Department: Biotechnology
Class: S.Y.B.Sc.
Semester: III
Subject: Molecular Biology
Sample Questions

Multiple Choice Questions

1. There are _____ main types of RNA molecules.
    a. Two
    b. Three
    c. Four
    d. Five

2. The _____with ribosomal proteins, makes up the ribosomes.
    a. mRNA
    b. rRNA
    c. tRNA
    d. snRNA

3. The _____ brings amino acids to ribosomes during translation.
    a. mRNA
    b. rRNA
    c. tRNA
    d. snRNA

4. RNA polymerase catalyzes the process of _____.
    a. Translation
    b. Transcription
    c. RNA Editing
    d. RNA Processing

5. A bacterial gene can be divided into _____ sequences.
    a. One
    b. Two
    c. Three
    d. Four

6. The consensus sequence at -10 region of sequence 5'-TTGACA-3 called as the _____.
    a. TATA box

b. Pribnow box
c. GC box
d. Goldberg-Hogness box

7. Initiation of transcription in _____ gene requires a RNA polymerase called the holoenzyme.
   a. Prokaryotic
   b. Eukaryotic
   c. Higher plant
   d. Higher animal

8. The holoenzyme untwists the DNA in the _____.
   a. -35 region
   b. -10 region
   c. -90 region
   d. -25 region

9. The untwisted form of the promoter is called the_____.
   a. closed promoter complex
   b. open promoter complex
   c. closed initiation complex
   d. open initiation complex

10. The sigma factor of the holoenzyme contacts the promoter directly at the _____.
    a. -55 to+20 sequences
    b. -50 to-200
    c. -35 and-10 sequences
    d. -90

11. RNA polymerase is contacting about 75 bp of the DNA from _____.
    a. -55 to+20
    b. -50 to-200
    c. -35 and-10 sequences
    d. -90

12. A molecular weight of a sigma factor in *E. coli* is _____.
    a. 70,000 Da
    b. 50,000 Da
    c. 35,000 Da
    d. 75,000 Da

13. Prokaryotic RNA polymerase has _____ proofreading activities.
    a. One
    b. Two
    c. Three
    d. Four

14. The termination of bacterial gene transcription is signaled by _____ sequences.
    a. Promoter
    b. Enhancer
    c. Terminator
    d. Activator

15. Rho is a _____ enzyme, it can unwind double-stranded nucleic acids.
    a. Polymerase
    b. Helicase
    c. Exonuclease
    d. DNAse

16. Eukaryotes possess _____ different classes of RNA polymerases
    a. One
    b. Two
    c. Three
    d. Four

17. _____ is located in nucleolus and synthesizes 28S, 18S, and 5.8S rRNA.
    a. RNA polymerase
    b. RNA polymerase III
    c. RNA polymerase II
    d. RNA polymerase I

18. _____ is located in nucleoplasm and synthesizes mRNAs and snRNAs.
    a. RNA polymerase
    b. RNA polymerase I
    c. RNA polymerase II
    d. RNA polymerase III

19. _____ is located in nucleoplasm and synthesizes tRNAs, 5S rRNA, snRNAs.
    a. RNA polymerase
    b. RNA polymerase I

c. RNA polymerase II
d. RNA polymerase III

20. The core promoter element _____ also called the Goldberg-Hogness box is located at about position-30.
    a. TATA box
    b. Pribnow box
    c. GC box
    d. AT box

21. The sequence of GC box is_____.
    a. GGCCC
    b. GGGCC
    c. GGGCG
    d. GGCCG

22. The housekeeping genes are recognized by _____.
    a. Promoters
    b. Activators
    c. Enhancers
    d. Terminators

23. The _____ are required for the maximal transcription of a gene.
    a. Promoters
    b. Activators
    c. Enhancers
    d. Terminators

24. Eukaryotic transcription initiation requires RNA Polymerase II and _____.
    a. General Factors (GFs)
    b. General Transcription Factors (GTFs)
    c. General Initiation Factors (GIFs)
    d. Transcription Factors (TFs)

25. In TFIID, number II indicates that _____.
    a. It is second transcription factor discovered
    b. It works with RNA polymerase II
    c. It has two roles in transcription
    d. It has no particular meaning

26. _____has helicase like activity that unwinds the promoter DNA.
    a. TFIID
    b. TFIIB
    c. TFIIE
    d. TFIIH

27. The _____ in mRNA specifies the amino acid sequence of a protein during translation.
    a. 5‘ UTR/ a leader sequence
    b. Protein-coding sequence
    c. 3' UTR/ a trailer sequence
    d. Consensus sequence

28. The enzyme involved in 5’ capping is _____.
    a. RNA Polymerase
    b. capping enzyme
    c. poly(A) polymerase
    d. Exonuclease

29. Poly (A) binding protein II (PABII) molecules bind to the _____as it is synthesized.
    a. poly(A) tail
    b. RNA transcript
    c. DNA template
    d. 5’ cap

30. A sequence that is not translated into an amino acid sequence is called as_____.
    a. Intron
    b. Exon
    c. DNA
    d. RNA

31. Which of the following is not step of mRNA processing?
    a. 5’ capping
    b. Splicing of introns
    c. Polyadenylation
    d. RNA silencing

32. Introns in pre-mRNAs are removed and exons joined in the nucleus by_____.
    a. Transcription
    b. Translation

c. mRNA editing
d. mRNA splicing

33. the active spliceosome is consist of _____.
a. U1, U2,U4 and U6
b. U1, U2,U5 and U6
c. U1, U2,U3 and U6
d. U1, U3,U4 and U6

34. A _____ is involved in the process of RNA Editing.
a. mRNA
b. tRNA
c. snRNA
d. guide RNA (gRNA)

35. Which of the following is not the characteristic of Genetic code?
a. It is a triplet code
b. It has comma
c. It is non-overlaping
d. It shows degeneracy

36. In both eukaryotes and prokaryotes, _____ is always the start codon for protein synthesis.
a. UAG
b. UAA
c. UGA
d. AUG

37. Amber is a termination codon represented by triplet codon in RNA.
a. UUG
b. AGU
c. UAG
d. UGA

38. The 20 different amino acids in the protein are coded by
a. 60 codons
b. 61 codons
c. 62 codons
d. 63 codons

39. Only 61 of the 64 codons specify amino acids; these codons are called _____ codons.

a. Initiator
b. Antisense
c. Sense
d. Non-sense

40. Stop codons are used to specify the end of _____ of a polypeptide chain.
a. Transcription
b. Translation
c. Modification
d. Sorting

41. The ____-base of the anticodon can wobble.
a. 3’
b. 5’
c. -3
d. -5

42. Polypeptide synthesis takes place on _____.
a. Ribosomes
b. DNA
c. RNA
d. Nucleus

43. Eukaryotic tRNA genes are transcribed by RNA polymerase_____.
a. I
b. II
c. III
d. IV

44. The nucleotide sequences of all tRNAs can be arranged into structure called as a _____.
a. Hairpin loop
b. Lariat
c. Cloverleaf
d. Stem

45. In tRNA _____ contains three nucleotide anticodon sequence.
a. loop I
b. loop II
c. loop III

d. loop IV

46. All tRNA molecules have the sequence _____ at their 3' ends.
    a. 5'-CCA-3'
    b. 5'-CAA-3'
    c. 5'-ACA-3'
    d. 5'-CCC-3'

47. The mRNA codon recognizes the tRNA anticodon and not the amino acid carried by the tRNA
    a. tRNA anticodon
    b. tRNA codon
    c. mRNA anticodon
    d. tRNA

48. Aminoacylation uses energy from ____hydrolysis.
    a. CTP
    b. GTP
    c. ATP
    d. TTP

49. The correct amino acid is attached to the tRNA by an enzyme called _____.
    a. aminoacyl–tRNA synthase
    b. tRNA synthase
    c. aminoacyl–tRNA synthetase
    d. tRNA synthetase

50. The process of addition of amino acid on tRNA is called_____, or charging, and produces an aminoacyl–tRNA.
    a. Acetylation
    b. Aminoacylation
    c. Amination
    d. Acylation

51. The bacterial ribosome has a size of 70S and consists of two subunits of sizes 50S (large subunit) and 30S.
    a. 80S
    b. 70S
    c. 60S
    d. 50S

52. Eukaryotic ribosomes have a size of 80S and consist of a large 60S subunit and a small 40S subunit.
    a. 50S and 30S
    b. 50S and 40S
    c. 60S and 40S
    d. 60S and 30S

53. In prokaryotes, the first amino acid in the polypeptide chain is _____.
    a. Methionine
    b. N-methyl methionine
    c. N-formyl methionine
    d. C-formyl methionine
54. Which of the following is not required in the initiation of translation?
    a. mRNA molecule,
    b. a ribosome,
    c. a specific initiator tRNA
    d. spliceosome

55. In bacteria, the initiator tRNA is_____.
    a. tRNA.Met
    b. tRNA.fMet
    c. rRNA.fMet
    d. mRNA.fMet

56. The mRNA RBS region is commonly known as the _____.
    a. Pribnow sequence
    b. TATA sequence
    c. Kozak sequence
    d. Shine–Dalgarno sequence

57. Then the enzyme _____ adds the formyl group to the methionine.
    a. aminoacyl–tRNA synthetase
    b. transformylase
    c. formylase
    d. formyltransferase

58. Polysomes are _____
    a. aggregation of ribosome
    b. aggregation of lysosomes

c. mRNA molecules to which many ribosomes are attached simultaneously
d. aggregation of mRNA

59. Elongation requires accessory protein factors, called _____.
    a. Initiation factors
    b. Elongation factors
    c. Cap-binding protein
    d. Accessory proteins

60. Which of the elongation factor binds to amino acyl tRNA?
    a. EF-Tu
    b. EF-G
    c. GDP
    d. EF-Ts

61. The elongation factor in eukaryotes is _____ which functions like bacterial EF-G.
    a. EF-1
    b. EF-2
    c. eEF-1
    d. eEF-2

62. The bond between the amino acid and the tRNA in the P site is cleaved by the enzyme _____.
    a. aminoacyl–tRNA synthetase
    b. transformylase
    c. peptidyl transferase
    d. polymerase

63. In the last step in the elongation cycle, _____the ribosome moves one codon along the mRNA toward the 3' end.
    a. Initiation
    b. Elongation
    c. Translocation
    d. Termination

64. Translocation is the last step in _____.
    a. Initiation
    b. Elongation
    c. Termination
    d. Translation

65. In protein synthesis, translocation is initiated with the movement of _____.
    a. tRNA from P-site to the A-site
    b. dipeptidyl tRNA from A-site to P-site
    c. tRNA from A-site to P-site
    d. tRNA from P-site to E-site

66. The sorting of proteins to their appropriate compartments is controlled by _____ sequences.
    a. Trailer sequence
    b. Leader/signal sequence
    c. Kozak sequence
    d. UTR sequence

67. The signal sequence is removed from the polypeptide by the enzyme _____.
    a. transformylase
    b. peptidyl transferase
    c. translocase
    d. signal peptidase

68. The phenomenon where one metabolite represses the catabolism of another metabolite is known as _____.
    a. Tryptophan operon
    b. Catabolite repression
    c. Lac operon
    d. Positive regulation

69. If the _____ protein dominates the lytic pathway is followed, by producing progeny phages and lysing the host cells.
    a. O
    b. N
    c. cI
    d. CRO

70. _____ is a 162 base pair region found between the promoter-operator and trp E.
    a. trp D
    b. trp A
    c. trp B
    d. trp L

71. The phage DNA integration into host chromosome is mediated by Int protein, product of ____ gene.
    a. ipt
    b. int
    c. N
    d. O

72. Name the enzyme synthesized by *trp A* gene
    a. β-galactosidase
    b. Tryptophan synthatase β
    c. Permease
    d. Tryptophan synthatase α

73. Tryptophan acts as _____.
    a. Repressor
    b. Inducer
    c. Activator
    d. Regulator

74. Regulation by means of a bound activator protein that facilitates transcription is called as _____ regulation.
    a. Positive
    b. Negative
    c. Active
    d. Inactive

75. _____ mutation refers to chain terminating and it results in premature chain termination of protein synthesis.

    a. Missense
    b. Nonsense
    c. Point
    d. Frameshift

76. _____ inhibits lac operon.
    a. Lactose
    b. Glucose
    c. Tryptophan
    d. cAMP

77. Name the enzyme synthesized by *lac* y gene
   a. β-galactosidase
   b. Glucose
   c. Permease
   d. Transacetylase

78. The two lacI genes are located on different chromosomes the $lacI^{+}$ is said to be _____ to $lacI^{-}$
   a. Co-dominance
   b. Trans-dominance
   c. Dominant
   d. cis-dominance

79. _____ is needed for the active transport of lactose from the growth medium into the cell.
   a. β-galactosidase
   b. Glucose
   c. Permease
   d. Transacetylase

80. The process of RNA inactivation by siRNAs is termed as _____.
   a. RNA silencing
   b. Short RNA inactivation
   c. RNA interference
   d. RNA disfunction

81. The sequence of the structural genes in the lac operon is _____.
   a. lacA-lacZ-lacY
   b. lacZ-lacY-lacA
   c. lacZ-lacA-lacY
   d. lacA-lacY-lacZ

82. If lactose and glucose are provided in the growth medium of culture of *E. coli*_____.
   a. Lactose operon is not transcribed
   b. Lactose metabolism is favored
   c. Both lactose and glucose are metabolized at same rate
   d. Adenylate cyclase is activated

83. Lac repressor dissociates from its operator when the repressor binds to _____.
   a. Promoter
   b. Inducer
   c. Catabolite activator site
   d. Lac z

84. The lactose repressor is encoded by _____.
   a. Lac-I
   b. Lac- A
   c. Lac-Y
   d. Lac-Z

85. Lac operon will be turned on when _____.
   a. Lactose is less than glucose
   b. Lactose is less than in the medium
   c. Glucose is enough in medium
   d. Lactose is more than glucose

86. Which of these acts as an inducer of the lac operon?
   a. Lactose
   b. Allolactose
   c. Glucose
   d. Galactose

87. _____ contain one copy each of two different polypeptides.
   a. Heterodimers
   b. Homodimers
   c. RNA polymerase
   d. DNA

88. A _____ is a large multiprotein complex that does not bind directly to DNA, but participates in the activation of transcription by interacting both with activators and with GTFs.
   a. Repressor
   b. Promoter
   c. Coactivators
   d. RNA polymerse

89. In mice H19 and Igf2 genes are controlled by the same enhancer. Which of the following is true?
    a. The enhancer enhances both the gene on promoter binding
    b. In one chromosome both the genes are expressed and in other they are not
    c. Igf2 shows paternal imprinting, H19 shows maternal imprinting
    d. Both the genes show paternal imprinting

90. If methods are based on cellular processes that lead to inactivation of gene expression by affecting the RNA, then it is called as _____.
    a. Transcriptional
    b. pre-transcriptional
    c. post-transcriptional
    d. translational

91. DNA _____ is also a method for gene silencing through short RNAs.
    a. Acetylation
    b. Acylation
    c. Phosphorylation
    d. Methylation

92. siRNA are produced by _____.
    a. Transcription
    b. DNA damage
    c. RNA damage
    d. Enzymatic action

93. If the siRNA is a complete homolog of the target mRNA sequences what is the net result?
    a. Double helix formation
    b. Translation inhibition
    c. mRNA degradation
    d. chromatin modification

94. Binding of siRNA to the DNA does not lead to _____.
    a. Chromatin remodeling
    b. Promoter unavailability
    c. Transcriptional inhibition
    d. Triple helix formation

95. Stem loop precursors are generally seen in which of the following?
    a. siRNA

b. miRNA
c. piRNA
d. ssRNA

96. _____ is a epigenetic phenomenon in which the gene expression of certain genes is determined by whether the gene is inherited from male or female parents.
a. Anticipation
b. Non penetrance
c. Genomic imprinting
d. Transcription

97. RAP1 has a _____.
a. Positive effect on transcription
b. negative effect on transcription
c. No effect on transcription
d. Immensely positive effect on transcription

98. Which is known to be methylated in eukaryotic cells?
a. Cytosine
b. Adenine
c. Guanine
d. Thymine

99. The translationally repressed mRNA with its associated miRISC is then sequestered from the translation machinery by moving into a _____ body.
a. B
b. K
c. P
d. M

100. Transcription of GAL1 and GAL10 is suppressed in the presence of _____.
a. Glucose
b. Galactose
c. Maltose
d. fructose