SET 2 – FULL ANSWER KEY

Section – A Answers (1×16 = 16 Marks)

1. **A** – Chalazal megaspore

2. **B** – Ovulation

3. **B** – Lagging strand synthesis

4. **C** – DNA ligase

5. **B** – Flippers of whale & forelimbs of horse

6. **C** – Transfer of alleles between populations

7. **C** – 50%

8. **A** – Bacillus thuringiensis

9. **C** – Lymph vessels

10. **C** – Reverse transcriptase

11. **C** – Tropical rainforest

12. **C** – One harmed, other unaffected

13. **A**

14. **A**

15. **A**

16. **A**

Section – B Answers (2×5 = 10 Marks)

17A. Double Fertilisation

Double fertilisation is unique to angiosperms.
• One male gamete fuses with egg → Zygote (2n)
• Other male gamete fuses with two polar nuclei → Primary endosperm nucleus (3n)

Significance:
• Ensures nourishment to embryo
• Efficient use of resources

OR

IUDs vs Oral Pills

IUDs	Oral Pills
Inserted in uterus	Taken orally
Long-term protection	Daily intake
Prevent implantation	Prevent ovulation

18. Sigma Factor

Sigma factor binds to RNA polymerase and helps it recognize promoter region.
It ensures correct initiation of transcription.

19. Genetic Drift & Bottleneck

Genetic drift = Random change in allele frequency.
Bottleneck effect = Sudden reduction in population leading to loss of genetic variation.

20A. PCR

PCR is called gene amplification technique because it produces millions of copies of desired DNA.

Steps:

1. Denaturation
2. Annealing
3. Extension

OR

Selectable marker = Gene used to identify transformants.
Example: ampR gene for ampicillin resistance.

21A. Inverted Biomass Pyramid

In aquatic ecosystem, phytoplankton biomass is less but turnover rate is high.
Thus biomass pyramid becomes inverted.

OR

Primary succession → Starts from bare rock
Secondary succession → Starts where soil already present

Section – C Answers (3×7 = 21 Marks)

22. Spermatogenesis

Occurs in seminiferous tubules.

Steps:
• Spermatogonia (2n)
• Primary spermatocyte (2n)
• Secondary spermatocyte (n)
• Spermatids (n)
• Spermatozoa (n)

Controlled by FSH, LH, Testosterone.

23. Incomplete Dominance (Snapdragon)

RR × rr

F1 = Rr (Pink)

F2 Phenotypic ratio = **1 Red : 2 Pink : 1 White**

Genotypic ratio = 1:2:1

24. Adaptive Radiation

Evolution of different species from common ancestor occupying different niches.
Example: Darwin's finches.

25. Recombinant DNA Formation

• Isolation of DNA
• Restriction digestion
• Ligation
• Transformation
• Selection

26. BOD

Biological Oxygen Demand = Amount of oxygen required by microbes to decompose organic matter.

High BOD → Oxygen depletion → Death of aquatic organisms.

27. Humoral vs Cell Mediated Immunity

Humoral → B cells → Antibodies
Cell mediated → T cells → Kill infected cells

28. Logistic Growth

Equation:
$$dN/dt = rN (K - N)/K$$

S-shaped curve
K = Carrying capacity

Section – D Answers (4×2 = 8 Marks)

29. Sickle Cell Anaemia

Type: Autosomal recessive

Parents: Both heterozygous (HbA HbS)

Probability next child normal = 25%

Common in malaria areas because heterozygotes resistant to malaria.

30. Urn Shaped Pyramid

Indicates declining population

Low birth rate
High old-age population

Economic burden due to ageing population

Corrective measure: Encourage higher birth rate

Section – E Answers (5×3 = 15 Marks)

31. DNA Replication

Semi-conservative
Enzymes: Helicase, Primase, DNA polymerase, Ligase

Lagging strand discontinuous due to opposite direction of template.

OR

tRNA structure: Clover leaf
Anticodon loop binds codon
Carries amino acid

32. Ti Plasmid & RNAi

Ti plasmid transfers gene into plant genome.

Restriction enzymes cut DNA at palindromic sites.

RNAi: dsRNA → mRNA degradation → Pest resistance.

33. Ecology Concepts

• Competitive exclusion → Gause experiment
• Resource partitioning → MacArthur's warblers
• Keystone species → Sea star (Pisaster)
• 10% law → Lindeman
• Energy pyramid always upright → Energy loss as heat