SET 5 – FULL ANSWER KEY

Section – A Answers (1×16 = 16 Marks)

1. **A** – Synergids
2. **A** – Oxytocin
3. **B** – Join Okazaki fragments
4. **A** – Primase
5. **C** – Bottleneck effect
6. **B** – Same codon codes for same amino acid
7. **B** – 25%
8. **A** – Bollworms
9. **B** – Antigen–antibody interaction
10. **A** – Tropical rainforest
11. **B** – Energy decreases at each trophic level
12. **C** – Thermus aquaticus
13. **A**
14. **A**
15. **A**
16. **A**

Section – B Answers (2×5 = 10 Marks)

17A. Significance of Double Fertilisation

• Formation of diploid zygote
• Formation of triploid endosperm
• Efficient use of nutrients
• Unique to angiosperms

OR

STDs: Sexually transmitted diseases

Examples:
• AIDS
• Syphilis

Prevention:
• Use of condoms
• Avoid multiple partners

18. Lac Operon (Presence of Lactose)

• Lactose converted to allolactose
• Allolactose binds repressor
• Repressor removed from operator
• Transcription of lac genes occurs

19. Gene Pool & Migration

Gene pool = Total genes and alleles in population

Migration introduces new alleles → Changes allele frequency → Disturbs equilibrium

20A. Restriction Enzymes

Restriction enzymes cut DNA at specific palindromic sequences.

Example: EcoRI

OR

Selectable marker = Gene used to identify transformed cells

Example: ampR gene

21A. Energy Pyramid

Producers = 50,000 kcal

Primary = 5,000 kcal
Secondary = 500 kcal
Tertiary = 50 kcal

Section – C Answers (3×7 = 21 Marks)

22. Menstrual Cycle

• Menstrual phase
• Follicular phase (FSH stimulates follicle)
• Ovulation (LH surge)
• Luteal phase (Progesterone secretion)

Hormonal control by FSH, LH, Estrogen, Progesterone

23. Monohybrid Cross

Yy × Yy

Genotypic ratio = 1 YY : 2 Yy : 1 yy

Phenotypic ratio = 3 Yellow : 1 Green

Probability of green = **1/4**

24. Darwin's Theory

• Variation
• Overproduction
• Struggle for existence
• Survival of fittest
• Natural selection

Example: Industrial melanism

25. PCR Steps

1. Denaturation
2. Annealing
3. Extension

Applications:
• DNA fingerprinting
• Disease diagnosis
• Forensic science

26. Eutrophication & Biomagnification

Eutrophication → Algal bloom → Oxygen depletion

Biomagnification → Increase in toxin concentration along food chain

Example: DDT accumulation

27. Innate vs Acquired Immunity

Innate:
- Present at birth
- Non-specific

Acquired:
- Develops after exposure
- Specific
- Memory cells formed

28. Logistic Growth

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

S-shaped curve

K = Carrying capacity

Section – D Answers (4×2 = 8 Marks)

29. ART Case

Blocked fallopian tube → IVF

IVF: Fertilisation outside body → Embryo transferred to uterus

ZIFT: Zygote transferred to fallopian tube

Limitation: Expensive and ethical issues

30. Insulin Production

Recombinant DNA = DNA formed by joining DNA from two organisms

Enzyme = DNA ligase

ori = Origin of replication

Insulin produced in bacteria via fermentation

Section – E Answers (5×3 = 15 Marks)

31. DNA Replication

- Semi-conservative
- Helicase
- Primase
- DNA polymerase
- Ligase

OR

Transcription in eukaryotes includes:

- Capping
- Tailing
- Splicing

32. Bt Cotton

Gene from Bacillus thuringiensis

Cry toxin forms pores in insect gut

Kills bollworms

33. Ecology Justification

- Competitive exclusion → Gause
- Resource partitioning → Warblers
- 10% law → Lindeman
- Keystone species → Sea star
- Tropics higher biodiversity → Stable climate