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प्री-बोर्ड परीक्षा:2024-25

PRE-BOARD EXAMINATION: 2024-25

SET-A

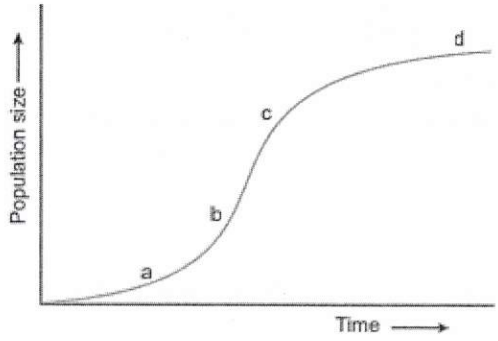
SUBJECT :BIOLOGY(044) TIME : 3 HOURS
CLASS : XII MM : 70

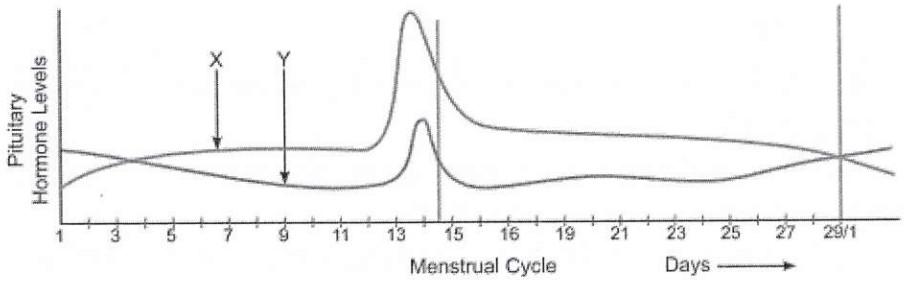
सामान्यनिर्देश/GENERAL INSTRUCTIONS:

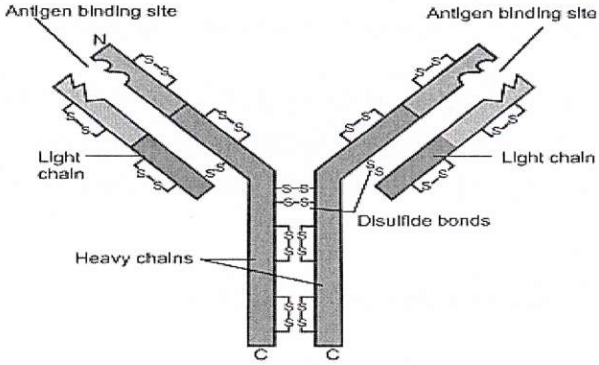
1. All questions are compulsory.
2. The question paper has five sections and 33 questions.
3. Section–A has 16 questions of 1 mark each; Section–B has 5 questions of 2 marks each; Section– C has 7 questions of 3 marks each; Section– D has 2 case-based questions of 4 marks each; and Section–E has 3 questions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

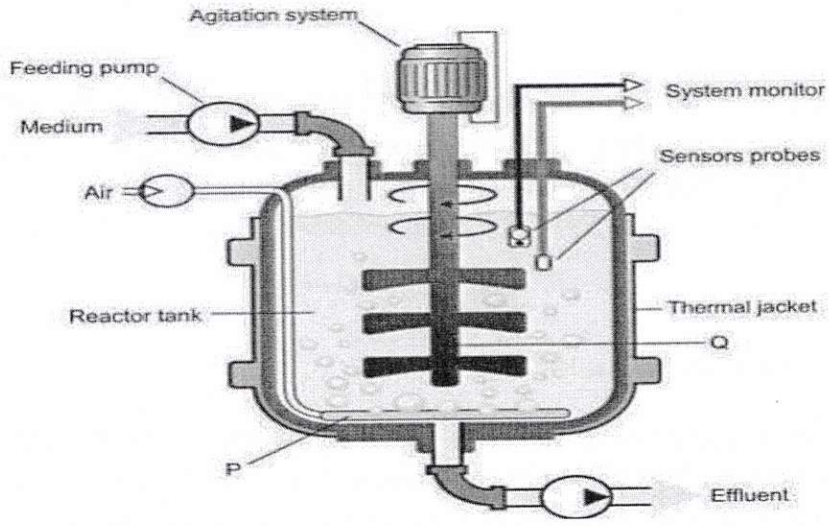
Q.NO	SECTION-A	MARKS
1	Consider three plants with the following modes of pollination: Plant P: autogamy Plant Q: xenogamy Plant R: geitonogamy Which of the above case/s is/are most likely to NOT show genetic variation in the offspring? A) only P B) only Q C) only P and R D) only Q and R	1
2	From the given statement given below choose the option that is true for a typical female gametophyte I. It is 8 nucleate and 7 celled at maturity. II. It is free nuclear during the development III. It is situated inside the integument, but outside the nucellus. IV. It has an egg apparatus situated at the chalazal end. A)I and IV (B) II and III (C) I and II (D) II and IV	1
3	Arun thinks that identifying the exact mRNA sequence from the protein sequence is difficult. Is he correct and why? (A) No, as the genetic code is universal. (B) Yes, as the genetic code is degenerate. (C) No, as the mRNA is translated into a protein sequence. (D) Yes, as the mRNA contains introns which are non-coding sequences.	1

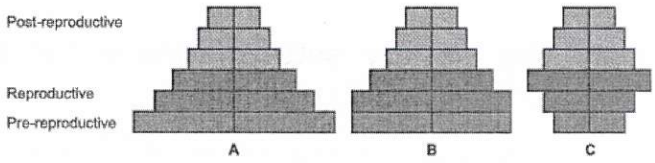
4	In a certain taxon of insects some have 17 chromosomes and the others have 18 chromosomes. The 17 and 18 chromosome bearing organisms are (A) males and females, respectively (B) females and males, respectively (C) all males (D) all females	1
5	In the F2 generation of a Mendelian dihybrid cross the number of phenotypes and genotypes are (A) phenotypes - 4; genotypes - 16 B) phenotypes - 9; genotypes - 4 (C) phenotypes - 4; genotypes - 8 D) phenotypes - 4; genotypes - 9	1
6	Discontinuous synthesis of DNA occurs in one strand, because (A) DNA molecule being synthesised is very long (B) DNA dependent DNA polymerase catalyses polymerisation only in one direction (5′ → 3′) (C) it is a more efficient process (D) DNA ligase joins the short stretches of DNA	1
7	Match the following columns of bacteria and their commercially important products Column I column II A. *Aspergillus niger* 1. Lactic acid B. *Acetobacter aceti* 2. Butyric acid C. *Clostridium butylicum* 3. Acetic acid D. *Lactobacillus* 4. Citric acid **Options:** (A)A-2 B-3 C-4 D-1 (B) A-2 B-4 C-3 D-1 (C) A- 4 B-3 C- 2 D-1 (D) A-4 B- 1 C-3 D-2	1
8	A survey for measuring the pollution in various water bodies is done by collecting the water samples and its analysis. Which of the following will show the degree of pollution? (A) Reduced BOD (B) less organic matter (C) Increased BOD (D) No change in DO or BOD	1
9	A bacterial cell was transformed with a recombinant DNA molecule that was generated using a human gene. However, the transformed cells did not produce the desired protein. Reasons could be: (A) Human gene may have intron which bacteria cannot process (B) Amino acid codons for humans and bacteria are different (C) Human protein is formed but degraded by bacteria (D) All of the above	1
10	Now days while talking about the application of biotechnology Bt toxin is one of the common examples which has changed scenario in farming. What is true about Bt toxin? (A) Bt protein exists as active toxin in the *Bacillus*.	1

	(B) The activated toxin enters the ovaries of the pest to sterilise it and thus prevent its multiplication. (C) The concerned Bacillus has antitoxins. (D) The inactive protoxin gets converted into active form in the insect gut.	
11	At which point in the graph shown below would there be zero population growth (DN/Dt = 0)?  (A) a (B) b (C) c (D) d	1
12	What is the difference between a community or group of communities and an ecosystem? (A) A community and the abiotic environment comprise an ecosystem. (B An ecosystem is a type of community. (C) A biome includes only the plant community or communities present in an environment. (D) An ecosystem includes only the abiotic aspects of a particular environment	1
	Question No. 13 to 16 consist of two statements – Assertion (A) and Reason (R). Answer these questions selecting the appropriate option 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 : Lactose is known to be the inducer and the substrate for the enzyme b-galactosidase. Reason : Repressor binds to the operator region of the operon and prevents binding of RNA polymerase	1
14	Assertion : :Histamine is related with allergic and inflammatory reactions. Reason : Histamine is a vasodilator.	1
15	Assertion : In a terrestrial ecosystem, detritus food chain is the major conduit for energy flow.	1

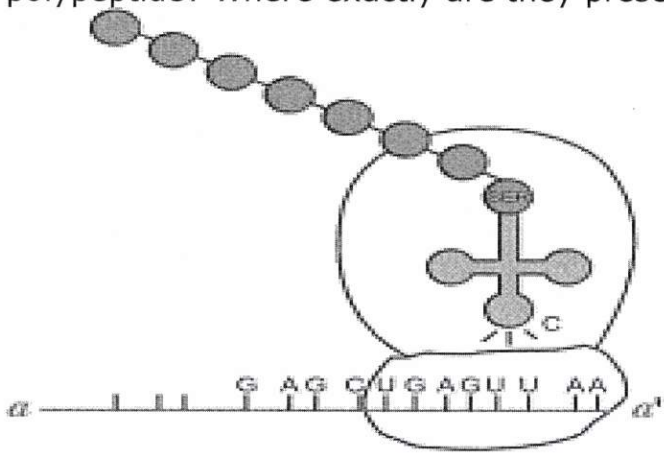
	Reason : Solar energy is the direct source for energy supply in a detritus food chain.	
16	Assertion : Tropical rainforest are rich in flora and fauna along with microbes on this biosphere. Reason : The low latitude humid tropics harbor the rainforest ecosystems.	1
	SECTION B	
17	Fertilisation is essential for production of seed, but in some angiosperms, seeds develop without fertilisation. (i) Give an example of an angiosperm that produces seeds without fertilisation. (ii) Name the process. **OR** Study the graph given below and answer the questions that follow:  (a) Name the hormones 'X' and 'Y'. (b) mention the target organs/site of these hormones.	2
18	A relevant portion of β-chain of haemoglobin of a normal human is given below: The codon for the sixth amino acid is GAG. The sixth codon GAG mutates to GAA as a result of mutation 'A' and into GUG as a result of mutation 'B'. Haemoglobin structure did not change as a result of mutation 'A' whereas haemoglobin structure changed because of mutation 'B' leading to sickle shaped RBCs. (i) Explain giving reasons how could mutation 'B' change the haemoglobin structure and not mutation 'A'. (ii) Write the genotype of (i) an individual who is carrier of sickle cell anaemia gene but apparently unaffected, and (ii) an individual affected with the disease. **OR** A red-eyed heterozygous female fruit fly is crossed with a red-eyed male. Work out all possible genotypes and phenotypes of the progeny. Comment on the pattern of inheritance of eye colour in fruit flies.	2

19	In a certain population, the frequency of three genotypes is as follows. **Genotypes: BB Bb bb Frequency: 22% 62% 16%.** What is the likely frequency of B and b alleles?	2
20	Given below is the structure of an antibody.  (i)A boy of ten years had chicken pox. He is not expected to have the same disease for the rest of his life. Mention how it is possible. (ii) Why is secondary immune response more intense than the primary immune response in humans? (iii) Some allergens trigger sneezing and wheezing in human beings. What causes this type of response by the body? **OR** IPM (integrated pest management)seeks to maintain the national crop ecosystem balance. It conserves the underlying natural resource base (i.e. soil, water and biodiversity) and enhances ecosystem services (i.e. pollination, healthy soils, diversity of species). With the help of two examples of explain how can we achieve sustainable development using IPM.	2
21	(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? **OR** (a) What are transgenic animals? (b) To produce transgenic animals, the gene of interest is introduced into embryonic stem cells. These stem cells are undifferentiated and the preferred target in the process of developing any transgenic animal. Give a reason why.	2
	SECTION C	
22	(a)Draw a labelled diagram of pollen grain with germ tube and two male gametes. (b) Name the organic material exine of the pollen grain is made up of. How is this material advantageous to pollen grain?	3

23	(i) Draw a sectional view of seminiferous tubule of a human. Label the following cells in the seminiferous tubule: (a) Cells that divide by mitosis to increase their number. (b) Cells that undergo Meiosis I. (c) Cells that undergo Meiosis II. (d) Cells that help in the process of spermiogenesis.	3
24	When a cross is made between tall plant with yellow seed (TtYy) and tall plant with green seed (Ttyy), what proportions of phenotype in the offspring could be expected to be (a) tall and green (b) dwarf and green?	3
25	With the help of suitable diagram explain: (i)Retroviruses have no DNA. However, the DNA of the infected host cell does possess viral DNA. How is it possible? (ii)Name the group of viruses responsible for causing AIDS in humans. Why are these viruses so named? (iii) List any two ways of transmission of HIV infection in humans, other than sexual contact.	3
26	How do biofertilisers enrich the fertility of the soil? Explain with the help of example **OR** Given below is a diagram of a bio-reactor with some of its parts.  (a) Which type of organisms can MOST likely be used if part P is not made a part of the bio-reactor? Why? (b) Identify the name and purpose of part Q. (c) How does the thermal jacket help in the process?	3

27	In a pond there were 20 Hydrilla plants. Through reproduction 10 new Hydrilla plants were added in a year. Calculate the birth rate of the population. OR Study the three different age pyramids for human population given below and answer the questions that follow:  (i)Write the names given to each of these age pyramids. (ii)Mention the one which is ideal for human population and why. (iii) What would be the growth rate pattern when the resources are unlimited?	3
28	Name the type of interaction seen in each of the following examples: (i) Ascaris worms living in the intestine of humans (ii) Wasp pollinating fig inflorescence (iii) Clown fish living among the tentacles of sea-anemone (iv) Mycorrhizae living on the roots of higher plants (v) Orchid growing on a branch of a mango tree (vi) Disappearance of smaller barnacles when Balanus dominated in the coast of Scotland.	3
	SECTION D	
29	In maize, the trait for the purple kernel (P) is dominant over the yellow kernel (p). A plant with purple kernels is crossed with another plant with yellow kernels and produces 2 offspring with purple kernels and 2 offspring with yellow kernels. (a) What is the genotype of the parental maize plants? (b) Draw a Punnett square to depict the cross between the two offspring with purple kernels. (c) Identify the genotypic and phenotypic ratios obtained from the cross in (b). OR (c) Describe a method that can definitely help with the identification of an unknown genotype of a plant with purple kernels.	4

30	The municipal wastewater is also called sewage. Sewage contains a large amount of organic matter and pathogenic microbes, human excreta etc. Before disposal, hence, sewage is treated in sewage treatment plants (STPs) Sewage treatment is done in two stages- primary treatment and secondary(biological) treatment. Primary Treatment - This involves the physical removal of particles from the sewage through filtration and sedimentation. The effluent from the primary settling tank is taken for secondary treatment. The primary effluent is passed into large aeration tanks where it is constantly agitated mechanically and air is pumped into it. This allows vigorous growth of useful aerobic microbes as flocs. These microbes consume the major part of the organic matter in the effluent. This significantly reduces the BOD. Once the BOD of sewage is reduced significantly, the effluent is then passed into a settling tank where the bacterial 'flocs' are allowed to sediment. This sediment is called activated sludge. A small part of the activated sludge is pumped back into the aeration tank to serve as the inoculum.The remaining major part of the sludge is pumped into large tanks called anaerobic sludge digesters. Here anaerobic bacteria produce biogas (methane, hydrogen sulphide, and carbon dioxide). The effluent from the secondary treatment plant is generally released into natural water bodies like rivers and streams. (i) What is important biotic part of inoculum? (ii) What is relation between amount of BOD and the amount of organic matter present in polluted water. (iii) How the Removal of methanogens will impact the primary and secondary treatment? OR How primary treatment is different from secondary treatment.	4
	SECTION E	
31	A Non-Government Organisation (NGO) aims to increase awareness against STDs. (a) What could be the ideal target age group for the NGO? (b) Mention any TWO potential long-term health-related complications of untreated STDs that the NGO should educate the target age group about. (c) Mention ONE contraceptive method that provides protection against the STD. Justify.	5

	(d) State TWO contraceptive methods that do not protect against STDs that they can educate the group about. OR Amey and Lalita are expecting their first child, with Lalita being in her second month of pregnancy with no known complications. Amey's family has a history of cystic fibrosis while Lalita's family has a history of Down's syndrome, leading to a concern that the baby may have one of these conditions. (a) Suggest and explain a way of testing if their baby is at risk for any genetic disorders. (b) In case of the presence of one or both of the abnormalities and posing a risk to the mother's health, mention one possible option for them to consider. (c) Is the process mentioned in (b) safe for Lalita at the current gestational age? Justify. (d) Under what conditions is the process mentioned in (b) illegal?	
32	(a) Identify the polarity from a to a' in the given diagram and mention how many more amino acids are expected to be added to this polypeptide chain. (b)Mention the DNA sequence coding for serine and the anticodon of tRNA for the same amino acid. (c) Why are some untranslated sequence of bases seen in mRNA coding for a polypeptide? Where exactly are they present on mRNA?  OR a) ABO blood group in humans is an example of multiple allelism and Co-dominance. Justify. b) A couple who has blood groups A and B have four children. Each child has a different blood group. Explain with the help of crosses to show how this is possible.	5
33	In 1997, an American company obtained patent rights on Basmati rice, allowing them to market a 'new'strain of Basmati rice in the United	5

	States and overseas. This 'new' Basmati strain was really derived from Indian farmer's varieties. (a) What is this unauthorised act called? Define it. (b) State TWO ways in which Indian farmers are set to lose due to this unauthorised act. (c) State TWO measures that different countries are taking to prevent such unauthorised exploitation of their bio-resources. **OR** In a huge culture flask with unlimited supply of nutrient medium, bacteria were grown. Their population kept on increasing as they were dividing by binary fission. a) What type of growth pattern will be seen in this population? b) Write the equation which can be used to calculate the population size after time t, when the initial population size of the bacteria is represented by N and population size after time t is represented by Nt. c) Draw a growth curve to depict the growth in the population size when growth in the population size is plotted over time. What will be the shape of this growth curve? d) If instead of providing the unlimited supply of culture medium in a huge flask, it is provided only in a very small test tube, then what will be the pattern of growth and the shape of the growth curve? Depict diagrammatically also.	

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