Molecular Genetics Formative Quiz

(LEC 1-12)

1. A gene is best defined as:
A. Any sequence coding for proteins
B. A DNA segment that encodes a functional product
C. Any repetitive DNA region
D. Only exons within DNA
E. A chromosome region without regulation

2. Which genetic structure physically carries genes?
A. RNA
B. Chromosomes
C. Ribosomes
D. Histones
E. Nucleotides

3. Histones are:
A. RNA-binding proteins
B. DNA repair enzymes
C. Structural proteins organizing DNA
D. Ribosomal proteins
E. Lipid molecules

4. Which chromosome region protects ends?
A. Centromere
B. Telomere
C. Origin
D. Enhancer
E. Promoter

5. A genome includes:
A. Only genes
B. Coding sequences only
C. All genetic material
D. Only introns
E. Only regulatory DNA

6. The diploid number of chromosomes in a human skin cell is:
A. 12.5
B. 23

C. 46
D. 48
E. 92

7. What is the structure that holds the sister chromatids together called?
A. Homologous chromosome
B. Centromere
C. Chromatid
D. Chromatin
E. Mitotic spindle

8. Which enzyme is used in the unwinding of DNA?
A. Ligase
B. Topoisomerase
C. Helicase
D. Exonuclease
E. DNA polymerase

9. Enzymes that regulate the process of supercoiling are termed:
A. DNA helicases
B. RNA polymerase
C. Topoisomerases
D. Nucleases
E. DNA polymerases

10. The 5' and 3' numbers are related to the:
A. Length of the DNA strand
B. Carbon number in sugar
C. The number of phosphates
D. The base pair rule
E. Nitrogen base

11. The role of primase is to:
A. Break up RNA primer
B. Unwind DNA ahead of fork
C. Proofread base pairing
D. Synthesize an RNA primer
E. Remove supercoiling

12. 30 nm wide helix with five or six nucleosomes per helix is known as:
A. Halonoid

B. Kinoplast
C. Solenoid
D. Rosette
E. Loops

13. Okazaki fragments occur on the ..... and are bonded together by .....
A. Leading strand, polymerase
B. mRNA, anticodons
C. Lagging strand, ligase
D. tRNA, ligase
E. tRNA, polymerase

14. The promoter sequence in transcription is recognized by:
A. DNA binding protein
B. DNA polymerase
C. RNA polymerase
D. Rho factor
E. Single strand binding protein

15. Proofreading of DNA polymerase is important to:
A. Form replication fork
B. Remove primer
C. Initiate replication
D. Terminate replication
E. Remove mismatched base

16. Non-coding sequences in a gene are known as:
A. Cistron
B. Intron
C. Exon
D. Telomere
E. Caps

17. Post-translational processing of proteins include:
A. Trimming
B. Translocation
C. Splicing
D. 5' capping
E. Polyadenylation

18. Gene which can express itself and hide expression of another gene is called:
A. Dominant gene
B. Recessive gene
C. Expressive gene
D. Multiple gene
E. Codominance

19. The first step in translation is:
A. Binding of two ribosomal subunits
B. Binding of mRNA to two ribosomal subunits
C. Binding of tRNA to small subunit
D. Binding of mRNA to small ribosomal subunit
E. Binding of tRNA to ribosomal subunits

20. The type of bond that holds nucleotides in RNA molecule is:
A. Hydrogen bond
B. Sulphur bond
C. Glycosidic bond
D. Triphosphate bond
E. Phosphodiester bond

21. The DNA between nucleosomes is referred to as:
A. Free DNA
B. Linker DNA
C. Loose DNA
D. Weak DNA
E. Relaxed DNA

22. Which nucleotide acts as second messenger for hormone?
A. UDP
B. SAM
C. PAPS
D. cAMP
E. AMP

23. One of the following is not present in DNA:
A. Thymine
B. Uracil
C. Guanine

D. Adenine
E. Xanthine

24. The sugar in RNA backbone is:
A. Sucrose
B. Deoxyribose
C. Fructose
D. Ribose
E. Glucose

25. The enzyme responsible for unwinding DNA is:
A. Primase
B. Polymerase
C. Helicase
D. Ligase
E. Topoisomerase

26. DNA polymerase synthesizes:
A. DNA in 5'→3' direction
B. DNA in 3'→5' direction
C. mRNA in 3'→5' direction
D. mRNA in 5'→3' direction
E. tRNA in 5'→3' direction

27. Which nucleotide is used for activation of glucose?
A. ADP
B. CDP
C. UDP
D. IDP
E. GTP

28. The replication bubble is formed by the action of:
A. RNA helicase
B. Primase
C. DNA helicase
D. DNA polymerase
E. RNA polymerase

29. The lagging strand has the following character:
A. Synthesized by DNA polymerase ε
B. Synthesized continuously

C. Formed as Okazaki fragment
D. Synthesized toward replication fork
E. Needs one primer only

30. The “ori” of replication is:
A. Site where replication starts
B. Site preventing initiation
C. Random DNA location
D. Termination site
E. Protein complex

31. The origin of replication has the following character:
A. AT-rich sequence
B. Single in eukaryotes
C. GC-rich sequence
D. Identified by DNA polymerase
E. Identified by transcription factors

32. Cutting out introns and joining exons is known as:
A. Capping
B. Splicing
C. Tailing
D. Elongation
E. Translation

33. The 5’ end of mRNA is modified by:
A. Poly-A tail
B. Introns
C. CCA sequence
D. Methylated guanine cap
E. Acetylated guanine

34. Which molecule carries amino acids to ribosomes?
A. rRNA
B. DNA
C. tRNA
D. mRNA
E. snRNA

35. Histone acetylation:
A. Silences genes

B. Activates transcription
C. Destroys DNA
D. Stops replication
E. Causes mutation

36. DNA is wrapped around histones forming:
A. Ribosomes
B. Chromatin
C. mRNA
D. Enzymes
E. Lipids

37. Leading strand is synthesized:
A. Discontinuously
B. Continuously
C. Randomly
D. Backwards
E. Independently

38. Telomerase contains:
A. DNA template
B. RNA template
C. Protein only
D. Lipid
E. Enzyme only

39. Telomere shortening leads to:
A. Cancer
B. Aging
C. Increased replication
D. Mutation repair
E. Protein synthesis

40. Anticodon is found in:
A. mRNA
B. tRNA
C. rRNA
D. DNA
E. Protein

41. Stop codons include:
A. AUG
B. UAA
C. GGG
D. CCC
E. AAA

42. The genetic code is universal means:
A. Same in most organisms
B. Same in DNA only
C. Same in RNA only
D. Same in proteins
E. Same in bacteria only

43. Which RNA polymerase synthesizes pre-rRNA (28S, 18S, 5.8S)?
A. RNA polymerase I
B. RNA polymerase II
C. RNA polymerase III
D. Mitochondrial polymerase
E. Reverse transcriptase

44. Alternative splicing primarily contributes to:
A. DNA replication
B. Protein diversity
C. Chromatin condensation
D. RNA degradation
E. Translation initiation

45. Initiator tRNA differs because it:
A. Binds A site
B. Carries methionine (or fMet)
C. Has no anticodon
D. Binds stop codon
E. Is degraded early

46. Which step requires GTP hydrolysis during elongation?
A. tRNA charging
B. Ribosome assembly
C. Translocation

D. mRNA capping
E. Splicing

47. During translation, amino acid addition depends on:
A. Codon on mRNA and anticodon on rRNA
B. Anticodon on mRNA and anticodon on tRNA
C. Anticodon on rRNA and codon on mRNA
D. Codon on mRNA and anticodon on tRNA
E. Codon on tRNA and anticodon on ribosome

48. Glycosylation of proteins mainly occurs in:
A. Nucleus
B. Cytosol
C. ER and Golgi
D. Mitochondria
E. Ribosome

49. The lac operon is induced in presence of:
A. Glucose
B. Lactose
C. cAMP absence
D. Repressor binding
E. ATP depletion

50. The trp operon is:
A. Inducible
B. Repressible
C. Constitutive
D. Silent
E. Mutated

51. Operator region binds:
A. RNA polymerase
B. Repressor protein
C. Ribosome
D. tRNA
E. DNA ligase

52. When glucose is low, lac operon transcription is:
A. Decreased
B. Increased

C. Unchanged
D. Blocked
E. Random

53. DNA methylation generally leads to:
A. Gene activation
B. Gene silencing
C. Increased translation
D. RNA stability
E. Protein degradation

54. Histone deacetylation results in:
A. Open chromatin
B. Closed chromatin
C. Increased transcription
D. DNA replication
E. RNA synthesis

55. Peptide bond formation during translation is catalyzed by:
A. Peptidyl transferase
B. Aminoacyl-tRNA synthetase
C. Peptide polymerase
D. Peptidyl synthetase
E. Endopeptidase