CLASS XII – BIOLOGY
SET – 3

Section – A (1×16 = 16 Marks)

Q1–12: MCQs

1. In a typical angiosperm ovule, antipodal cells are located at:
A. Micropylar end
B. Chalazal end
C. Central cell
D. Funiculus

2. Acrosomal reaction in human sperm is triggered by:
A. Zona pellucida proteins
B. Estrogen
C. Progesterone
D. LH

3. DNA replication is semi-conservative because:
A. One strand is conserved
B. One parental and one newly synthesized strand form daughter DNA
C. Both strands are newly formed
D. Replication is discontinuous

4. In lac operon, repressor protein is coded by:
A. lacZ
B. lacY
C. lacA
D. lacI

5. Founder effect is a type of:
A. Mutation
B. Natural selection
C. Genetic drift
D. Gene flow

6. A codon UAA codes for:
A. Methionine
B. Tryptophan
C. Stop signal
D. Leucine

7. If frequency of allele A = 0.7, then frequency of aa under H-W equilibrium is:
A. 0.09
B. 0.21
C. 0.49
D. 0.30

8. Bt toxin acts by:
A. Blocking nerve transmission
B. Creating pores in midgut epithelium
C. Inhibiting protein synthesis
D. Preventing moulting

9. Ringworm is caused by:
A. Virus
B. Bacteria
C. Fungi
D. Protozoa

10. Restriction enzymes cut DNA at:
A. Random sites
B. Specific palindromic sequences
C. Promoter region only
D. Introns only

11. Ecological succession reaches climax when:
A. Maximum diversity achieved
B. Community becomes stable
C. Both A and B
D. Soil formation stops

12. Which ecosystem has highest net primary productivity per unit area?
A. Coral reefs
B. Desert
C. Open ocean
D. Grassland

Q13–16: Assertion & Reason

13.
Assertion: Genetic code is degenerate.
Reason: More than one codon codes for same amino acid.

14.
Assertion: Inbreeding increases homozygosity.
Reason: It allows expression of recessive deleterious alleles.

15.
Assertion: Primary treatment of sewage reduces BOD significantly.
Reason: Organic matter is decomposed by aerobic microbes.

16.
Assertion: RNAi technology is used to silence specific genes.
Reason: It prevents translation of mRNA.

Options same as previous sets.

Section – B (2×5 = 10 Marks)

17. Attempt either A or B

A. Explain microsporogenesis with labelled stages.
OR
B. Why are condoms considered dual protection devices?

18. Explain operon concept with diagram (lac operon).

19. Differentiate between stabilizing and directional selection with example.

20. Attempt either A or B

A. Explain vector and its essential features.
OR
B. Why is insertional inactivation preferred over antibiotic resistance screening?

21. Attempt either A or B

A. Construct energy pyramid if producers have 10,000 kcal.
OR
B. Explain ecological pyramids and state why pyramid of energy is always upright.

Section – C (3×7 = 21 Marks)

22. Describe oogenesis with diagram and mention meiotic arrest stages.

23. Genetic Cross Numerical (Very Tough)

In humans, widow's peak (W) is dominant over straight hairline (w), and free earlobe (E) is dominant over attached (e).

A man heterozygous for both traits marries a woman homozygous recessive for both.

(i) Write genotypes
(ii) Find phenotypic ratio
(iii) Probability of child with straight hairline and free earlobe

24. Explain divergent evolution and homologous organs with examples.

25. Describe steps of PCR and explain role of Taq polymerase.

26. Explain eutrophication and its ecological consequences.

27. Differentiate between primary and secondary immune response.

28. Explain exponential population growth with equation and graph.

Section – D (4×2 = 8 Marks)

29. Case Study – Blood Group Inheritance

A father has blood group AB and mother has blood group O.

A. Possible blood groups of children?
B. Genotypes involved?
C. Why is AB group called universal recipient?
D. What type of inheritance is shown in ABO system?

30. Case Study – Biotechnology in Agriculture

A farmer grows Bt cotton. After 5 years, pest resistance decreases.

A. Why does resistance develop?
B. What is refuge strategy?
C. How does Cry toxin kill insects?
D. Name gene responsible.

Section – E (5×3 = 15 Marks)

31.

A. Explain transcription in eukaryotes.
B. Describe post-transcriptional modifications.

OR

Explain translation with initiation, elongation and termination steps.

32.

A. Explain role of Agrobacterium tumefaciens in gene transfer.
B. Describe restriction enzymes and sticky ends.
C. Explain RNA interference mechanism.

OR

Explain formation of recombinant DNA using BamHI with diagram.

33.

Justify with suitable examples:

A. Competitive exclusion principle
B. Resource partitioning
C. Keystone species
D. 10% Law of Energy Transfer
E. First Law of Thermodynamics in ecosystem

OR

Explain why tropics show higher biodiversity than temperate regions.