Sample Question Paper
Class XII (2014-15)
Biology (044)

Time allowed: 3hrs   **Maximum Marks: 70**

General Instructions:

1. **There are a total of 26 questions and five sections in the question paper. All questions are compulsory.**

2. **Section A contains question number 1 to 5, Very Short Answer type questions of one mark each.**

3. **Section B contains question number 6 to 10, Short Answer type I questions of two marks each.**

4. **Section C contains question number 11 to 22, Short Answer type II questions of three marks each.**

5. **Section D contains question number 23, Value Based Question of four marks.**

6. **Section E contains question number 24 to 26, Long Answer type questions of five marks each.**

7. **There is no overall choice in the question paper, however, an internal choice is provided in one question of two marks, one question 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.**

Section - A

1. A tissue culture experiment has been performed with a plant tissue infected with TMV. Meristematic tissue produces healthy plant. Reason out the possibility of obtaining such result. **1**

2. State a method of cellular defence which works in all eukaryotic organisms. **1**

3. In case of an infertile couple, the male partner can inseminate normally but the mobility of sperms is below 40 percent. Judge, which kind of ART is suited in this situation to form an embryo in the laboratory, without involving a donor? **1**

4. Calculate the length of the DNA of bacteriophage lambda that has 48502 base pairs. **1**

5. If two genes are located far apart from each other on a chromosome, how the frequency of recombination will get affected? **1**

Section - B

6. The alarming population growth is leading to scarcity of basic requirements. Enumerate and justify any two population control measures to overcome this problem. **2**

7. Both Down's syndrome and Turner's syndrome are examples of chromosomal disorders. Cite the differences between the two. **2**

8. Demand for mushroom as food has led to its culturing on a large scale. Similarly, it is perceived that microbes too would become acceptable as food. Identify a microbe which can be cultured as a food source and give the applicability of its culture in the given context. **2**

OR

Success rate of artificial insemination in cattle is fairly low. Identify any other mean to improve the successful production of hybrids. State the advantages of this technique. **2**

9. a) Patients who have undergone myocardial infarction are given clot buster. Mention the clot buster administered and its microbial source.

b) A person recuperating from illness is advised to have curd regularly. Why? **1+1**

10. Interpret two effects of loss of biodiversity in a region. **2**

Section - C

**11.** Draw and label the enlarged view of microsporangium. State the function of its innermost layer. **3**

12.
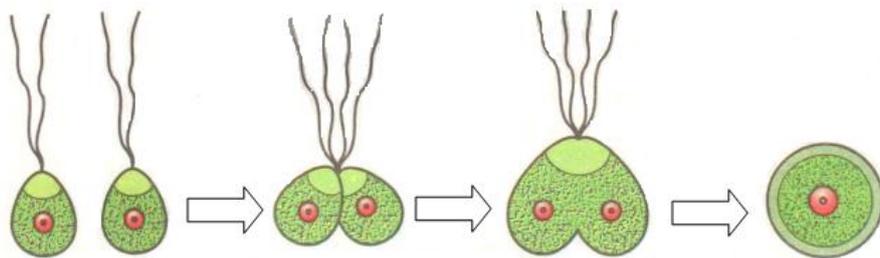
a) State the type of gametes shown in the diagram.

b) Identify the process taking place and the resultant structure.

c) Name an organism that reproduces in this manner. **1+1+1**

13. Diagrammatically represent the experimental set up that proves Oparin - Haldane hypothesis. **3**

14. A cross is made between different homozygous pea plants for contrasting flower positions.

a) Find out the position of flowers in F_1 generation on the basis of genotypes.

b) Work out the cross upto F_2 generation.

c) Compute the relative fraction of various genotypes in the F_2 generation?   **1+1+1**

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

a) Recognize and explain the process by which Tasmanian wolf evolved.

b) Give one example of an animal that has evolved along with Tasmanian wolf.

c) Compare and contrast the two animals shown?   **1+1+1**

16. Your classmate complains of headache and cough to the doctor. The doctor confirms that he is suffering from Pneumonia and not just common cold. How the doctor must have reached to such conclusion? Mention any two precautions to be followed to prevent the spread of this disease.   **3**

17. Cow dung and water is mixed and the slurry is fed into the biogas plant for digestion by microbes. The person performing the process shares that there is no need to provide inoculum for it, why? What is the role of microbes at the source? Under which condition will they be most active and effective?   **3**

18. A person is born with a hereditary disease, suggest the possible corrective method for it. Illustrate by giving a specific example.   **3**

19. A doctor prescribed morphine as a sedative and pain killer to your cousin who has undergone surgery. Even after recovery he continued to consume the prescribed medicine. What do you conclude about his condition? After appraising yourself, what measures will you suggest to him to control this problem? Briefly explain any two.

3

20.
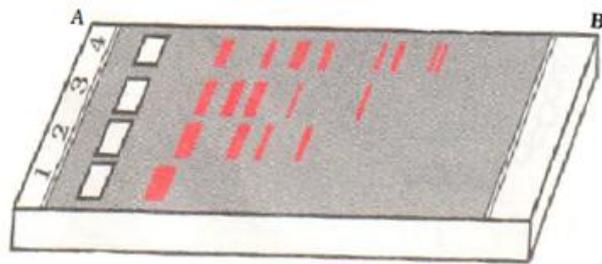
a) Mark the positive and negative terminals.

b) What is the charge carried by DNA molecule and how does it help in its separation?

c) How the separated DNA fragments are finally isolated?   **1+1+1**

OR

CryIAb is introduced in a plant to control infestation by corn borer.

a) Name the resultant plant after successful insertion of the gene desired.

b) Summarize the action of the gene introduced.   **½ +2½**

21.   a) In pBR322, foreign DNA has to be introduced in tet^R region. From the restriction enzymes given below, which one should be used and why:

PvuI, EcoRI,   BamHI

b) Give reasons, why the other two enzymes cannot be used.   **2+1**

22.   The graph given below shows the distribution of biomes:
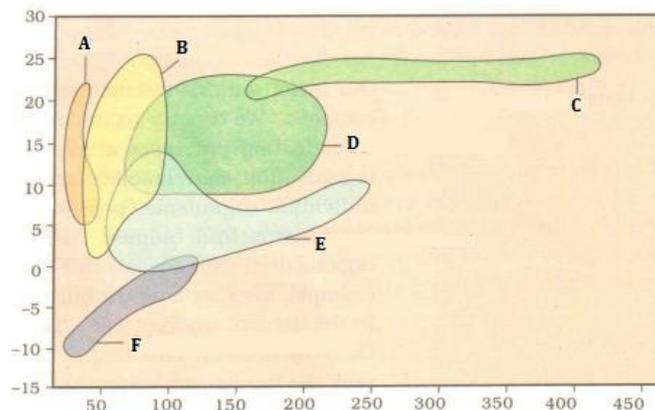

a) What do the 'X' and 'Y' axes represent?

b) Mark 'grassland' and 'coniferous forest' biomes.

c) Why is 'F' located at the given position in the graph?   **1+1+1**

Section - D

23. A son persuades his father to replace his old mobile phone with the latest model launched in the market. He also shares the latest features it has and explains how it can be of a help to him in the modern technological world. Father is reluctant in buying a new one and tries to explain about its environmental impact. How do you think, the biologist father has tried to convince his son? Justify the arguments of father and son both, by mentioning positive aspects of the behavior displayed by both of them in the situation concerned (three each). **4**

Section - E

24.
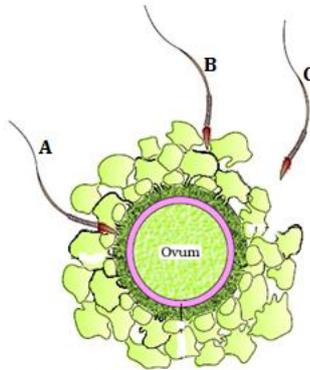
a) Compare the fate of sperms shown in the diagram.

b) What is the role of zona pellucida in this process?

c) Analyze the changes occurring in the ovum during the process.

d) Mention what helps in the entry of sperm into the ovum.

e) Specify the region of female reproductive system where the event represented in the diagram takes place. **1+1+1+1+1**

OR

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

5
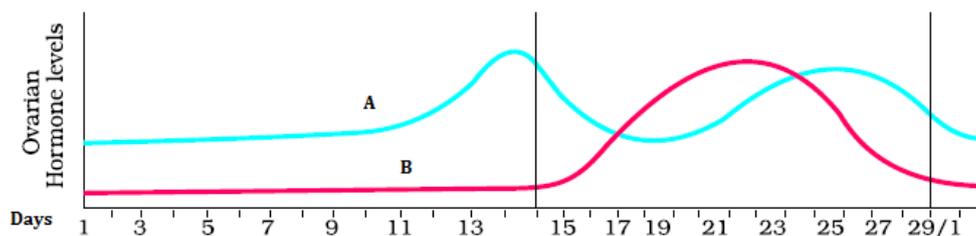
a) Identify 'A' and 'B'.

b) Specify the source of the hormone marked in the diagram.

c) Reason out why A peaks before B.

d) Compare the role of A and B.

e) Under which condition will the level of B continue to remain high on the 28th day?

1+1+1+1+1

25. Explain the process of protein synthesis from processed m-RNA. **5**

OR

Which methodology is used while sequencing the total DNA from a cell? Explain it in detail. **5**

26. Citing lake as an example of a simple aquatic ecosystem, interpret how various functions of this ecosystem are carried out. Make a food chain that is functional in this ecosystem. **5**

OR

a) Colonization of a rocky terrain is a natural process. Mention the group of organisms which invade this area first. Give an example.

b) Over the years, it has been observed that some of the lakes are disappearing due to urbanization. In absence of human interference, depict by making a flow chart, how do the successional series progress from hydric to mesic condition.

c) Identify the climax community of hydrarch and xerarch succession. **1+3½+ ½**

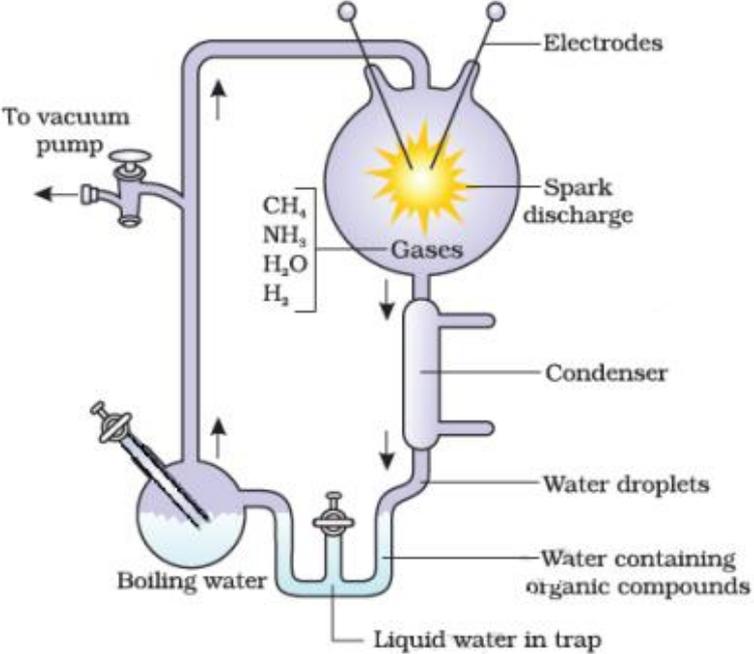**✳✳✳**

Sample Question Paper

Class – XII (2014-15)

Biology

Marking Scheme

Section - A

Q. No.	Suggestive answer	Marks distribution	Total marks
1	Meristematic tissues are free of virus	1	1
2	RNA interference	1	1
3	Intra Cytoplasmic Sperm Injection (No marks for abbreviation - ICSI)	1	1
4	Distance between two consecutive base pairs = 0.34 x 10^{-9} m The length of DNA in bacteriophage lambda = 48502 x 0.34 x 10^{-9} m = 16.49 x 10^{-6} m	½ ½	1
5	Frequency of recombination will be higher	1	1

Section - B

Q. No.	Suggestive answer	Marks distribution	Total marks
6	Population control measures are: - Use of contraceptive methods, to prevent pregnancy - Advertisements in the media, to generate awareness - Statutory raising of marriageable age of the female to 18 years and that of males to 21 years, to delay the number of births - Incentives given to couples with small families, to motivate others to comply (Any two of the above measures with explanation)	½ x 2 = 1 ½ x 2 = 1	2
7	Down's syndrome is Trisomy affected chromosome number 21/can occur in either males or females / total number of chromosome is 47 (any two) Turner's syndrome is monosomy of the X - chromosome/ can occur only in females/ total number of chromosome is 45 (any two)	½ x 2 = 1 ½ x 2 = 1	2
8	*Spirulina* Produces large quantities of food rich in protein, minerals, fats, carbohydrates and vitamins // *Methylophilus methylotrophus*		2

	250 gm of this microorganism produces 25 tonnes of protein per day (Any of the above two) **OR** Multiple Ovulation Embryo Transfer Technology Produces 8-10 eggs at a time, Genetic mother is only available for super – ovulation; increases herd size in a short time (Any two)	1 x 2 = 2 1 ½ x 2 = 1	
9	a) Streptokinase, *Streptococcus* b) Curd contains Lactic Acid Bacteria, which play beneficial role in checking disease causing microbes / It is a source of vitamin B_{12} too	½ x 2 = 1 ½ x 2 = 1	2
10	- Decline in plant production - Lowered resistance to environmental perturbations such as drought - Increased variability in certain ecosystem processes such as plant productivity/ water use / pest & disease cycles (any two)	 1 x 2 = 2	2

Section - C

Q. No.	Suggestive answer	Marks distribution	Total marks
11	 (Any four of the labels) Tapetum nourishes the developing pollen grains	 ½ x 4 = 2 1	3
12	a) Isogametes b) Fertilization and zygote c)*Cladophora / Clamydomonas*	1 ½ x 2 = 1 1	3

13

(Any six different labels) | ½ x 6 = 3 | 3 |
| 14 | a) Axial position
b)　　　AA　x　aa　　　　　　　　　　　P
　　　(Axial)　(Terminal)
　　　A⟍　　⟋a

　　　　　Aa (Axial)　　　　　　　　　F₁
　　　　　　↓
　　　Aa　x　Aa　　　　　　　Selfing

　　　A　a　　A　a

AA　　　Aa　　　Aa　　　aa　　　　F₂

　¼　　　½　　　¼ | ½
½

½

½
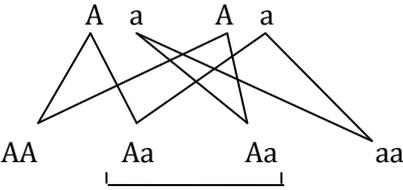
1 | 3 |
| 15 | a) Adaptive radiation – The process of evolution of different species in a given geographical area starting from a point and literally radiating to other areas of geography (habitats).
b) Tiger cat/banded ant eater/Marsupial rat/Kangaroo/Wombat/Bandicoot/Koala/Marsupial mole/Sugar glider
c) Wolf is a placental mammal, whereas Tasmanian wolf is a marsupial mammal | ½ x 2 = 1

1

½ x 2 = 1 | 3 |
| 16 | Doctor confirms pneumonia on the basis of the following symptoms – fever/chills/grey – blue lips and finger nails (any two);

and not common cold as the following symptoms are not observed – Nasal congestion/sore throat/hoarseness (any | ½ x 2 = 1

½ x 2 = 1 | 3 |

	two) Precautions – 1) Cover the nose when near the patient 2) Do not share glasses and utensils / articles used by the infected person	½ x 2 = 1	
17	Rumen of cattle Breakdown of cellulose Anaerobic condition	1 1 1	3
18	Gene Therapy ADA (Adenosine deaminase) deficiency has been treated through gene therapy Lymphocytes from the blood of the patient are grown in a culture, a functional ADA cDNA is introduced into these lymphocytes, which are subsequently returned to the patient. The permanent cure is done by introducing ADA cDNA into cells at early embryonic stages.	½ ½ ½ x 4 = 2	3
19	Drug dependence - is the tendency of the body to manifest a characteristic and unpleasant withdrawl syndrome if regular dose of drugs is abruptly discontinued / because of perceived benefits, drugs are frequently used repeatedly from which the person may not be able to get out. Measures: - Education and counseling - to face problems and stresses/ to channelize the energy into healthy persuits like reading, music, yoga and other extracurricular activities - Seeking help from parents - to guide the person appropriately and immediately - Seeking professional and medical help - to help the person to get rid of the problem completely with sufficient efforts and will power (any two)	½ x 2 = 1 ½ x 4 = 2	3
20	a) Positive terminal – 'B' Negative terminal – 'A' b)DNA being negatively charged, moves towards the positive electrode (anode) c) By elution – separated bands of DNA are cut out from the agarose gel and extracted from the gel piece **OR** a) Bt corn b) *Cry I Ab*/ Bt toxin gene codes for crystal protein; the Bt toxin protein exists as an inactive protein, but once an insect ingests it, it gets converted into an active form due to the alkaline pH of the gut which solubilizes the crystal. The activated toxin binds to the surface of mid gut and creates pores that cause swelling, lysis and eventually death of the insect.	½ x 2 = 1 ½ x 2 = 1 ½ x 2 = 1 ½ ½ x 5 = 2½	3

		Marks distribution	Total marks
21	a) Bam HI should be used, as restriction site for this enzyme is present in tet^R region	1 x 2 = 2	3
	b) PvuI will not be used, as restriction site for this enzyme is present in amp^R region (not in tet^R)	½	
	EcoRI will not be used, as restriction site for this enzyme is not present in selectable marker tet^R	½	
22	a) 'X' axis – Mean annual precipitation (cm) 'Y' axis – Mean annual temperature (^{0}C)	½ x 2 = 1	3
	b) Grassland – B Coniferous forest – E	½ x 2 = 1	
	c) The mean annual temperature ranges from -12 to 2^{0}C error accepted $\pm$ 2 and mean annual precipitation ranges from 10 – 125 cm, these are the optimum conditions in tundra biome	½ x 2 = 1	

Section - D

Q. No.	Suggestive answer	Marks distribution	Total marks
23	Father explains that it will lead to generation of e – waste; Difficulty in recycling e – waste / hazardous nature of recycling of e – waste / exposing workers to toxic substances present in e – waste (Any one)	1	4
	Son's wish to update his father with modern techniques, Awareness about trends and technologies, well versed with their applicability in daily life (any other similar / appropriate values)	½ x 3 = 1½	
	Concern for environment, scientific thinking, inquisitive nature, social awareness, judicious use of money, sense of responsibility (any other similar / appropriate values)	½ x 3 = 1½	

Section - E

Q. No.	Suggestive answer	Marks distribution	Total marks
24	a) A is able to penetrate/ fertilize the ovum, whereas B and C are unable to penetrate/ fertilize // B and C will degenerate	½ x 2 = 1	5
	b) Zona pellucida ensures the entry of only one sperm into the ovum	1	
	c) Induces completion of meiotic division of the	½ x 2 = 1	

		secondary oocyte, formation of second polar body and a haploid ovum		
		d)Enzymes of acrosome (½ mark if only 'acrosome' is written)	1	
		e) Ampullary – isthmic junction of the fallopian tube	1	
		OR a) A – Estrogen B – Progesterone	½ x 2 = 1	
		b) A – Maturing ovarian follicle / Graafian follicle B – Corpus luteum	½ x 2 = 1	
		c) Formation of Graaffian follicle (releases estrogen) is followed by the formation of corpus luteum (releases progesterone)	1	
		d) Role of A (Estrogen) – leads to changes in the ovary and uterus / regeneration of endometrium through proliferation	½	
		Role of B (Progesterone) – Maintenance of endometrium for implantation of the fertilized ovum/ maintenance of other events of pregnancy	½	
		e) In case of pregnancy	1	
25		For initiation, the ribosome bind to the mature m – RNA at the start codon (AUG) that is recognised by the initiator t – RNA. During elongation, charged t RNA sequentially binds to the appropriate codon in m- RNA with the aniticodon present on tRNA. The ribosome moves from one codon to another adding amino acids one after the other to form polypeptide, i.e. translation. During termination, the release factor binds to stop codon (UAA, UAG, UGA), terminating translation and releasing the polypeptide chain.	½ x 10 = 5	5
		OR Methodology used – Sequence Annotation – total DNA from a cell is isolated,	½ x 2 = 1	
		converted into random fragments of relatively smaller sizes,	½	
		and cloned in suitable host using specialized vectors.	½	
		The cloning resulted into amplification of each piece of DNA fragment.	½	
		The fragments were sequenced using automated DNA sequencers,	½	
		these sequences are then arranged based on some overlapping regions (present in them).	½	
		This requires generation of overlapping fragments (for sequencing).	½	

	Specialized computer based programmes were developed, and	½		
	these sequences were subsequently annotated and assigned to each chromosome.	½		
26	i) Productivity – conversion of inorganic into organic material with the help of solar energy by the autotrophs	½ x 2 = 1	5	
	ii) Energy flow – unidirectional movement of energy towards higher trophic level (and its dissipation and loss as heat to the environment)	½ x 2 = 1		
	iii) Decomposition – fragmentation, leaching, catabolism, humification, mineralization by bacteria, fungi and flagellates (abundant at the bottom of lake)	½ x 2 = 1		
	iv) Nutrient cycling – decomposition of dead matter to release the nutrients back to be re-used by the autotrophs	½ x 2 = 1		
	Food chain in aquatic ecosystem (lake) Phytoplanktons ⟹ Zooplanktons ⟹ Small fish ⟹ Big fish (Any other appropriate example)	1		
	OR			
	a) Pioneer species, lichen	½ x 2 = 1		
	b) Phytoplankton – hydric ⟱ Submerged plant stage ⟱ Submerged free floating plant stage ⟱ Reed swamp stage ⟱ Marsh – meadow stage ⟱ Scrub stage ⟱ Forest stage – Mesic	½ x 7 = 3½		
	c) Forest	½		

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