PRE-BOARD-1 EXAMINATION 2025-26
BIOLOGY (044)

Class: XII Max. Marks:70
Date 10.11.25

SECTION-A

Q.no	Question	Marks
1.	B.2000	1
2.	D. Bagging and rebagging	1
3.	C. ii & iv	1
4.	B.100	1
5.	C. Sex determination in grasshopper	1
6.	C.5`-UUACGUACCGUG-3`	1
7.	A. Chromosome-1	1
8.	D. The leg mutation might lead to reproductive isolation and speciation due to an effect on the mating call.	1
9.	A. 23%	1
10.	B. Allergy	1
11.	B. Fix atmospheric nitrogen	1
12.	D. Consanguineous mating	1
13.	C. A is true but R is false.	1
14.	A. Both A and R are true, and R is the correct explanation of A.	1
15.	C. A is true but R is false.	1
16.	A. Both A and R are true, and R is the correct explanation of A.	1

SECTION-B

17. Fruit formed without fertilization = parthenocarpy**.**In banana: fruit develops parthenocarpically, no fertilization, seeds are undeveloped.In citrus: some varieties show parthenocarpic fruit set induced hormonally (auxin, gibberellin). 2

Or

In Zostera (sea grasses), pollination is hydrophily (water pollination)**.** Pollen grains are filamentous, drift in water, reach submerged stigmas.

18. Four salient observations from Human Genome Project: 2

1. ~20,000–25,000 protein-coding genes only.
2. Majority of genome is non-coding (introns, regulatory, repetitive).
3. High similarity between human individuals (~0.1 % variation).
4. Existence of many repetitive elements, pseudogenes, transposons.

19. Scientific name: *Papaver somniferum*. 2
Part used: Opium latex.
Effect on body: Bind opioid receptors → analgesia, euphoria, respiratory depression, sedation, addiction, slow gut motility, etc.

20. A.Cheese making is biotechnology because it uses microorganisms (lactic acid bacteria) and enzymes (e.g. rennet) to transform milk into cheese. 2

B.Insertional inactivation (blue/white screening) is preferred because it lets you visually distinguish recombinant vs non-recombinant colonies (white = insert disrupts lacZ) without needing multiple antibiotic plates

21. A. Inverted pyramid of biomass can occur when the primary producers have a very fast turnover so their standing biomass is low, while herbivores or higher trophic levels accumulate more biomass. Example: aquatic ecosystems with phytoplankton (low biomass at any instant) supporting larger biomass of zooplankton/fish. 2

ii) No. The pyramid of energy is always upright (cannot be inverted). Because with each trophic transfer, energy is lost (respiration, heat), so less energy is available at higher levels.

OR

B. i) Inverted pyramid
ii) No. The pyramid of energy is always upright (cannot be inverted). Because with each trophic transfer, energy is lost (respiration, heat), so less energy is available at higher levels.

SECTION-C

22. The mitotic division starts as the zygote moves through the isthmus of the oviduct called cleavage towards the uterus and forms 2, 4, 8, 16 daughter cells called blastomeres. The embryo with 8 to 16 blastomeres is called a morula.The blastomeres in the blastocyst are arranged into an outer layer called trophoblast and an inner group of cells attached to trophoblast called the inner cell mass. The trophoblast layer then gets attached to the endometrium and the inner cell mass gets differentiated as the embryo. After attachment, the uterine cells divide rapidly and covers the blastocyst. As a result, the blastocyst becomes embedded in the endometrium of the uterus.This is called implantation and it leads to pregnancy. 3

23. A. Amniocentesis 1
B. In amniocentesis some of the amniotic fluid of the developing foetus is taken to analyse the fetal cells and dissolved substances. This procedure is used to test for the presence of certain genetic disorders such as, down syndrome, haemophlilia, sickle-cell anemia, etc., determine the survivability of the foetus. 1
C. Government of India legalised MTP in 1971 with some strict conditions to avoid its misuse. Such restrictions are all the more important to check indiscriminate and illegal female foeticides which are reported to be high in India. 1

24. In an animal, assume that rough coat (R) is dominant over smooth coat (r) and the black (B) is dominant over white (b) Consider that these two pairs of alleles assort independently then: 3

i) 100% offspring from the cross RrBb X RRBB would be rough and black.
ii) 50%, progeny will be homozygous for both of the characters from the cross RrBB X rrBB

25. Darwin vs de Vries 3

1. Darwin emphasized natural selection acting on small variations; de Vries emphasized mutation as the main source of new traits.
2. Darwin's changes are gradual; de Vries allowed sudden jumps (saltations).
3. Darwin's mechanism is external (selection on variation), de Vries' is internal (mutation generates variation).

26. Sewage / biological treatment**:** After primary treatment, effluent goes to aeration tanks where microbes oxidize organic matter (activated sludge), then secondary settling to remove sludge, and finally disinfection or polishing before release. 3

27. (i) The scientific name of the nematode that infests tobacco plants is Meloidogyne incognita, and it infests the roots. (ii) Agrobacterium is used to introduce a gene into the tobacco plant that produces both sense and antisense RNA, which then forms a double-stranded RNA (dsRNA). This dsRNA triggers RNA interference (RNAi), silencing the nematode's essential genes and preventing the parasite from surviving in the plant. 3

28. i) 1950-Expanding: The population structure in 1950 exhibits a broad-based pyramid indicating a higher percentage of young individuals. This suggests a population with a higher birth rate. 1

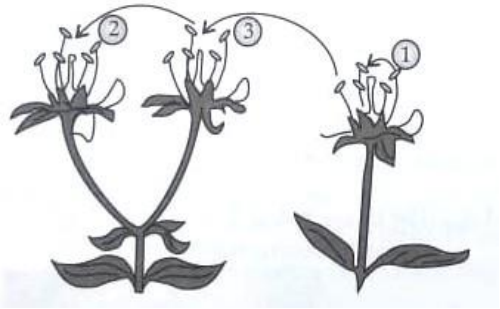
ii) 2007- Stable: The narrowing of the pyramid towards the top signifies a lower population of elderly individuals.Pre-reproductive and reproductive age nearly being the same. 1

iii) 2050-Declining: By 2050 inverted pyramid shows a declining population where birth rates are very less and the populations of elderly people will increase. 1

SECTION-D

29. Attempt either subpart C or D. 4

Study the diagram given below showing the modes of pollination. Answer the questions that follow.



A. (i) In the given diagram, method 1 is representing the "autogamy" type of pollen transfer as pollination is achieved within the same flower. Method 2 is representing "Geitonogamy", in which transfer of pollen grains from anther to stigma of another flower of the same plant occurs. Method 3 represents "Xenogamy", where transfer of pollen grains from anther to stigma of a different plant occurs.

B. In water lily, the flowers emerge above the level of water and are pollinated by insects or wind.
In Vallisneria, the female flower reaches the surface of water by the long stalk and male flowers or pollen grains are released on to surface of water. They are carried passively by water currents, some of them eventually reach the female flowers and the stigma.

C. One hereditary device is self-incompatibility, a genetic mechanism that prevents a plant's own pollen from fertilizing its ovules. One physiological device is dichogamy, where the male (pollen) and female (stigma) parts of a flower mature at different times, preventing self-pollination.
OR

D. Monosporic embryo sac development in angiosperms starts with a diploid megaspore mother cell (MMC) undergoing meiosis to produce four haploid megaspores, of which only one survives and develops into the embryo sac.

30. 4

A. Sporozoite.

B. Gametocyte formation and haemozoin formation.

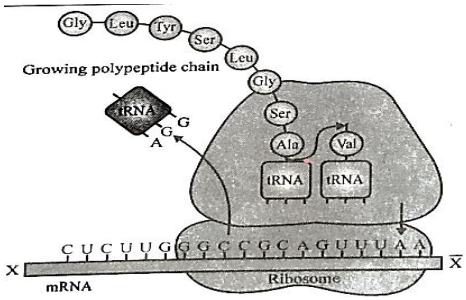
Attempt either option C or D.

C. Zygote formation
OR

D. Malaria, Haemozoin

SECTION-E

31. A. Study the schematic diagram given below and answer the questions that follow: 5



i) Translation of mRNA occurs in the 5' to 3' direction. Two more amino acids can be added to the polypeptide that is being translated because UAA is a stop codon..

ii) AUG is the initiating codon for translation, its anticodon is UAC and the amino acid it codes for is methionine.

iii) The charging of an adaptor molecule (tRNA) is the process where a specific amino acid is covalently attached to the 3' end of its corresponding tRNA molecule. This process is catalyzed by the enzyme aminoacyl-tRNA synthetase and requires ATP.
OR

B.i) The central dogma of molecular biology describes the flow of genetic information within a biological system. It states that information flows from DNA to RNA and then to

protein. This process includes DNA replication, transcription (DNA to RNA), and translation (RNA to protein).

ii) Transcription is the process of making an RNA copy from a DNA template, while translation is the process of synthesizing a protein from an mRNA template. Transcription occurs in the nucleus (eukaryotes) or cytoplasm (prokaryotes) with the help of RNA polymerase. Translation occurs on ribosomes in the cytoplasm.

iii) The sequence of amino acids that will be translated is Arginine-Threonine-Histidine-Leucine-Proline-Glycine-Valine-Proline-Proline-Leucine-Serine. The triplet codons that should be added to bring the end of translation at X are the stop codons, which are UAA**,** UAG, or UGA**.**

32. A. i) Farmers favor Bt cotton because it:Reduces pesticide use**:** Bt cotton requires fewer pesticide applications, leading to cost savings and reduced environmental impact. 5
Increases yield: By controlling bollworm infestations, Bt cotton often results in higher cotton yield.
Lowers cultivation costs**:** Fewer pesticide sprays reduce overall farming expenses.
(ii) Two insects killed by Bt toxin: lepidopterans (tobacco budworm, armyworm), coleopterans (beetles) and dipterans (flies, mosquitoes)Cotton bollworm
(iii) Bt toxin is harmless to the bacterium *Bacillus thuringiensis* because:Inactive form**:** The toxin is produced as an inactive crystalline form within the bacterium.
Activation in insect gut**:** When ingested by insects, the alkaline pH and digestive enzymes in their gut activate the toxin.
OR
B. i)To make bacterial cells competent for transformation:Calcium chloride treatment: Bacterial cells are exposed to a cold calcium chloride solution.
Increased membrane permeability**:** Calcium ions neutralize negative charges on the cell membrane, making it more permeable to DNA.
Heat shock: A brief heat shock facilitates the uptake of foreign DNA into the cells.
ii)Gel electrophoresis is used to separate DNA, RNA, or proteins based on size and charge:
Process: Samples are loaded into a gel matrix and subjected to an electric field.
Separation: Smaller molecules move faster through the gel, allowing size-based separation.
Importance**:** Essential for DNA fingerprinting, gene analysis, and protein studies.
(iii) Stain used in gel electrophoresis: Ethidium bromide It is visible under UV light.

33. A. India is one of the 12 mega biodiversity countries in the world. 5
i) India is considered mega-diverse due to its rich variety of ecosystems, species, and genetic diversity, resulting from its varied climate, topography, and geographical isolation.
ii) In-situ: Conservation within natural habitats. Examples include:Protected areas**:** National parks and wildlife sanctuaries.
Biosphere reserves: Areas designated for conservation and sustainable use.
Ex-situ**:** Conservation outside natural habitats. Examples include:
Botanical gardens**:** For conserving plant diversity.
iii) Protecting these species is crucial because:
Ecological balance**:** They play vital roles in their ecosystems.
Cultural value: Often hold significance in local traditions and cultures.
Scientific research: Provide insights into evolution and adaptation.
Economic benefits: Can contribute to ecotourism and sustainable use.
OR

B. i) Loss of biodiversity affects agriculture by:Reduced pollination**:** Leading to lower crop yields.
Increased pest outbreaks: Disrupting natural pest control.
Soil degradation**:** Affecting soil fertility and structure.
ii) Pollinators are essential for:Crop pollination**:** Ensuring the reproduction of many plants.
Biodiversity maintenance: Supporting the growth of diverse plant species.
Food production**:** Contributing to the availability of a variety of foods.
iii) Habitat preservation**:** Maintaining areas with wildflowers and native plants.
Crop rotation**:** Diversifying plant species to support pollinator populations.
Integrated pest management**:** Using biological control methods to reduce pesticide reliance.