CLASS XII – BIOLOGY

SET – 8

Section – A (1×16 = 16 Marks)

Q1–12: MCQs (HOTS Based)

1. In a typical 8-nucleate embryo sac, number of haploid nuclei contributing to endosperm formation is:
A. One
B. Two
C. Three
D. Four

2. A woman shows absence of LH surge. Which event will NOT occur?
A. Ovulation
B. Corpus luteum formation
C. Progesterone secretion
D. Follicular growth

3. If a DNA segment has 2400 base pairs, number of hydrogen bonds will be maximum when:
A. AT rich
B. GC rich
C. Equal AT and GC
D. Only AT

4. Which statement is correct about genetic code?
A. Overlapping
B. Commaless
C. Ambiguous
D. Species specific

5. A sudden migration of individuals into a small isolated population may cause:
A. Founder effect
B. Gene flow
C. Bottleneck
D. Genetic isolation

6. If p = 0.5, q = 0.5, frequency of heterozygotes under H-W equilibrium is:
A. 0.25
B. 0.5

C. 0.75
D. 1

7. RNAi technology specifically targets:
A. DNA replication
B. mRNA degradation
C. Protein folding
D. Ribosome synthesis

8. HIV primarily infects cells having receptor:
A. CD4
B. CD8
C. CD3
D. CD28

9. During PCR, exponential amplification occurs because:
A. DNA doubles each cycle
B. Primers degrade
C. Enzyme inactivates
D. DNA reduces

10. Which ecosystem shows inverted biomass pyramid?
A. Forest
B. Grassland
C. Pond
D. Desert

11. Keystone species removal will cause:
A. Minor disturbance
B. Collapse of ecosystem
C. Increased diversity
D. No change

12. Cry1Ac gene in Bt cotton targets:
A. Coleopterans
B. Lepidopterans
C. Dipterans
D. Nematodes

Q13–16: Assertion–Reason (Concept Integration)

13.
Assertion: Ovum is arrested at metaphase II until fertilisation.
Reason: Completion of meiosis requires sperm entry.

14.
Assertion: Degeneracy of genetic code reduces effect of mutations.
Reason: Multiple codons code for same amino acid.

15.
Assertion: Secondary treatment reduces BOD significantly.
Reason: Aerobic microbes oxidise organic matter.

16.
Assertion: Competitive exclusion does not allow coexistence of identical niches.
Reason: Two species competing for same resources cannot stably coexist.

(Options same as previous sets)

Section – B (2×5 = 10 Marks)

17. Attempt either A or B

A. Explain pollen–pistil interaction and its importance in preventing self-pollination.
OR
B. Differentiate between IVF and ICSI.

18. Explain Meselson and Stahl experiment with diagram and conclusion.

19. Advanced Hardy–Weinberg Numerical

In a population, 9% individuals are affected by recessive disorder.
Calculate:
(i) q
(ii) p
(iii) Carrier frequency

20. Attempt either A or B

A. Describe essential features of a good cloning vector.
OR
B. Explain gel electrophoresis with labelled diagram and principle.

21. Attempt either A or B

A. If producers capture 500,000 kcal energy, calculate energy at tertiary level using 10% law.

OR

B. Explain r and K selection strategies with ecological examples.

Section – C (3×7 = 21 Marks)

22. Describe oogenesis with stages of meiotic arrest and hormonal regulation.

23. Advanced Dihybrid Probability

In cross AaBb × aaBb

(i) Probability of aaBb
(ii) Probability of phenotype showing both dominant traits
(iii) Probability of offspring recessive for both

24. Explain convergent evolution with examples and distinguish from divergent evolution.

25. Describe process of recombinant DNA technology step-wise with diagram.

26. Explain eutrophication and biomagnification with real-life example.

27. Explain primary vs secondary immune response with graph interpretation.

28. Population Growth Numerical

Initial population (N_0) = 100
r = 0.4

Calculate population after 3 years using exponential growth formula.

Section – D (4×2 = 8 Marks)

29. Case Study – Sex Linked Trait

A carrier female marries a haemophilic male.

A. Possible genotypes of offspring
B. Probability of haemophilic daughter
C. Why is haemophilia more common in males?
D. Type of inheritance

30. Case Study – Environmental Biology

A lake near industrial area shows mass fish death.

A. What ecological phenomenon may have occurred?
B. Define BOD
C. How does high BOD affect aquatic life?
D. Suggest two preventive measures

Section – E (5×3 = 15 Marks)

31.

A. Explain DNA replication with enzymes and diagram.
B. Why is lagging strand synthesized discontinuously?

OR

Explain translation process with detailed steps and ribosome structure.

32.

A. Explain Agrobacterium-mediated transformation.
B. Describe restriction enzymes and sticky ends.
C. Explain RNA interference mechanism in pest resistance.

OR

Explain PCR with diagram and applications in forensic science.

33.

Justify with suitable examples:

A. Gause's competitive exclusion principle
B. Resource partitioning

C. Keystone species
D. 10% law of energy transfer
E. Latitudinal gradient of biodiversity

OR

Explain ecological pyramids with limitations and thermodynamic laws.