



ELIZADE UNIVERSITY
ILARA-MOKIN

FACULTY: BASIC & APPLIED SCIENCES

DEPARTMENT: BIOLOGICAL SCIENCES

COURSE TITLE: MICROBIAL GENETICS AND MOLECULAR MICROBIOLOGY

COURSE CODE: MCB 407

LECTURER: DR ADEBAYO SHITTU

DURATION: 2¹/₂

HOD's SIGNATURE

NAME: MAT. No:

INSTRUCTIONS
ANSWER ALL QUESTIONS

SECTION 1:

Objective Questions

- Which of the following about base pairing in DNA is FALSE?
A. Purines base pair with pyrimidines. B. Adenine base pairs with Thymine.
C. Guanine base pairs with Adenine. D. Cytosine base pairs with Guanine. E. A and B
- When DNA is distributed to daughter cells following DNA replication:
A. both daughter cells contain only newly synthesized, daughter DNA.
B. one daughter cell contains both newly synthesized DNA strands, while the other daughter cell contains both the original, parental DNA strands.
C. the DNA in each daughter cell contains one original, parental DNA strand and one newly synthesized, daughter strand. D. A and C E. B and C
- The exact point where nucleotides are being added to growing daughter strands during DNA replication is called:
A. the origin. B. the double helix. C. the template. D. the replication fork.
- What is the function of transfer RNA?
A. It "transfers" the information encoded in a gene to a ribosome.
B. It forms part of a ribosome's structure.
C. It carries amino acids into a growing protein chain, as specified by codons in the messenger RNA.
D. It permits messenger RNA to detach from the ribosome when protein synthesis is complete.
- In the Lactose operon:
A. the genes in the operon are always expressed.
B. the genes in the operon are only expressed when lactose is present.
C. the genes in the operon are only expressed when lactose is absent.
D. the genes in the operon are never expressed.
- The expression of an individual's genes for a particular trait that results in the outward appearance of that individual is called the:
A. genotype. B. phenotype. C. genome. D. phenomics. E. genomics
- When a bacteriophage infects a bacterial cell, the newly synthesized bacteriophage may acquire bacterial DNA by mistake. If such a newly synthesized bacteriophage then infects a new bacterial cell, it may introduce foreign bacterial DNA into the new cell. This phenomenon is called:
A. sexual reproduction. B. transformation. C. transduction. D. conjugation.
- Ultraviolet light can cause mutations by:
A. forming intercalating agents. B. acting as a free radical. C. resulting in the formation of thymine-dimers.
D. acting as a non-free radical. E. changing a DNA nucleotide into a different DNA nucleotide.
- The proofreading activity of DNA polymerase:
A. is a feature of prokaryotic cells only. B. is a feature of eukaryotic cells only.
C. insures that very few mutations occur in the first place.
D. insures that if the wrong base is inserted during DNA replication, it will usually be removed and replaced. E. A and D
- In a nonsense mutation
 - a normal codon is converted to a stop codon
 - polypeptide elongation is aborted
 - protein formation is ended before whole protein could be made
 - it may or may not lead to serious phenotypic change
- Mutations are

1. changes in DNA base sequence 2. May produce altered protein
 3. often disadvantageous or lethal 4. May be neutral (unaltered protein)
 A. All are correct B. 1 & 2 C. 2 & 3 D. 1, 2 & 3 E. 1, 3 & 4
12. In Transcription & Translation in Prokaryotes
 1. mRNA made in cytoplasm 2. No introns to remove 3. it is monocistronic
 4. related genes are grouped in operons with single promoter
 A. All are correct B. 1, 2 & 4 C. 2 & 3 D. 1, 2 & 3 E. 1, 3 & 4
13. Inducers
1. regulate gene expression 2. turn on transcription 3. bind to and change the shape of repressor
 4. inducer-bound repressor can't bind to operator hence transcription occurs
 A. 1, 2 & 3 B. 1 & 2 C. 2 & 3 D. All are correct E. 1, 3 & 4
14. Repressors
1. involved in regulation of gene expression 2. bind to DNA & prevent transcription,
 3. repressor protein binds to operator (near promoter) 4. Prevents transcription
 A. 1 & 2 B. All are correct C. 2 & 3 D. 1, 2 & 3 E. 1, 3 & 4
15. Identify which of the following statements regarding fertility plasmids is *incorrect*.
- A. Bacteria possessing the F plasmid are called F⁺ and they synthesize a sex pilus.
 B. F plasmids replicate by the bidirectional, dual replication fork pathway starting from a single origin of replication.
 C. Conjugation between an F⁻ bacterium and an F⁻ one is an example of horizontal gene transfer.
 D. Because F plasmids are self-transmissible, they can mediate both mobilization and conjugation.
 E. Hfr cells have F plasmids integrated into the host cell chromosome.
16. Which explanation best describes the difference between Hfr versus F' cells?
- A. In Hfr cells, the F plasmid integrates into the *E. coli* chromosome and disrupts essential genes, while F' cells integrate at locations that are non-lethal.
 B. In Hfr cells, the F plasmid has replicated to a large size through rolling circle replication, but in F' cells, the F plasmid has reduced in size owing to a large deletion which inhibits the cell's ability to undergo conjugal transfer.
 C. In Hfr cells, the F plasmid is integrated in the *E. coli* chromosome and the entire *E. coli* chromosome can be transferred to an F⁻ cell during conjugal transfer, but in F' cells the F plasmid has left the *E. coli* genome taking a small segment of juxtaposed bacterial DNA during the excision process, which can be transferred to F⁻ cells.
 D. none of the listed
17. Why must the lagging strand of DNA be replicated in short pieces?
- A. because of limited space B. otherwise, the helix will become distorted C. none of the listed
 D. to make proofreading of code easier E. DNA polymerase can synthesize in only one direction
18. Which of the following is *mismatched*?
- A. Transformation: uptake of DNA directly from local environment
 B. Prophage: bacteriophage genome integrates into host's chromosome
 C. Vertical transfer: spread of antibiotic resistance between bacterial species by uptake of plasmids encoding drug-resistance genes
 D. Conjugation: sex pilus
 E. Transduction: packaging of small fragments of bacterial chromosomes into virus particles
19. What is the function of transfer RNA?
- A. It "transfers" the information encoded in a gene to a ribosome.
 B. It forms part of a ribosome's structure.
 C. It carries amino acids into a growing protein chain, as specified by codons in the messenger RNA.
 D. It permits messenger RNA to detach from the ribosome when protein synthesis is complete.
20. In translation

5. Describe the process of tautomerism, depurination and deamination (with a figure each) in spontaneous mutation.
6. Why are restriction enzymes useful in biotechnology? Describe three general uses of genetically engineered bacteria. Outline 5 IMPORTANT factors in ensuring quality control in a Polymerase Chain Reaction (PCR). Mention (with examples) the limitations of PCR-based techniques.