Roll No. | | | | | | |

SET-01

Candidates must write the Set No on the title page of the answer book.

SAHODAYA PREBOARD EXAMINATION – (2025-26)
CLASS-XII

- Please check that this question paper contains **12** printed pages.
- Set number given on the top right-hand side of the question paper should be written on the title page of the answer book by the candidate.
- Check that this question paper contains **33** questions.
- **Write down the Serial Number of the question in the left side of the margin before attempting it.**
- 15 minutes time has been allotted to read this question paper. The question paper will be distributed 15 minutes prior to the commencement of the examination. The students will read the question paper only and will not write any answer on the answer script during

BIOLOGY (044)

Maximum marks - 70 ***Time allowed – 3hours***

General Instructions:

(i) All questions are compulsory.

(ii) The question paper has five sections and 33 questions. All questions are compulsory.

(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. 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. No. 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

1. The ploidy of male plant is 2n and the female plant is 4n. After artificial hybridization of the two plants, what would be the ploidy of the endosperm and zygote respectively in the progeny plant? 1

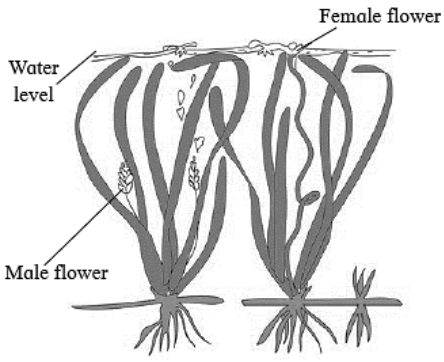
(A) 3n,5n

(B) 5n,3n

(C) 7n,4n

(D) 5n,2n

2. Observe the diagram and identify the mechanism of water pollination from the given options: 1



(A) Pollen grains are carried passively inside the water, some of them reach stigma and achieve pollination.

(B) Male and female flowers emerge above the level of water and are pollinated by bees.

(C) Female flowers reach the surface of the water, pollen grains reach stigma and achieve pollination.

(D) Male and female flowers emerge above the level of the water and are pollinated by wind.

3. Different structures are formed in different parts of female reproductive tract. Find out the correct match with correct ploidy of structure from the following: 1

Sl.No	Ovary	Fallopian Tube	Uterus
(A)	2^{O} Oocyte (2n)	Zygote (2n)	Blastocyst
(B)	2^{O} Oocyte (n)	Ootid (n)	Morula
(C)	1^{O} Oocyte (n)	2^{O} Oocyte (n)	Blastocyst
(D)	1^{O} Oocyte (n)	Ootid/Ovum (n)	Blastocyst

4. Three genes 'R', 'S' and 'T' are located on the same chromosome. The recombinant percentage between 'R' and 'T' is 35% and 'S' and 'T' is 45% respectively, predict the correct order of the gene sequence on the chromosome and recombinant percentage between 'R' & 'S'. 1

(A) S R T & 50% (B) S R T & 80% (C) S R T & 10% (D) S T R & 20%

5. The different types of RNAs transcribed by RNA polymerase III in eukaryotes are: 1

(A) tRNA, hnRNA, 28s RNA

(B) 28s RNA, 18s RNA, 5.8s RNA

(C) tRNA, 5s rRNA, snRNAs

(D) hnRNA, 18s rRNA, 28s RNA

6. Match the codons given in column I with their respective amino acids given in column II and choose the correct answer. 1

Column -I (Codons)		Column -II (Amino acids)	
A	UUU	I	Serine
B	GGG	II	Methionine
C	UCU	III	Phenylalanine
D	CCC	IV	Glycine
E	AUG	V	Proline

(A) A – III; B – IV; C – I; D – V; E – II

(B) A – III; B – I; C – IV; D – V; E – II

(C) A – III; B – IV; C – V; D – I; E – II

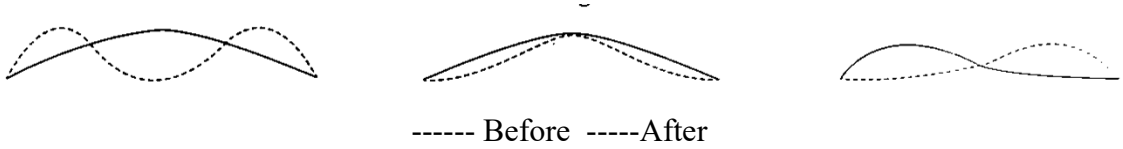
(D) A – II; B – IV; C – I; D – V; E – III

7. How many histone proteins are present in a eukaryotic nucleosome? 1

(A) 4 (B) 5 (C) 8 (D) 9

8. Fossil records show that the size of the black bears in Europe increased during each glacial period. Which of the following graphs represents this case? 1

A. Disruptive Selection B. Stabilizing Selection C. Directional Selection



------ Before -----After

(A) Graph 'A' (B) Graph 'B' (C) Graph 'C' (D) None of these

9. Select the incorrect statement regarding Hardy-Weinberg principle and factors affecting genetic equilibrium. 1

(A) Random mating in a large population helps maintain Hardy-Weinberg equilibrium.

(B) Gene flow refers to the movement of alleles from one population to another, and it always increases genetic diversity.

(C) Mutation can introduce new alleles into a population and disturb Hardy-Weinberg equilibrium.

(D) Natural selection, when directional can lead to evolutionary change and affect allele frequencies.

10. Identify the wrong statement from the following. 1

(A) α-interferon, a biological response modifier is administered to cancer patients.

(B) Carcinogens are the agents that transform the neoplastic cells into normal cells.

(C) MRI is often used to detect pathological and physiological changes in the living tissues.

(D) Metastasis is the property of malignant tumors.

11. Antibiotics produced by microbes are regarded as one of the most significant discoveries of the twentieth century and have greatly contributed towards the welfare of the human society. Which one of the following is not true about antibiotics? 1

(A) They are the chemicals produced by microbes that kill or retard the growth of other microbes.

(B) First antibiotic was discovered by Alexander Fleming.

(C) They are produced by prokaryotes only.

(D) Penicillin, the first antibiotic was used to treat the soldiers wounded in World War II.

12. The colonies of recombinant bacteria appear white in contrast to blue colonies of non-recombinant bacteria because of 1

(A) insertional inactivation of alpha galactosidase in recombinant bacteria

(B) inactivation of glycosidase enzyme in recombinant bacteria

(C) non recombinant bacteria containing B-galactosidase

(D) insertional inactivation of galactosidase in recombinant bacteria

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 (A)-** Apomictic seeds of mango plant retains all parental characters. 1

Reason (R)- The nucellar cells of mango undergoes meiosis and develops into embryos.

14. **Assertion (A)-** The embryos of fish, salamander, tortoise, chick and a man of same age resemble one another closely**.** 1

Reason (R)- 'Ontogeny recapitulates phylogeny', according to recapitulation theory.

15. **Assertion (A)-** Withdrawal symptoms appear when a person abruptly stops the intake of drugs. 1

Reason (R)- The body becomes physically and psychologically depend on drugs after prolonged use.

16. **Assertion (A)-** The milk of 'Rosie' cow contained human Beta lactalbumin which made the milk rich in protein 1

Reason (R)- Rosie was the first transgenic cow to make more nutritionally balanced milk for consumption by human babies

SECTION-B

17. A garden pea plant bearing inflated and green pods when crossed with another pea plant bearing inflated and yellow pods, produced inflated green pods & constricted green pods in the ratio of 3:1. Workout the cross and write the genotype of the parents. 2

18. ***Attempt either option A or B*** 2

(A) Justify the following statements:

(a) Dengue virus (DENV) can inhibit the innate immune response.

(b) Ringworm cause appearance of dry, scaly lesions mostly in skin folds such as in groin or between toes.

(c) *Plasmodium vivax* when infect RBC can cause chill and high fever recurring every three to four hours.

(d) *Wuchereria bancrofti* cause gross deformities of lower limb and genital organs.

OR

(B) Mention any one effect of the following drugs:

(a) Smack

(b) Hashish

(c) Anabolic steroids in female

(d) Alkaloids of *Atropa belladonna*

19. ***Attempt either option A or B*** 2

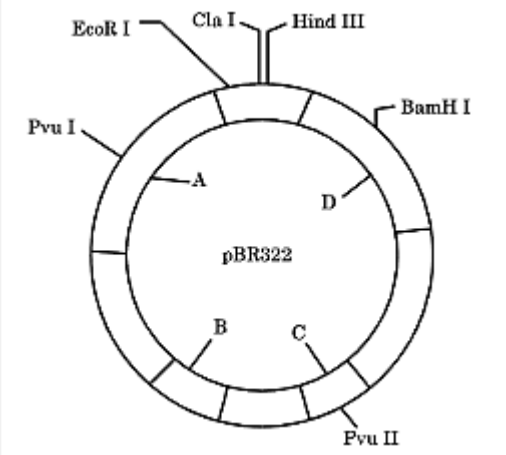
(A) Causative agents of HIV-AIDS & covid-19 belong to the same group of viruses. To diagnose and amplify the genetic material for further study PCR Test is carried out. During the process human DNA polymerase is used.

(i) How it will affect the process and why?

(ii) How PCR differs from gene cloning?

OR

(B) Observe the diagram of pBR322. Identify B and C. Mention their functions.



20. (A) Orchid grows on Mango Plant and *Cuscuta* grows on hedge plant. How do they differ with respect to their population interaction? 2

(B) Competition can occur in between distantly related species without extinction of competing species. Justify with one example.

21. ***Attempt either option A or B*** 2

(A) (a) Represent diagrammatically pyramid of biomass of sea & forest ecosystem.

(b) What are the limitations of ecological pyramid?

OR

(B) Decomposition is a catabolic process controlled by both abiotic & biotic factors, Justify it.

SECTION - C

22. A pregnant woman facing difficulties during child birth. So, the doctor injected one hormone into the mother's blood. 3

(A) Identify the hormone that the doctor injected into the pregnant woman.

(B) Enumerate the function of that hormone just after the injection.

(C) Can that hormone triggers the posterior pituitary to release birth hormone? Justify your answer and also explain how it leads to parturition?

23. (A) What are the causes of the two major types of thalassemia? 3

(B) How is thalassemia different from sickle cell anemia?

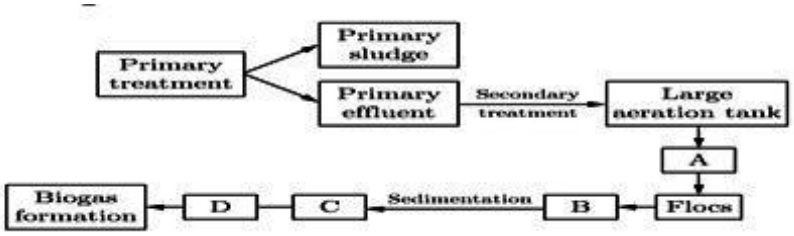
(C) Write one difference between Pleiotropy and polygenic inheritance?

24. (A) Darwinism, the theory of natural selection has a wide acceptance. However, it has been criticized too. Why? 3

(B) Which is the most accepted theory of evolution? What does it base on?

(C) What are the two main propositions of Oparin & Haldane?

25. Refer to the given below flow chart that shows the sewage treatment. 3

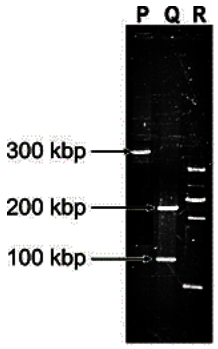


(A) Identify 'A', 'C' and 'D' in the given process.

(B) Explain the process at step 'D'.

(C) What is the significance of low 'B' in the given process and how does it form 'C'?

26. Nidhi performed gel electrophoresis after treating one vector with restriction enzyme/enzymes in three different settings. She added one mixture in the well 'P', one in 'Q' and another mixture in well 'R'. Given beside is an image of the result. 3

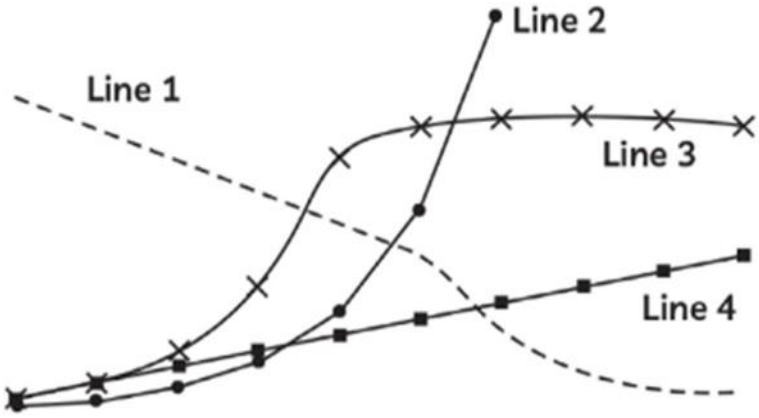


(A) What can be concluded about the mixtures loaded in well 'P' and 'Q'?

(B) What is likely the reason that the fragments in wells 'Q' and 'R' are different?

(C) How pure DNA fragments are visualized?

27. The population growth curves for a particular population at different parameters are depicted in the graph below. 3



(A) Which kind of curve/ line best illustrates a population in are source-constrained setting? Explain the curve.

(B) Which line represents a population that reaches a carrying capacity? Mention the shape of the curve.

(C) Identify the curve that represents population growth when resources are unlimited. Name the type of growth model exhibited by it.

28. (A) What was the contribution of 'Ramsar convention' in the field of biodiversity? 3

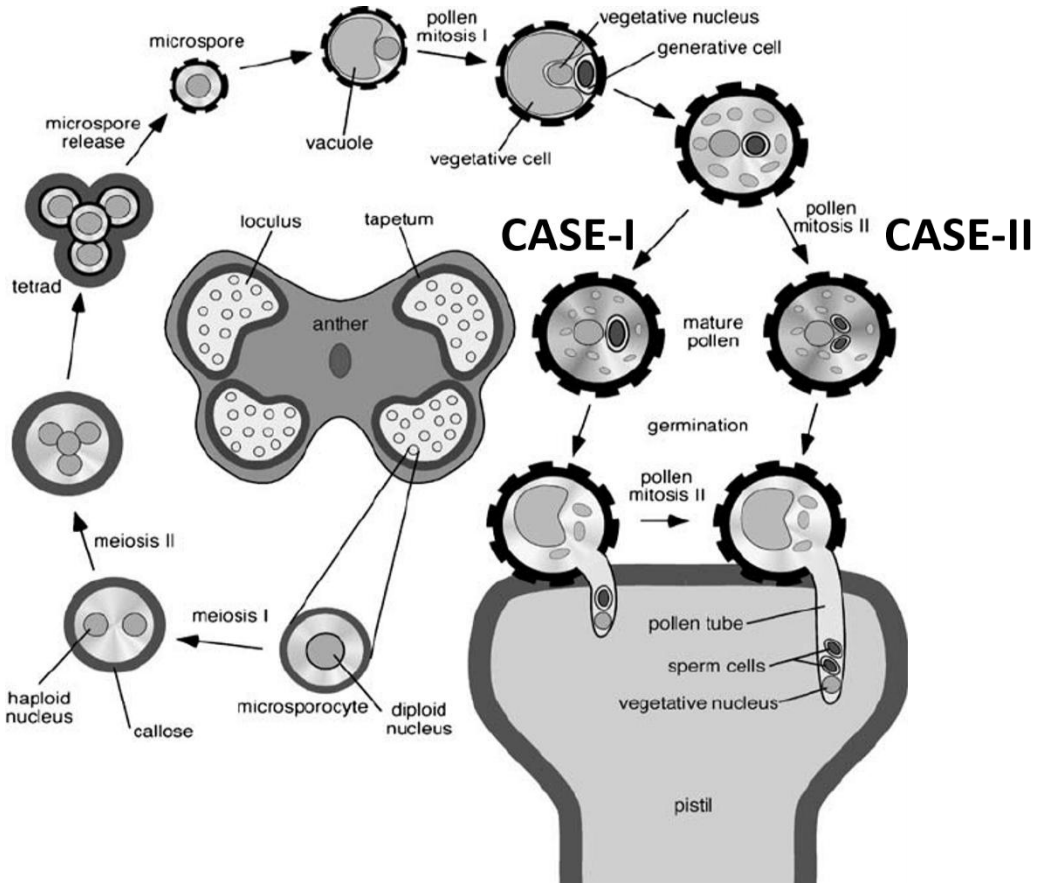
(B) How can we conserve the threatened species?

(C) Give two reasons as to why prokaryotes are not given any figures for their diversity by the ecologist?

SECTION - D

Q.no 29 and 30 are case based questions. Each question has subparts with internal choice in one subpart.

29. The flow diagram shows the detailed process of male gamete formation and germination of pollen grains in Angiosperms. Observe the diagram carefully and answer the questions that follow. 4



(A) Find out the number of chromosomes present in microspore and male gamete respectively; if the diploid male plant has 124 chromosomes. (1)

(B) Identify the function of generative cell. Differentiate between the Case-I and case-II on the basis of time or site of division of generative cell. (2)

Attempt either subpart C or D

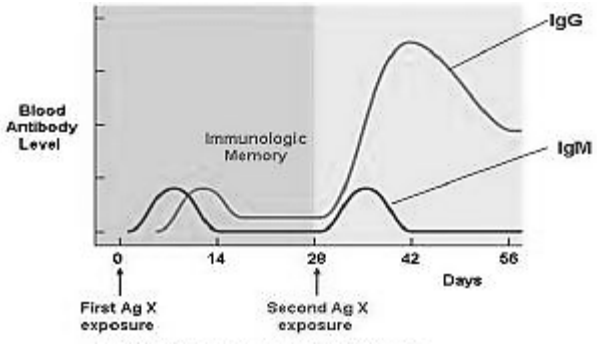
(C) Calculate the number of Microspore Mother Cell/ Pollen mother cells (PMC) involved for the production of 3200 male gametes. (1)

OR

(D) Calculate the number of generative cells involved for the production of 1600 male gametes. (1)

30. The graph represents the antibody levels during immune responses: 4

Study the graph and answer the questions that follow:



(A) Which response is faster and stronger? Identify the reason behind it. (1)

(B) (i) How are the antibodies produced against first exposure to antigen "x" differs from those in second exposure to the same "x" antigen? (1)

(ii) Which antibody provides defense against foreign antigen to an infant? Identify the type of acquired immunity. (1)

Attempt either subpart C or D

(C) Why is vaccination based on the principle of secondary immune response? (1)

OR

(D) Why is a gap of around 28 days shown between the first exposure and second exposure to the antigen "x"? (1)

SECTION-E

31. ***Attempt either option A or B*** **5**

(A) (a) Draw the diagram of a human sperm and label the following parts depicting their technical terms:

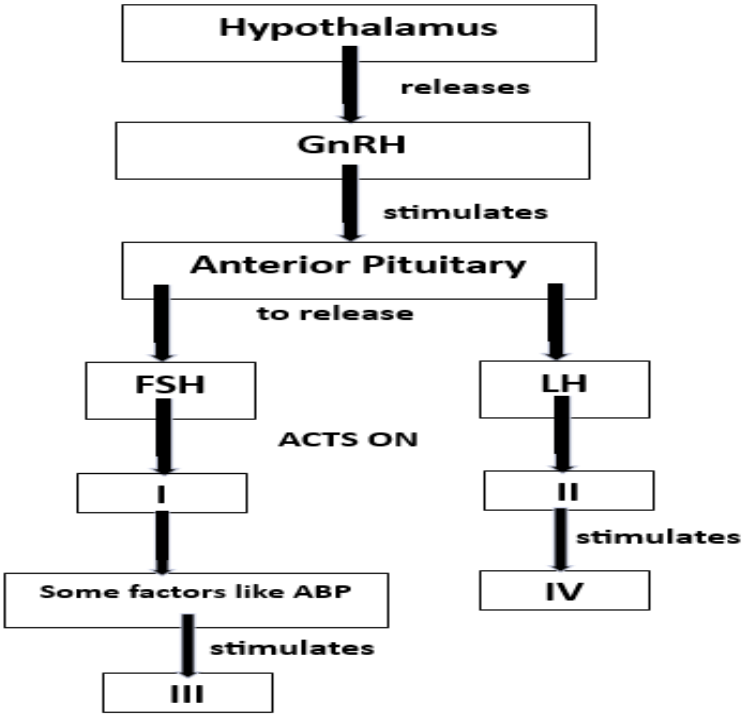
(i) The structure whose enzyme helps in fertilization of ovum.

(ii) Energy source for swimming.

(iii) Organelle carrying paternal chromosomes.

(iv) Part of human sperm that helps in swimming.

(b) Check the flow chart showing hormonal control of spermatogenesis. Identify "I" and "II". Give the technical terms for "III" and "IV".

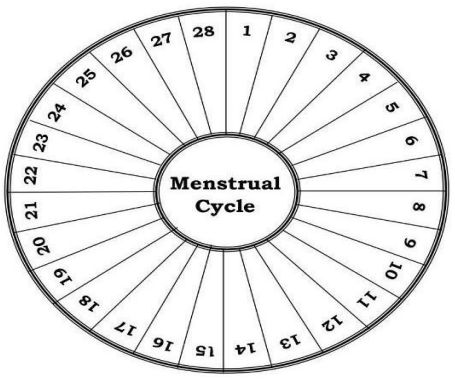


OR

(B) (a) A couple is adapting natural method of contraception where the couple avoid or abstain from coitus in some days of menstrual cycle. The female has 28 days menstrual cycle. Observe the 28 days menstrual cycle and answer the questions that follow:

(i) Write the name of the natural method of contraception adopted by that couple. Explain why there is high chance of fertilization during that time period?

(ii) In the month of September, the female partner got her period on 5th day and it lasted up to 9th day. Find out the fertile period of the female for September.



(b) A couple is infertile and the type of infertility of male and female partner is given below:

Couple	Type of infertility
Male	Has less than 20% sperm with vigorous motility in the ejaculates.
Female	Can produce female gamete but uterus is unsuitable for foetal development.

Suggest the type of ARTs and enumerate each step of ARTs in a sequence that can enable the couple to have a baby.

32. ***Attempt either option A or B***

(A) Given below is a stretch of DNA showing the coding strand of a structural gene of a transcription unit.

5'-ATGACCGTATTTTCTGTAGTGCCCGTACTTCAGGCATAA—3'

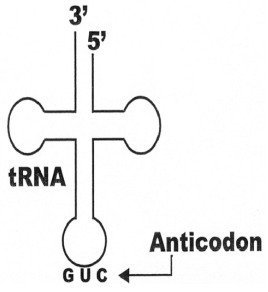
(i) Write the corresponding template strand and the mRNA strand that will be transcribed, along with its polarity.

(ii) If GTA of the above DNA is an intron, depict the sequence involved in the formation of m-RNA strand in a bacterium.

(iii)

(a) Find out the codon in m-RNA with correct polarity for the given t-RNA.

(b) Is cognate t-RNA binds with stop codon to terminate the process of translation? Justify your answer.



OR

(B) Meselson and Stahl carried out an experiment to prove the nature of DNA replication. Recall the experiment and answer the following questions.

(a) Which two types of nitrogen were used by them in their experiment and why?

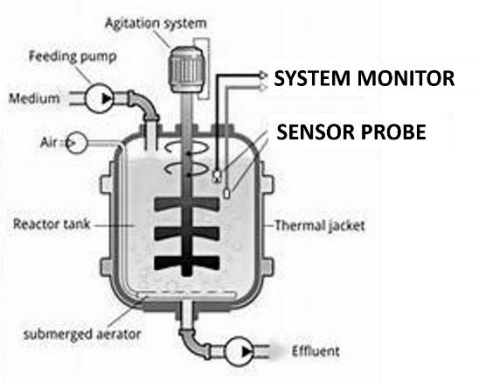
(b) Why did they take samples of E. coli at definite time intervals for their observation?

(c) State the role of cesium chloride density gradient in their experiment.

(d) Write the conclusions they arrived at.

33. ***Attempt either option A or B***

A. Rati wants to grow a variant of the *Lactobacillus* species in a bioreactor. *Lactobacillus* is commonly used as a starter culture for diary products. Shown below is a bioreactor she had in her laboratory.



(i) Identify one component that should definitely not be present in the reactor to grow the Lactobacillus species. Justify.

(ii) Explain two quantities that the sensors in the bioreactor should monitor. Also, write four advantages of using stirred tank.

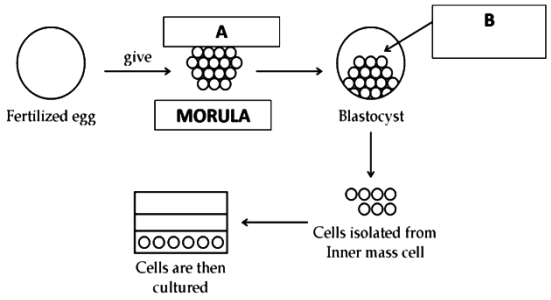
(iii) Explain in brief how is an alien DNA introduced into a plant cell.

OR

(B) (a) Give me a piece of tissue/cell. I will give you thousands of plants. Justify the statements by answering the following questions:

(i) Name the property and the technique.

(ii) Mention the raw materials required & why?



(b) The given figure shows the embryonic stem cells. Identify 'A' and 'B'. Define them.

(c) What is the role played by GEAC in the field of biotechnology?