COMMON PRE-BOARD EXAMINATION

BIOLOGY-Code No. 044

Class-XII-(2025-26)

SET: 2

Time allowed: 3 Hrs. **Maximum Marks: 70**

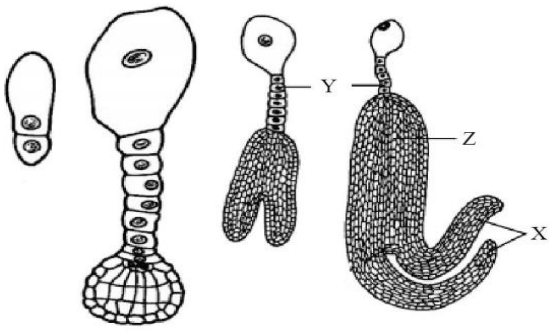
General Instructions:

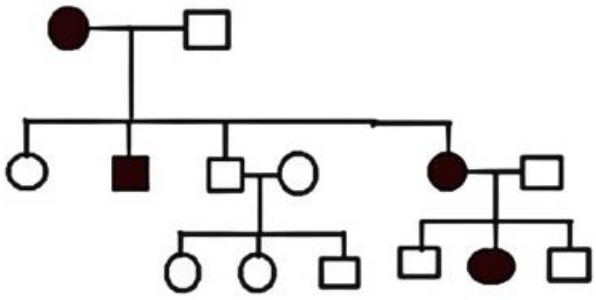
Read the following instructions very carefully and follow them:

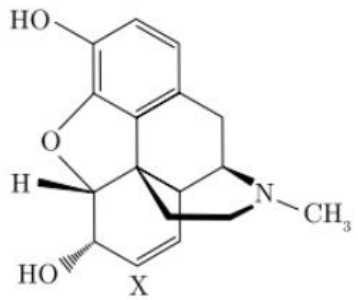
(i) All questions are compulsory.
(ii) The question paper has five sections and 33 questions.
(iii) Section–A has 16 questions of 1 mark each; Section–B has 5 questions of 2 marks each; Section– C has 7 questions of 3 marks each; Section– D has 2 case-based questions of 4 marks each; and Section–E has 3 questions of 5 marks each.
(iv) There is no overall choice. Answer all 33 questions. However, internal choices have been provided in some questions. A student has to attempt only one of the alternatives in such questions.
(v) Wherever necessary, neat and properly labelled diagrams should be drawn.

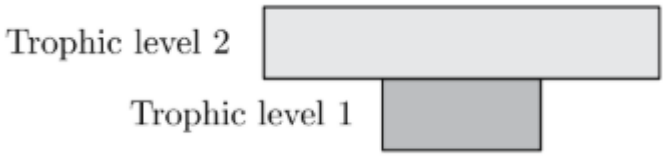
Section – A

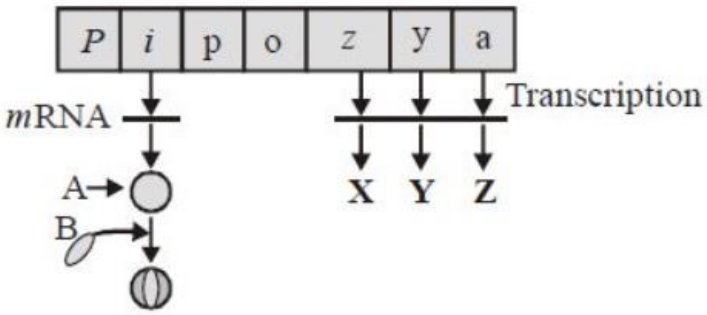
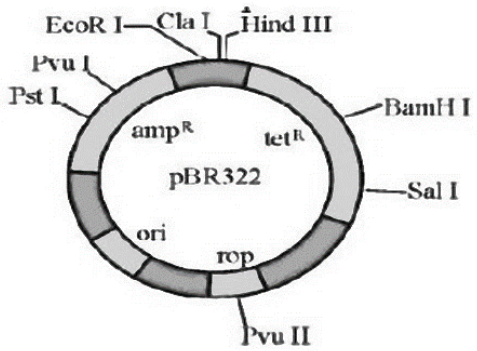
Q. Nos. 1 to 12 are multiple-choice questions. Only one of the choices is correct. Select and write the correct choice as well as the answer to these questions.

Q. No.	Questions	Marks
1	Choose the correct labelling for the part X, Y and Z in the given figure of the stages in embryo development of dicot:  A. X is suspensor, Y is radicle and Z is cotyledon. B. X is radicle, Y is cotyledon and Z is suspensor. C. X is cotyledon, Y is suspensor and Z is radicle. D. X is zygote, Y is radicle and Z is cotyledon.	1
2	The primary endosperm nucleus (PEN) is formed by the fusion of A. 2 polar nuclei + 1 synergid cell nucleus B. 1 polar nucleus + 1 antipodal cell nucleus + 1 synergid cell nucleus	1

	C. 2 polar nuclei + 1 male gamete nucleus D. 2 antipodal cell nuclei + 1 male gamete nucleus.	
3	From among the situations given below, choose the one that prevents both autogamy and geitonogamy. A. Monoecious plant bearing unisexual flowers B. Dioecious plant bearing only male or female flowers C. Monoecious plant with bisexual flowers D. Dioecious plant with bisexual flowers	1
4	The immature germ cells undergo division to produce sperms by the process of spermatogenesis. Choose the correct statement with reference to the given sentence. A. Spermatogonia have 46 chromosomes and always undergo meiotic cell division. B. Primary spermatocytes divide by mitotic cell division. C. Secondary spermatocytes have 23 chromosomes and undergo second meiotic division. D. Spermatozoa are transformed into spermatids.	1
5	In sea urchin DNA, which is double-stranded, 17% of the bases were shown to be cytosine. The percentages of the other three bases expected to be present in this DNA are: A. G 17%, A 16.5%, T 32.5% B. G 17%, A 33%, T 33% C. G 8.5%, A 50%, T 24.5% D. G 34%, A 24.5%, T 24.5%	1
6	Study the pedigree analysis of human given below and identify the type of inheritance along with an example.  A. Sex linked recessive, Haemophilia B. Sex linked dominant, Colour blindness C. Autosomal recessive, sickle cell anaemia D. Autosomal dominant, Myotonic dystrophy	1
7	Match column I with column II and select the correct option from the given codes. **Column I** / **Column II** A. Turner's Syndrome — (i) XX-XO B. Linkage — (ii) AA+XO C. Birds — (iii) Morgan D. Grass hopper — (iv) ZZ-ZW	1

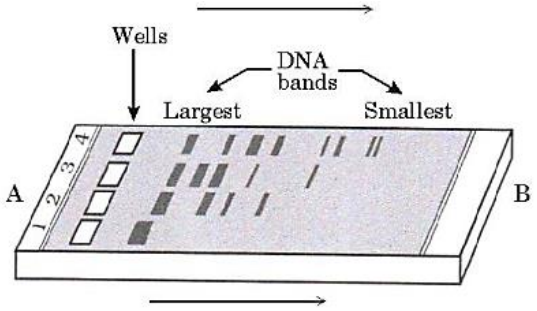
	A. A- (ii), B- (iii), C- (i), D- (iv) B. A- (ii), B- (iii), C- (iv), D- (i) C. A- (iii), B- (iv), C- (i), D- (i) D. A- (iv), B- (iii), C- (ii), D- (i)	
8	 Identify the drug from the chemical structure. A. Morphine B. Cannabinoid C. Coca alkaloid D. Cocaine	1
9	The foetus gets immunised after receiving antibodies from the mother through the placenta. This type of immunisation is called: A. active immunity B. innate immunity C. passive immunity D. humoral immunity	1
10	According to the Hardy-Weinberg principle, the frequency of alleles in a population will remain constant if: A. Mutation occurs at a high rate. B. Genetic drift is absent. C. Natural selection is intense. D. Gene flow is restricted.	1
11	The eyes of an Octopus and the eyes of a cat show different patterns of structure, yet they perform similar functions. This is an example of A. homologous organs that have evolved due to convergent evolution B. homologous organs that have evolved due to divergent evolution C. analogous organs that have evolved due to convergent evolution D. analogous organs that have evolved due to divergent evolution	1
12	The promoter site and the terminator site for transcription are located at: A. 3′ (downstream) end and 5′ (upstream) end, respectively of the transcription unit B. 5′ (upstream) end and 3′ (downstream) end, respectively of the transcription unit C. 5′ (upstream) end D. 3′ (downstream) end	1

	Questions No.13 to 16 consist of two statements- Assertion (A) and reason (R). Answer these questions selecting the appropriate options given below. A. Both A and R are true and R is the correct explanation of A B. Both A and R are true and R is not the correct explanation of A C. A is true but R is false D. A is false but R is true	
13	**Assertion (A):** GEAC will decide the safety of introducing GM organism for public use. **Reason (R):** Genetic modifications of organisms may have opposite results when introduced into the ecosystem.	1
14	**Assertion (A):** Rosie was the first transgenic cow to make more nutritionally balanced milk for consumption by human babies. **Reason (R):** The milk of Rosie cow contained α-1-antitrypsin, which made the milk rich in protein.	1
15	**Assertion (A):** Wings of birds and bats are different in origin but have similar function. **Reason (R):** Wings of birds and bats are examples of homologous structure.	1
16	**Assertion (A):** Functional ADA cDNA genes must be inserted in the lymphocytes at the early embryonic stage. **Reason (R):** Cells in the embryonic stage are mortal , differentiated and easy to manipulate.	1
	Section – B	
17	**<u>Attempt either option A or B.</u>** A. Given below is a pyramid of biomass in an ecosystem where each bar represents the standing crop available in the trophic level.  (i) With the help of an example, explain the conditions where this kind of pyramid is possible in nature. (ii) Will the pyramid of energy also be of the same shape in this situation? Give a reason for your response. **OR** B. During a class tour to a botanical garden, Mamta saw that many plant species were present there, which are no more found in the wild. She asked her teacher about how these rare species are cultivated and protected in such areas. (i) Which mode of biodiversity conservation is represented by Botanical gardens and zoos? (ii) How is the 'Sixth extinction, presently in progress, different from the previous episodes?	2

18	A diagram showing the lac operon in the "switched on" state . The structural genes (*z, y, a*) are shown being transcribed.  (i) Name the inducer molecule in this process. (ii) Explain how the binding of the inducer results in the "switching on" of the operon. (iii) Name the enzyme produced by the ***Z*** gene.	2
19	**Attempt either option A or B.** A. Mention one application for each of the following. (i) Passive immunization. (ii) Anti- histamine (iii) Colostrum (iv) Cytokine- barrier OR B. Explain, giving two reasons , how immune response by 'vaccine' is different from that by 'antitoxin' in humans.	2
20	Draw a diagram of L.S of an anatropous ovule of an angiosperm and label the following parts. (i) Nucellus (ii) Secondary nucleus	2
21	**Attempt either option A or B.** A. Observe the diagram shown below of pBR 322. Answer the questions that follow:  (i) What is pBR322? (ii) Write the role of 'rop'. (iii) State the significance of 'ampR' and 'tetR'.	2

OR

B. Given below is the diagram representing the observations made for separating DNA fragments by the Gel electrophoresis technique. Observe the illustration and answer the questions that follow:

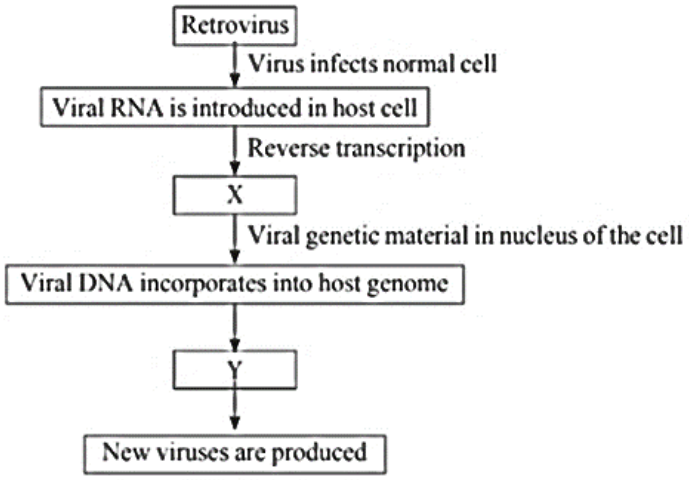


(i) Why are the DNA fragments seen to be moving in the direction A to B?

(ii) How can the separated DNA fragments be visualised for further technical use?

Section – C

22 In the given flow chart, the replication of retrovirus in a host cell is shown. Study the flow chart and answer the following questions. 3

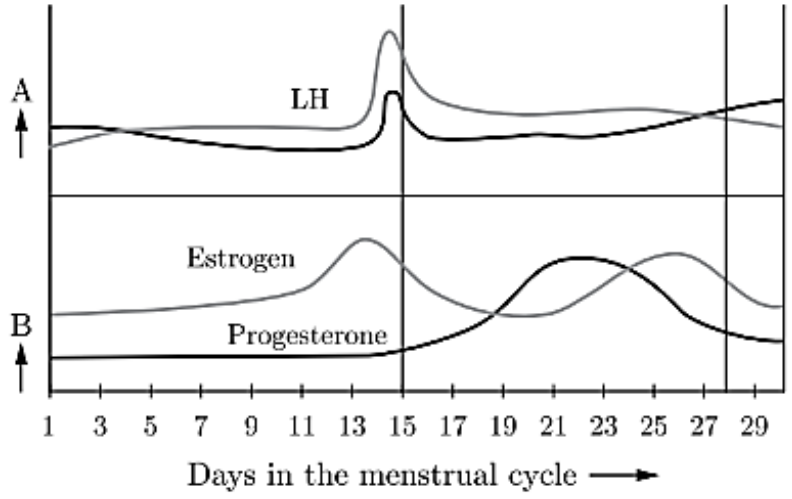


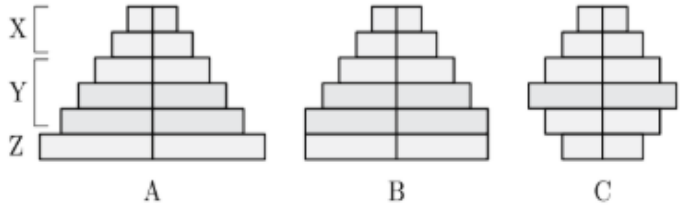
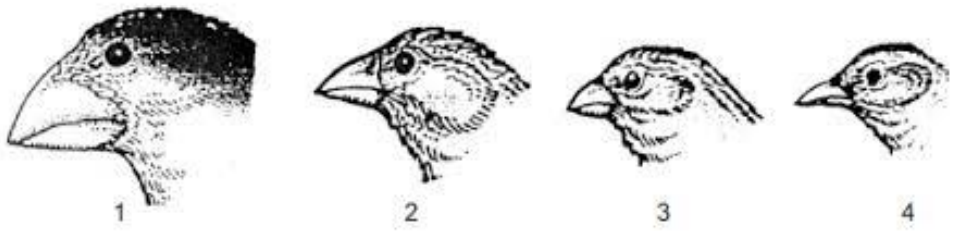
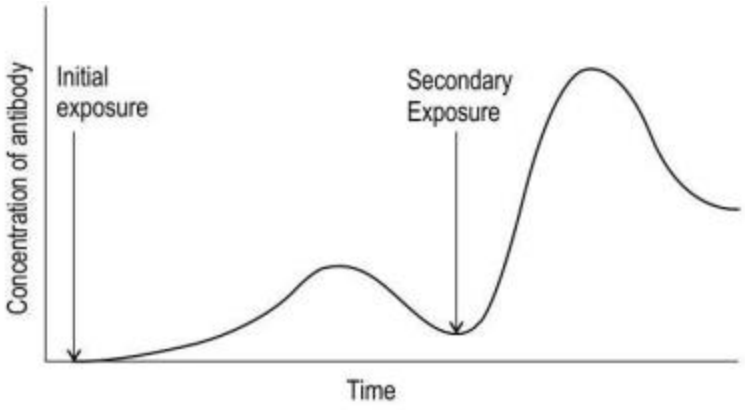
(i) Identify X and Y.

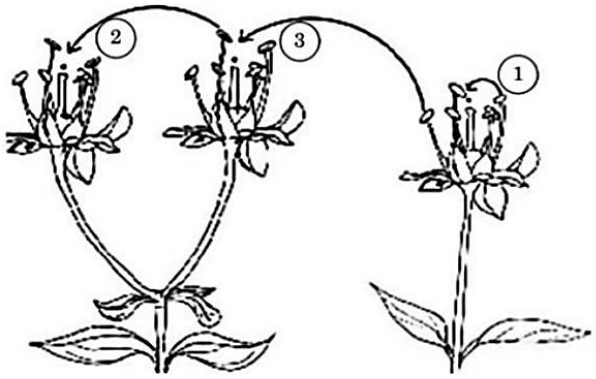
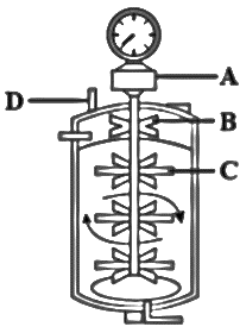
(ii) Which specific type of cell in the human immune system is the very first to be targeted and infected when a person is exposed to HIV infection?

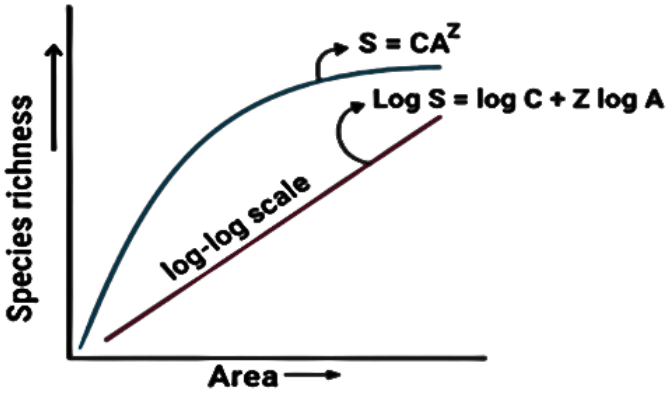
(iii) Give any two modes by which HIV can be transmitted from an infected person to a healthy person.

(iv) Explain the role of Reverse transcriptase.

23	What is hnRNA? Explain the changes hnRNA undergoes during its processing to form mRNA.	3
24	Inheritance is the process of passing genetic traits from parents to offspring through genes located on chromosomes. (i) What is the inheritance pattern observed in the size of starch grains and seed shape in Pisum sativum? (ii) Work out the monohybrid cross showing the above traits. (iii) How does this pattern of inheritance deviate from that of Mendelian law of dominance?	3
25	A large number of married couples the world over are childless. It is shocking to know that in India, the females are blamed for the couple being childless. (i) State any 2 reasons responsible for infertility. (ii) Suggest any two techniques that can help the couple to have a child where the problem is with the male partner.	3
26	In the figure given below, parts A and B show the levels of hormones which influence the menstrual cycle. Study the figure and answer the questions that follow:  (i) Name the organs which secrete the hormones represented in parts A and B. (ii) State the impact of the hormones in part B on the uterus of the human female during 6 to 15 days of the menstrual cycle. (iii) What happens to the corpus luteum in human female if the ovum is (a) fertilised, (b) not fertilised?	3

27	The given figure shows the different types of age pyramids for the human population.  (i) What do the parts 'X' and 'Z' represent? (ii) Which type of population is represented by pyramids A and B? (iii) Differentiate between A and C.	3
28	Observe the given image and answer the following questions.  (i) Mention the specific geographical area where these birds were found. (ii) Name and explain the phenomenon that has resulted in the evolution of such diverse species in the region. (iii) How did Darwin visit the particular geographical area?	3
	Section – D	
29	The graph given below shows the levels of antibodies against a pathogen over a period of 30 years in a person's body.  A. What do the two peaks mean? (1) B. Explain the reason behind the difference in the size of the two peaks. (2)	4

	Attempt either subpart C or D. C. Name the lymphocytes that help in immune response in the human body. (1) **OR** D. Name the type of antibody produced in response to allergens. (1)	
30	Study the diagram given below showing the modes of pollination. Answer the questions that follow.  A. Identify the technical terms used for each of the pollen transfer methods labelled as 1 and 2. (1) B. Explain how the following plants accomplish successful pollination: (i) Water lily (ii) Vallisneria (2) **Attempt either subpart C or D.** C. Flowering plants have evolved various mechanisms to prevent inbreeding depression. Describe one physiological mechanism that helps the plants to achieve this goal. (1) **OR** D. Write any two characteristic features of insect pollinated flowers? (1)	4
	Section – E	
31	(i) Observe the sketch of the stirred-tank bioreactor and label the parts A, B, C and D.  	5

	(ii) β-Galactosidase enzyme is considered a better selectable marker. Justify the statement. (iii) Name the source of the DNA polymerase in PCR. Mention why it is used? **OR** (i) How is Agrobacterium tumefaciens able to transform a normal plant cell into a tumour. (ii) What is a DNA probe? Give its application in Biotechnology. (iii) How does EcoRI specifically act on a DNA molecule? Explain.	
32	(i) Name the two growth models that represent population growth and draw the respective growth curves they represent. (ii) Mention any two special adaptations evolved in parasites. (iii) State Gause's competitive exclusion principle. **OR** The following graph shows the species area relationship. Answers the Questions as directed.  (i) Name the naturalist who studied the kind of relationship shown in the graph. Write the observations made by him. (ii) Write the situations as discovered by the ecologists when the value of 'Z' lies between (i) 0.1 and 0.2, (ii) 0.6 and 1.2 (iii) What does 'Z' stand for? (iv) What did David Tilman's experiments show about the relationship between biodiversity and ecosystem productivity? (Give 2 points).	5
33	(i) What was the experimental material used by Griffith? (ii) What is the S and R strain refer to? (iii) How did Griffith explain the transformation of R strain into S strain? (iv) How was the bio chemical nature of this transforming principle determined? **OR**	5

	Observe the segment of mRNA given below.  (i) Explain and illustrate the steps invoved to make fully processed hnRNA. (ii) Gene encoding RNA polymerase I and III have been affected by mutation in a cell. Explain its impact on the synthesis of polypeptide , stating reasons.	

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