Quiz 5:

1. Which feature of plasmids is most critical in their role as vectors in gene cloning?

A) Their circular shape
B) The presence of virulence factors
C) Independent replication from chromosomal DNA
D) The ability to carry multiple antibiotic resistance genes
E) Their role in nitrogen fixation

2. Which type of mutation is most likely to give bacteria an advantage in antibiotic resistance without affecting other cellular functions?

A) Lethal mutation
B) Silent mutation
C) Frameshift mutation
D) Missense mutation
E) Nonsense mutation

3. During natural transformation in Gram-positive bacteria, which of the following is true regarding the DNA uptake process?

A) Double-stranded DNA is taken up and integrated
B) Single-stranded DNA is taken up and complementary strand is synthesized
C) Only plasmid DNA is taken up
D) RNA fragments are co-transported with DNA
E) DNA is incorporated without homologous recombination

4. Which of the following is NOT a requirement for bacterial conjugation?

A) F pilus
B) Competent recipient cells
C) Direct cell-to-cell contact
D) F plasmid
E) Mating bridge formation

5. In generalized transduction, what makes the defective phage incapable of lysing a new bacterial cell?

A) Lack of tail fibers for attachment
B) Presence of bacterial DNA instead of phage DNA
C) The phage genome being too large
D) Inability to form a prophage
E) Failure to infect the recipient cell

6. In Griffith's experiment with Pneumococcus, which of the following destroyed the ability of the smooth strain to transform the rough strain?

A) Lipid destruction
B) Protein degradation
C) DNA destruction
D) Carbohydrate removal
E) RNA degradation

7. Which of the following describes the process where bacterial DNA from one bacterium is transferred to another via a bacteriophage?

A) Transformation
B) Transduction
C) Conjugation
D) Horizontal gene transfer
E) Transposon insertion

8. Which type of bacteriophage is most likely to engage in lysogenic conversion?

A) Virulent phage
B) Defective phage
C) Temperate phage
D) Generalized transducing phage
E) Filamentous phage

9. In specialized transduction, what part of the bacteriophage cycle leads to the accidental transfer of bacterial DNA?

A) Adsorption of phage to host cell
B) Phage genome packaging
C) Integration into the host genome
D) Prophage induction
E) DNA replication of the host cell

10. Which process requires a competent bacterial cell to uptake naked DNA from its environment?

A) Conjugation
B) Transduction
C) Transformation
D) Transposition
E) Lysogeny

11. Which bacterial structure plays the most critical role in conjugation?

A) F pilus
B) Cell membrane proteins
C) Ribosome
D) DNA binding proteins
E) Flagella

12. What is the primary function of transposons in bacteria?

A) Encode antibiotic resistance genes
B) Facilitate homologous recombination
C) Mediate the direct transfer of plasmid DNA
D) Jump from one location in the genome to another
E) Produce enzymes to degrade toxins

13. Which of the following is true about the F+ cell in bacterial conjugation?

A) It lacks a fertility plasmid
B) It acts as the recipient in the transfer
C) It has a fertility factor that can initiate transfer to F– cells
D) It undergoes transformation to acquire new genes
E) It always forms defective phages during conjugation

14. In specialized transduction, which genes can be transferred between bacteria?

A) Any gene from the donor bacterium
B) Genes flanking the phage integration site
C) Plasmid-specific genes only
D) Ribosomal RNA genes
E) Genes located in transposons

15. Which of the following best describes the role of RecA protein in bacterial genetics?

A) It synthesizes new strands of DNA during replication
B) It mediates the exchange of DNA between donor and recipient cells during transformation
C) It inhibits conjugation in competent cells
D) It facilitates the lysis of bacteria during transduction
E) It repairs errors in plasmid replication

Answers:

1. C
2. B
3. B
4. B
5. B
6. C
7. B
8. C
9. D
10. C
11. A
12. D
13. C
14. B
15. B