CLASS XII – BIOLOGY

SET – 7

Section – A (1×16 = 16 Marks)

Q1–12: MCQs

1. Syngamy occurs between:
A. Two polar nuclei
B. Egg and male gamete
C. Synergids and male gamete
D. Antipodals and male gamete

2. Corpus luteum secretes:
A. Estrogen only
B. Progesterone
C. LH
D. FSH

3. The direction of synthesis of new DNA strand is:
A. 3' → 5'
B. 5' → 3'
C. Both directions
D. Random

4. Inducer molecule in lac operon is:
A. Glucose
B. Lactose
C. Allolactose
D. Galactose

5. Variation introduced by mutation is:
A. Temporary
B. Heritable
C. Non-genetic
D. Environmental

6. The initiator codon is:
A. UAA
B. UAG
C. AUG
D. UGA

7. If frequency of recessive phenotype is 16%, value of q is:
A. 0.4
B. 0.16
C. 0.8
D. 0.2

8. AIDS is caused by:
A. Retrovirus
B. Bacteria
C. Fungus
D. Protozoa

9. Cry toxins are produced during which stage of bacterium?
A. Log phase
B. Stationary phase
C. Sporulation
D. Death phase

10. Which trophic level has maximum energy?
A. Secondary consumers
B. Primary consumers
C. Producers
D. Tertiary consumers

11. r-strategists generally show:
A. Long life span
B. Fewer offspring
C. High parental care
D. Rapid reproduction

12. Plasmids are:
A. Linear DNA
B. Circular extrachromosomal DNA
C. RNA molecules
D. Proteins

Q13–16: Assertion–Reason

13.
Assertion: Ovum completes meiosis II only after fertilisation.
Reason: Sperm entry triggers completion of meiosis.

14.
Assertion: Secondary immune response is stronger than primary.
Reason: Memory cells respond rapidly.

15.
Assertion: Genetic drift can lead to loss of alleles.
Reason: It is more significant in small populations.

16.
Assertion: Energy flow in ecosystem follows 10% law.
Reason: Most energy is lost as heat during metabolic activities.

(Options same as previous sets)

Section – B (2×5 = 10 Marks)

17. Attempt either A or B

A. Explain double fertilisation and mention its products.
OR
B. What are oral contraceptive pills? How do they prevent pregnancy?

18. Describe structure of tRNA and mention its role in translation.

19. Define gene frequency. How does natural selection affect it?

20. Attempt either A or B

A. Explain essential features of a cloning vector.
OR
B. Describe PCR and role of Taq polymerase.

21. Attempt either A or B

A. Construct pyramid of energy if producers fix 200,000 kcal.
OR
B. Explain logistic population growth with equation.

Section – C (3×7 = 21 Marks)

22. Describe menstrual cycle with hormonal control.

23. Dihybrid Cross Numerical

In peas, round (R) dominant over wrinkled (r), yellow (Y) dominant over green (y).
Cross RrYy × RrYy

(i) Phenotypic ratio
(ii) Probability of wrinkled green
(iii) Genotypic ratio

24. Explain Lamarck vs Darwin theory differences.

25. Describe process of transcription in prokaryotes.

26. Explain primary and secondary sewage treatment.

27. Differentiate between innate and acquired immunity.

28. Population Numerical

Initial population = 500
Growth rate (r) = 0.2

Calculate population after 3 years using exponential model.

Section – D (4×2 = 8 Marks)

29. Case Study – ABO Inheritance

Father: Blood group A (heterozygous)
Mother: Blood group B (heterozygous)

A. Possible blood groups of child
B. Probability of O blood group child
C. Type of inheritance
D. Why is AB universal recipient?

30. Case Study – Bt Cotton

A. What gene is inserted in Bt cotton?
B. From which organism?
C. How does it protect crop?
D. Why is refuge strategy important?

Section – E (5×3 = 15 Marks)

31.

A. Explain DNA replication with enzymes involved.
B. Why is replication semi-conservative?

OR

Explain translation in detail with steps.

32.

A. Explain Agrobacterium-mediated gene transfer.
B. What are restriction enzymes?
C. Explain RNA interference.

OR

Explain gel electrophoresis and its principle.

33.

Justify the following with examples:

A. Competitive exclusion principle
B. Resource partitioning
C. Keystone species
D. 10% Law
E. Latitudinal gradient of biodiversity

OR

Explain ecological pyramids with diagrams and limitations.