SET - 1

Roll No. | | | | | | |

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

SAHODAYA PRE BOARD EXAMINATION – 2024-25

- Please check that this question paper contains 11 printed pages.
- Set number given on the 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 the period. Students should not write anything in the question paper.

CLASS – XII

Sub.: BIOLOGY (044)

Time Allowed : 3 hours **Maximum Marks: 70**

General Instructions:

(i) All questions are compulsory.

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

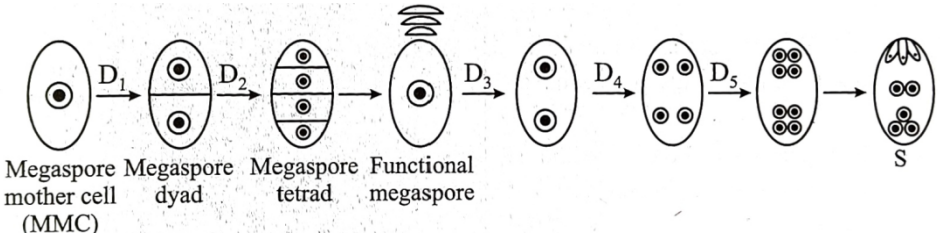
(iii) Section – A has 16 questions of 1 mark each; Section – B has 5 questions of 2 marks each; Section – C has 7 questions of 3 marks each; Section – D has 2 case-based questions of 4 marks each; and Section – E has 3 questions of 5 marks each.

(iv) There is no overall choice. 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 labeled diagrams should be drawn.

SECTION – A

01. The figure given below shows megasporogenesis and development of typical female gametophyte in angiosperms. In which of the following options all divisions (D_1 to D_5) and structure (S) are correctly identified?



	D_1	D_2	D_3	D_4	D_5	S
(a)	Meiosis I	Meiosis II	Mitosis	Mitosis	Mitosis	Microgametophyte
(b)	Meiosis I	Meiosis II	Mitosis	Mitosis	Mitosis	Embryo
(c)	Meiosis I	Meiosis II	Mitosis	Mitosis	Mitosis	Embryo sac
(d)	Mitosis	Meiosis	Mitosis	Mitosis	Mitosis	Embryo sac

02. Identify the correct statement from the following.

(a) High levels of estrogen triggers the ovulatory surge.

(b) Oogonial cells start to proliferate and give rise to functional ova in regular cycles from puberty onwards.

(c) Sperms released from seminiferous tubules are highly motile/non-motile.

(d) Progesterone level is high during the post ovulatory phase of menstrual cycle.

03. Identify the genotype and find out what proportion of the offsprings from cross AABBCC ×AaBbCc will be completely heterozygous for all genes segregated independently.

(a) 1/8 AaBbCc (b) 1/8 AaBbCc

(c) 1/16 AaBbCc (d) 1/16 AaBbCC

04. Proteinaceous factors are required to initiate translation. The correct consequences for translation with the mRNA in an eukaryote are

(a) Ribosome binds to UTR →cognate tRNA binds to codon.

(b) Smaller sub unit binds at codon AUG → cognate tRNA binds to codon →larger sub unit binds to smaller sub unit.

(c) Larger sub unit binds to smaller sub unit → cognate tRNA binds to codon →peptide bond formation.

(d) Charged tRNA binds to AUG→ smaller sub unit binds to mRNA→ larger sub unit binds to smaller sub unit.

05. In a population of 1000 individuals, 360 belong to genotype AA, 480 to Aa and remaining 160 to aa. Based in this date the frequency of allele A in the population is

(a) 0.5 (b) 0.6

(c) 0.7 (d) 0.4

06. Foetus receive some antibodies from the mother through placenta during pregnancy. This is an example of

(a) Naturally acquired active immunity
(b) Artificially acquired passive immunity
(c) Naturally acquired passive immunity
(d) Artificially acquired active immunity

07. Match the following columns and select the correct option :

	I		II
(A)	Dragonflies	(i)	Biocontrol agent of several plant Pathogens
(B)	Bacillus thuringiensis	(ii)	Get rid of mosquitoes
(C)	Glomus	(iii)	Narrow spectrum insecticidal applications
(D)	Baculoviruses	(iv)	Biocontrol agents of lepidoteran plant pests
		(v)	Absorb phosphorus from soil

(a) A-ii, B-iv, C-v, D-iii (b) A-iii, B-v, C-iv, D-i
(c) A-ii, B-i, C-iii, D-iv (d) A-ii, B-iii, C-iv, D-v

08. I. ..A... is the ability of a cell to take up foreign DNA

II. The cell is treated with specific concentration of a divalent cation such as ...B. to Increase pore size in cell wall

III. In ….C... method recombinant DNA is directly injected into the nucleus of an animal cell, the most appropriate option regarding A. B and C is

(a) A-Competency, B- Calcium, C-gene gun method
(b) A-Transformation, B-Sodium, C-microinjection method
(c) A-Competency, B-Calcium, C-microinjection method
(d) A-Transformation, B- Sodium, C-gene gun method

09. Which of the following statements is incorrect regarding RNA interference?

(a) It is a method of cellular defense
(b) The introduction of DNA into the host cell produces both sense and anti-sense RNA.
(c) It involves silencing of a specific mRNA
(d) Using a retroviral vector nematode specific was introduced into gene the host plant.

10. Which of the following is the most accurate comment on Earth's carrying capacity (K)?

(a) K is smaller now than it was a thousand years ago.
(b) The human population is still a long way from K.

(c) Our technology has allowed us to keep increasing K.

(d) When it comes to humans, the concept of K is irrelevant.

11. Which of the following statements about productivity is true?

(a) Primary productivity of all ecosystems is constant.

(b) Primary productivity depends on the plant species inhabiting a particular area.

(c) Net primary productivity is the amount of biomass available for consumption by carnivores.

(d) Secondary productivity is defined as the rate of formation of new organic matter by decomposers.

12. The Earth Summit held in Rio de Janeiro in 1992 was called

(a) for immediate steps to discontinue use of CFCs that were damaging the ozone layer

(b) to reduce CO_2 emissions and global warming

(c) for conservation of biodiversity and sustainable utilization of its benefits

(d) to assess threat posed to native species by invasive weed species.

In the following questions a statement of assertion followed by a statement of reason is given. Choose the correct answer out of the following choices.

(a) Both Assertion and Reason are true and Reason is the correct explanation of Assertion.

(b) Both Assertion and Reason are true but Reason is not the correct explanation of Assertion.

(c) Assertion is true but Reason is false.

(d) Assertion is false but Reason is true.

13. **Assertion :** Primary transcripts in eukaryotes are nonfunctional.

Reason : Methyl guanosine triphosphate is attached to 5'-end of mRNA.

14. **Assertion :** A temperature control system is an important requirement for bioreactor.

Reason : Every microorganism or enzyme is functional only at an optimum temperature conditions.

15. **Assertion :** Detritivores and decomposers have no place in ecological pyramid.

Reason : Detritivores and decomposers do not play any vital role in the ecosystem.

16. **Assertion :** Tissue culture, a technique of rapid multiplication of plants is a strategy of ex-situ conservation.

Reason : The plants produced from tissue culture can survive any adverse condition and have 100% survival rate.

SECTION – B

17. (a) In a case of polyembryony if an embryo develop from the synergid and another from the nucellus, which one would be haploid & which one would be diploid?

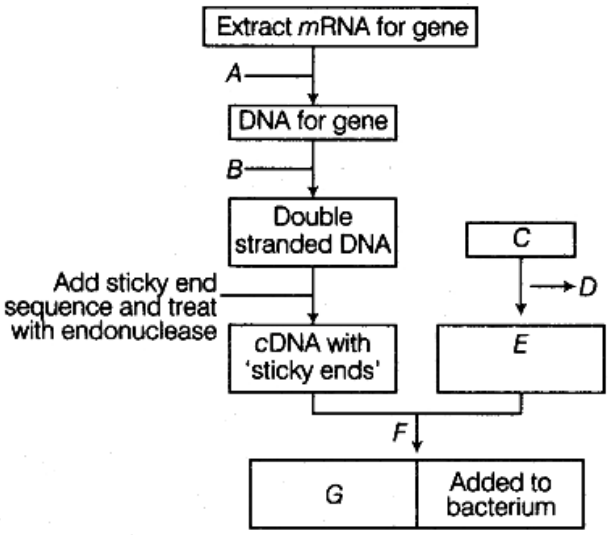
(b) Mention the factors that are crucial for storage of mature seeds.

18. Fill in the blank (i), (ii), (iii), (iv) with name of the mammals of Australia.

Placental mammal	Marsupial mammal
Anteater	(*i*)
(*ii*)	Spotted cuscus
Bob cat	(*iii*)
(*iv*)	Tasmanian wolf

19. Give the binomials of two types of yeast and the commercial bioactive products they help to produce.

20. Identify the labelled items B, C, D & E in the flow chart given below.



21. **ATTEMPT EITHER OPTION A OR B.**

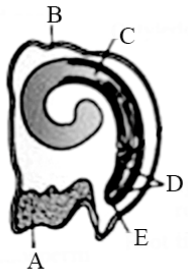
A. What would happen to the successive trophic levels in the pyramid of energy, if the rate of reproduction of phytoplanktons was slowed down? Suggest two factors which could cause such a reduction in phytoplankton reproduction.

Or

B. Introduction of alien species has led to environmental damage and decline of indigenous species. Give any one example of how it has affected the indigenous species?

SECTION – C

22. Observe the given picture of the seed & answer the following questions.



(a) Label A and mention its function in the given seed.

(b) Identify 'D'& 'C'.

(c) How is the arrangement of 'E' in the given picture different from that of bean seed?

23. How quantitative inheritance different from qualitative inheritance. Explain with example based on synthesis of globin chain molecule in blood.

24. (a) A garden pea plant bearing terminal, violet flowers, when crossed with another pea plant bearing axial, violet flowers, produced axial, violet flower and axial, white flowers in the ratio of 3:1. Work out the cross showing the genotypes of the parent pea plants and their progeny.

(b) Name and state the law that can be derived from this cross.

25. (a) According to Darwinian theory of natural selection the rate of appearance of new forms are linked to the life-cycle or the life-span of an organism. Explain with the help of an example.

(b) State a reason for the increased population of dark coloured moths with the loss of lichens (on tree barks) during industrialization period in England.

26. (a) Name two organisms belonging to two different kingdoms that are commonly used as biofertilizers.

(b) 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?

27. (a) While doing a PCR, 'denaturation' step is missed. What will be its effect on the process?

(b) For selection of recombinants, insertional inactivation of antibiotic marker has been superceded by insertional inactivation of a marker gene coding for a chromogenic substrate. Give reasons.

28. **ATTEMPT EITHER OPTION A OR B.**

A.

(i) Write the importance of measuring the size of a population in a habitat or an ecosystem.

(ii) Explain with the help of an example how the percentage cover is a more meaningful measure of population size than mere numbers.

OR

B.

(i) Predation is usually referred to as a detrimental association. State any three positive roles that a predator plays in an ecosystem.

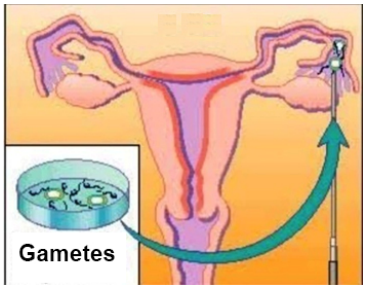
(ii) What is pseudocopulation. How it is exhibited explain with an example.

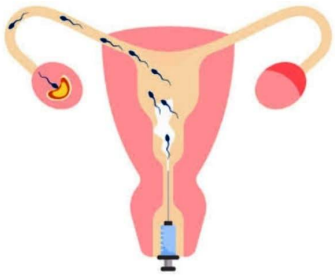
SECTION – D

29. Infertility could be explained as a problem in conceiving a baby by a couple, majorly caused by a medical issue faced by a person or both in the couple. A recent report published by the Indian Society of Assisted Reproduction (ISAR) has suggested that approximately 10-14% of Indian couples face this issue.

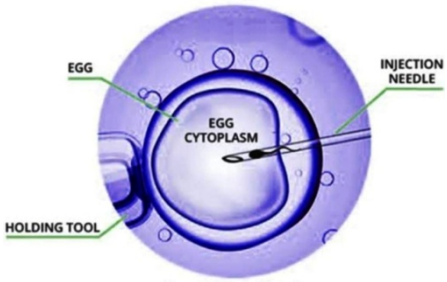
Infertility is a medical condition in which a couple faces issues conceiving a baby.

Some recent research has also said that it is a lifestyle growing day by day. Various medical technologies have come now to cope with these conditions, which could help to diagnose and correct treatment of some of these disorders and enable couples to have children.

(A) 

(B) 

(C)



(D)

(a) Identify the given methods / ART in the figure A, B, C, D.

Attempt either option subpart b or c.

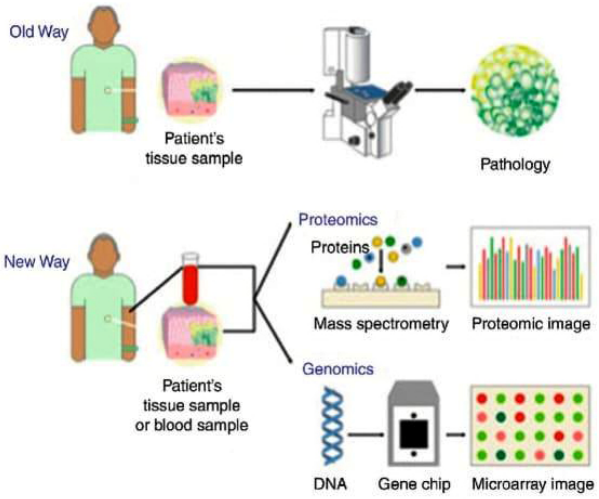
(b) Suggest and explain the assisted reproductive technique which will help a couple to have children where the female had a blockage in the fallopian tube and the male partner had a low sperm count.

OR

(c) Name & describe the technique that can help a healthy married woman who is unable to produce viable ova, but wants to bear a child.

(d) Give the major causes of infertility in couples.

30. The image below describes the molecular diagnostic procedures.



(a) Write any two biochemical molecular diagnostic procedure for early detection of viral infection.

Attempt either option subpart b or c.

(b) Which technique is used to detect gene mutation in case of suspected cancer patient & how this technique is used?

OR

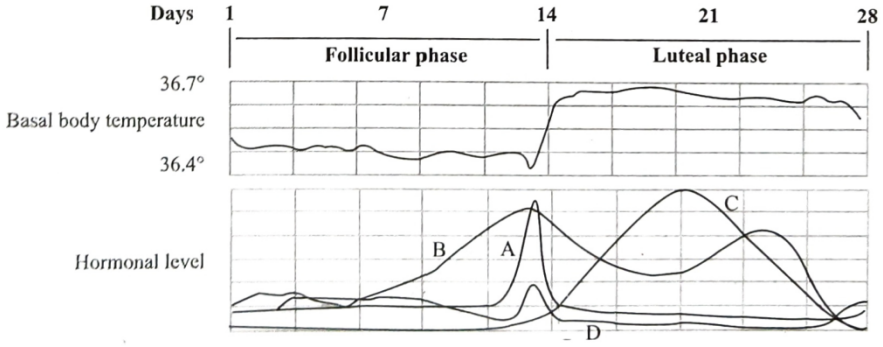
(c) Name and explain the technique that is based on the principles of antigen and antibody interaction. Can this technique be used in the molecular diagnosis of a genetic disorder, such as phenylketonuria?

(d) Name two human diseases that are being studied by transgenic model.

SECTION – E

31. **ATTEMPT EITHER OPTION A OR B.**

A. Maya has been trying to conceive for a few months. She started charting her basal body temperature and decided to undergo hormonal testing over the course of her menstrual cycle. The provided graph shows the hormonal changes and the basal body temperature during her menstrual period.



(i) How could a consistent high level of hormone A and low level of hormone D impact the menstrual cycle?

(ii) Observing the peak of hormone C after 14th day of menstruation cycle on Maya's graph, discuss the implications of sustained high levels of hormone C during early pregnancy stages. After reviewing Maya's graph, comment on the chances of her potential pregnancy.

OR

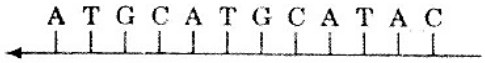
B. (i) Does self incompatibility impose any restrictions on autogamy? Give reasons and suggest the method of pollination in such plants.

(ii) In which plant groups is hydrophilic pollination commonly found, and how do the pollen grains of hydrophilic flowers protect themselves from water?

(iii) A guava has 200 viable seeds. How many total gametes are required to produce the above mentioned seeds?

32. (a) If there are 999 bases in RNA that codes for a protein with 333 amino acids and the base at position 901 is deleted then the length of RNA becomes 998 bases. How many codes will be altered.

(b) Construct a complete transcription unit with promoter and terminator on the basis of the hypothetical coding strand given below:



(c) State the function of ribozyme & release factor in protein synthesis respectively.

(d) Diagrammatically represent mRNA having sequence coding for serine & the anticodon of t-RNA for the same amino acid.

OR

(a) (i) During DNA replication what is the average rate of polymerization in *E.coli* & mention the time taken by *E.coli* for DNA replication.

(ii) What are the two functions of monomers (dNTPs)

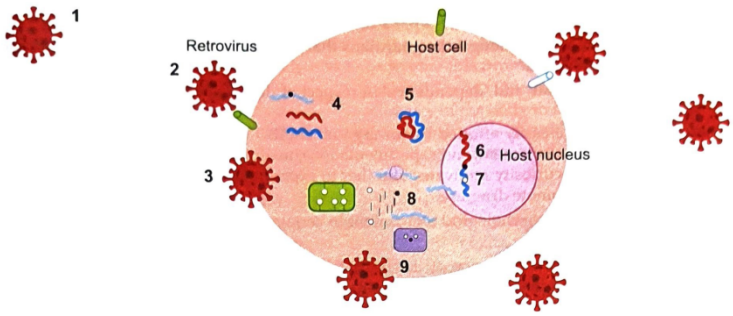
(b) During *invitro* synthesis of DNA a researcher used 2', 3'-dideoxycytidine triphosphate as raw nucleotide in place of 2'-deoxycytidine triphosphate, other conditions remaining as standard. Will further polymerisation of DNA continue up to the end or not? Explain.

(c) If Meselson and Stahl's experiment is continued for sixth generations in bacteria what would be the ratio of heavy strands ^{15}N / ^{15}N : hybrid ^{15}N / ^{14}N : Light ^{14}N / ^{14}N containing DNA in the sixth generation.

(d) What would happen if histones were to be mutated & made rich in acidic amino acid such as aspartic acid & glutamic acid in place of basic amino acids lysine & arginine?

33. (a) The image below represents the replication of a retrovirus.

In the image, steps 1- 5 depict different stages in the invasion of the retrovirus into the host cell and steps 6-9 show the invasion of the host DNA and the processes resulting out of it.



(i) Why does the retrovirus need to use reverse transcriptase to infect the host genome?

(ii) What is the significance of step 7 and 8 (after the viral genome enters the host nucleus) as shown in the diagram?

(b) All human beings have cellular oncogenes but only a few suffer from cancer disease. Give reasons.

(c) A person shows strong unusual hypersensitive reactions when exposed to certain substances present in the air, identify the condition. Name the cells responsible for such reactions. What precaution should be taken to avoid such reactions.

Or

(a) Why is tobacco smoking associated with rise in blood pressure and emphysema? Explain.

(b) Name the plant source of the drug popularly called "smack'. How does it affect the body of the abuser?

(c) Why docs a doctor administer tetanus antitoxin and not a tetanus vaccine to a child injured in a roadside accident with a bleeding wound? Explain.