most active and effective?

(b) Large quantities of sewage are generated every day in cities and towns, which is treated in Sewage Treatment Plants (STPs) to make it less polluting. Construct a flow chart representing the three main steps of primary treatment of water.

(1½+1½)3M

SECTION D

22. Two types of aquatic organisms in a lake show specific growth patterns as shown below, in a brief period of time. The lake is adjacent to an agricultural land extensively supplied with fertilizers. Answer the following based on the facts given above.



(i) Name the organisms depicting the patterns A and B

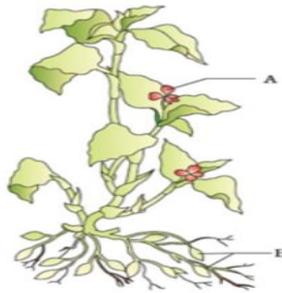
(ii) State the reason for the growth pattern seen in A

(iii) Write the effects of the growth patterns as shown in figure.

3M

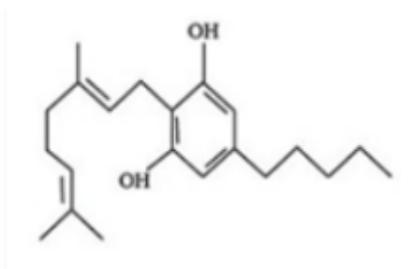
23. (a) There are two different types of flowers marked A and B in the image given below. Identify the flower types and the kind of pollination that will occur in each of them.

(b) Rose plants have large flowers but rarely do they produce fruits. On the contrary, the tomato plant produces fruit but has very small flowers. Comment with suitable reasons.



3M

24. Answer the following questions on the outline structure of a drug shown below:(a) Name the group of drugs this structure represents, and which organ of the body is affected by the consumption of this drug?



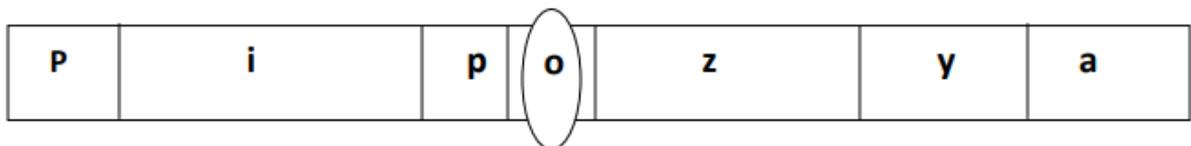
(b) Fill the missing data in the table depicting diseases, their causatives and symptoms.

Name of the disease	Causative Organism	Symptoms
Typhoid	A	Stomach pain, High fever, headache, weakness, constipation.
B	Rhinoviruses	Nasal congestion and discharge, sore throat, cough, headache.

3M

SECTION E

25. Observe the representation of genes involved in the lac operon given below.

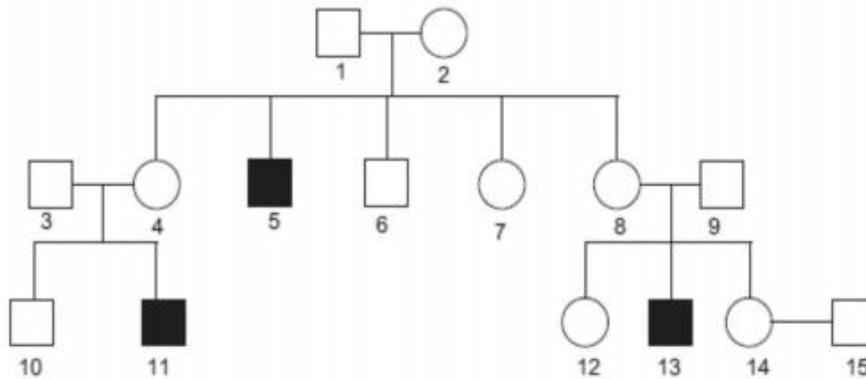


- Identify the region where the repressor protein will attach normally.
- Under certain conditions repressor is unable to attach at this site. Explain.
- If repressor fails to attach to the said site what products will be formed by z, y and a?
- Analyze why this kind of regulation is called negative regulation.

$$[\frac{1}{2} + 1 + 1\frac{1}{2} + 2 = 5]$$

OR

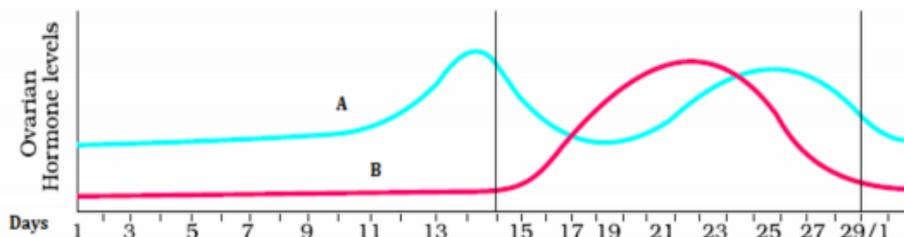
Haemophilia is a sex-linked recessive disorder of humans. The pedigree chart given below shows the inheritance of Haemophilia in one family. Study the pattern of inheritance and answer the questions given.



- Give all the possible genotypes of the members 4, 5 and 6 in the pedigree chart.
- A blood test shows that the individual 14 is a carrier of haemophilia. The member numbered 15 has recently married the member numbered 14. What is the probability that their first child will be a haemophilic male? Show with the help of Punnett square.
- Both Down's syndrome and Turner's syndrome are examples of chromosomal disorders. Cite the differences between the two, at the chromosomal level.

($1\frac{1}{2} + 1\frac{1}{2} + 2$)

26. The graph given below shows the variation in the levels of ovarian hormones during various phases of menstrual cycle.



- Identify 'A' and 'B'.
- Specify the source of the hormone marked in the diagram.
- Reason out why A peaks before B.
- Compare the role of A and B.

- e) A village health worker was taking a session with women. Village women were confused as to how a thin metallic Copper loop can provide protection against pregnancy. Justify the use explaining the mode of action of IUDs.

OR

- a) Identify the figures A and B



- b) The embryo sac in female gametophyte is seven celled and eight nucleated structure. Justify the statement with the help of a labelled diagram. 5M

27. (a) Explain three ways in which natural selection can affect the frequency of heritable trait in a population.

(b) How does Hardy Weinberg equilibrium get disturbed which may lead to founder effect?

(c) The frequency of two alleles in a gene pool is 0.15 (A) and 0.75 (a). Assume that the population is in Hardy-Weinberg equilibrium. Calculate the percentage of heterozygous individuals in the population. (3+1+1)

OR

(a) Represent diagrammatically the steps in amplification of DNA fragment.

(b) How is a plant cell made 'competent' to take up the recombinant DNA from the medium?

(c) What is the difference between *cry* and Cry? (3+1+1)

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