※ 注意：請於答案卷內所附之表格上作答。

Single choice questions. Please choose the only one as the best answer. A part: Question 1 to 10, each question 1 point. B part: Question 11 to 70, each question 1.5 point. Please fill in your answer into the answer table.

A part: Question 1 to 10, each question 1 point.

1. DNA is a double helix was found at

   a. 1952
   b. 1953
   c. 1957
   d. 1958
   e. 1959
   f. none of the above.

2. DNAase hypersensitive sites change

   a. nuclesome
   b. enhancer
   c. chromatin
   d. promoter
   e. none of the above structure.

3. Which is not a stop codon ?

a. UAG
b. UAA
c. UGA
d. UGG

4. Which statement is the best ?
a. Once a *tRNA* has been charged, the amino acid plays no further role in its specificity.
b. Once a *tRNA* has been charged, the anticodon plays no further role in its specificity.
c. Once a *t*RNA has been charged, the amino acid plays no further role in the peptidyl bond formation.
d. Once a *t*RNA has been charged, the anticodon plays no further role in its peptidyl bond formation.
e. None of the above.

5. In bacteria, the intercistronic regions lie between the coding regions of

a. two monocistronic mRNAs
b. one monocistronic and one polycistronic mRNA
c. one polycistronic mRNA
d. two polycistronic mRNAs
e. none of the above is correct.

6. Which statement is correct ?

a. The initiator N-formyl-methionyl-tRNA (fMet-tRNA$_f$) is generated by formylation of methionyl-tRNA, using tetrahydrofolate as cofactor.
b. The initiator methionyl-tRNA (Met-tRNA$_f$) is generated by deformylation of N-formyl-methionyl-tRNA, using tetrahydrofolate as cofactor.
c. The initiator methionyl-tRNA (Met-tRNA$_f$) is generated by deformylation of N-formyl-methionyl-tRNA, using formy-tetrahydrofolate as cofactor.
d. The initiator N-formyl-methionyl-tRNA (fMet-tRNA$_f$) is generated by formylation of methionyl-tRNA, using formy-tetrahydrofolate as cofactor.
e. The initiator N-formyl-methionyl-tRNA (fMet-tRNA$_f$) is generated by formylation of methionyl-tRNA, using formy-CoA as cofactor.
f. The initiator methionyl-tRNA (Met-tRNA$_f$) is generated by deformylation of

接背面

N-formyl-methionyl-tRNA, using CoA as cofactor.
g. none of the above is correct.

7. According to wobble hypothesis, wobbling occurs because the conformation of the *tRNA* anticodon loop permits the flexibility at the

a. first
b. second
c. third
d. fourth
base of the anticodon.

8. The initial sequence of the RNA transcript can be represented as:

a. 3'pppA/GNpNpNp
b. 5'pA/GNpNpNp
c. 5'pppA/GNpNpNp
d. 3'pA/GNpNpNp
e. 5'pppA/CNpNpNp
f. 3'pA/CNpNpNp
g. 5'pppT/CNpNpNp
h. 3'pT/CNpNpNp
i. 5'pppT/GNpNpNp
j. 3'pT/GNpNpNp

9. mRNA is identical in sequence with one strand of the DNA, which can be called
a. sense strand
b. antisense strand
c. template strand
d. coding strand
e. noncoding strand
f. complementary strand
g. either sense strand or coding strand
h. either template strand or antisense strand
i. either noncoding strand or antisense strand
j. either template strand or noncoding strand
k. none of the above is correct.

10.In E.coli, the control of transcription initiation can be executed by the +substitution of
a. core enzyme
b. sigma factor
c. rho factor
d. DNA binding motif
e. None of the above

B part: Question 11 to 70, each question 1.5 point.

11. The *lac* genes are controlled by the

a. positive regulation, expression is possible when an active regulator protein is present.
b. positive regulation, expression is switched off unless by a repressor protein.
c. negative regulation, expression is possible when an active regulator protein is present.
d. negative regulation, expression is switched off unless by a repressor protein.
e. none of the above is correct.

12. Which statement is not correct ?

a. The bacteria genome is a single circular replicon.
b. The plasmid is an nonautonomous circular DNA genome that consitiutes a separate replicon.
c. Each eukaryotic chromosome contains a many replicons.
d. More than one is incorrect

接次頁

13. About DNA polymerase I, which statement is correct ?

a. Klenow fragment has polymerase and 5'-3' exonuclease activities.
b. Klenow fragment has 5'-3' exonuclease activities.
c. Klenow fragment has polymerase and 3'-5' exonuclease activities.
d. Small fragment has polymerase and 5'-3' exonuclease activities.
e. Small fragment has polymerase and 3'-5' exonuclease activities.
f. Small fragment has 3'-5' exonuclease activities.
g. none of the above is correct.

14. A restriction polymorphism can be used as a genetic marker to measure recombination distance from a phenotypic marker. Red eye fly with 2 DNA bands at low MW position cross with White eye fly with 1 DNA band at high MW position. The percentage of progenies are listed.

45% Red eye fly with 2 DNA bands at low MW position.
45% White eye fly with 1 DNA band at high MW position.
5% Red eye fly with 1 DNA band at high MW position.
5% White eye fly with 2 DNA bands at low MW position.

Which statement is correct ?

a. Red eye and white eye markers are 45 map unit apart.
b. Red eye and white eye markers are 90 map unit apart.
c. Red eye and white eye markers are 10 map unit apart.
d. Red eye and white eye markers are 5 map unit apart.
e. Restriction marker and eye color marker is 45 map unit apart.
f. Restriciton marker and eye color marker is 90 map unit apart.
g. Restriction marker and eye color marker is 10 map unit apart.
h. Restriction marker and eye color marker is 5 map unit apart.
i. All the above statements are incorrect.

15. Why hybrid promoter of thymidine kinase and β-globin works ? Since the main purpose of the *cis*-elements is

a. to increase the efficiency of transcription
b. to bring the factors they bind into the vicinity of the enhancer
c. to bring the factors they bind into the vicinity of the initiation complex
d. to promote the TFIID binding to TATA
e. none of the above is correct

16. About Gal4 transcription factor regulation, which statement is correct ?

a. Galatose bind to Gal4 when galactose is present
b. Galatose bind to Gal 80 when galactose is present
c. Gal4 always binds to Gal 80
d. Gal4 always binds to UAS
e. none of the above is correct.

17. In splicing reaction, U6snRNA can pair between two snRNAs. These two are

a. U1 and U3
b. U3 and U4
c. U4 and U2
d. U4 and U5
e. U1 and U5
f. U1 and U3
g. None of the above is correct.

18. If DNA damage occurred after S phase, P53 acts on cell. 2 hours after the cell responds to this event, we extract cell DNA. On the 1.5 % agarose gel electrophoresis, we expect to observe

a. a smear pattern above 10kb region
b. a random DNA fragment pattern
c. a fragmentation of DNA with increment ladder pattern, the smallest band is around 200bp

接背面

d. a smear pattern below10kb region
e. none of the above.

19. The first step in gene expression is
a. the action of transcription
b. the acquisition of the " active" structure of a gene
c. the initiation of transcription
d. the translation of mRNA
e. none of the above.

20. The most common target for upstream transcription factors is
a. TFIIA
b. TFIIB
c. TFIID
d. TFIIF
e. TFIIE
f. TFIIH
g. none of the above.

21. If A > B is used to represent A provides the source for B, which description is correct ?

a. exon >coding region > ORF
b. coding region > Exon > ORF
c. exon > ORF >coding region
d. ORF> coding region > Exon
e. ORF> exon > coding region
f. coding region > ORF>Exon
g. none of the above is correct.

22. During splicing, which can be named as a splicesome ?
a. C1 complex
b. B1 complex
c. B2 complex
d. A complex
e. E complex
f. F complex
g. C2 complex
h. none of the above.

23. During transcription, which statement is correct ?

a. phosphodiester bond formation involves a hydrophilic attacked by the 3'-OH group of the last nucleotide of the chain on the 5' triphosphate of the incoming nucleotide, with release of pyrophosphate.
b. phosphodiester bond formation involves a hydrophilic attacked by the 3'-OH of the incoming nucleotide on the 5'-OH group of the last nucleotide of the chain , with release of pyrophosphate.
c. phosphodiester bond formation involves a hydrophilic attacked by the 5'-OH of the incoming nucleotide on the 3'-OH group of the last nucleotide of the chain on, with release of pyrophosphate.
d. phosphodiester bond formation involves a hydrophilic attacked by the 5'-OH of the incoming nucleotide on the 3'-OH group of the last nucleotide of the chain on, with release of triphosphate.
e. none of the above is correct.

24. About nonsense suppressor, which statement is the best ?

a. it is isolated by its ability to respond to a wild type nonsense codon.
b. it is isolated by its ability to respond to a mutant nonsense codon.
c. Nonsense suppressors can read through natural termination codons.
d. Nonsense suppressors can not read through natural termination codons.

接次頁

e. a and c are correct.
f. a and d are correct.
g. b and c are correct.
h. b and d are correct.

25. Which is a leucine zipper protein ?

a. MyoD
b. Fos
c. Oct-1
d. VDR
e. TFIIIA
f. none of the above.

26. G protein receptor is a

a. receptor tyrosine kinase
b. steroid receptor
c. serpentine transmembrane protein
d. postassium channel receptor
e. none of the above.

27. Which is not a response element ?

a. TATA
b. HSE
c. GRE
d. SRE
e. none of the above.

28. Codon 12 mutation in Ras protein directly affects the binding of
a. GDP
b. Sos
c. Ras GAP
d. GTP
e. GDI
f. GEF
g. none of the above.

29. Which of the following does not have histone fold ?

a. H3
b. H2A
c. $TAF_{II}42$
d. RAP74
e. $TAF_{II}62$
f. none of the above.

30. In PCR reaction, you obtained multiple bands in your first try. You are most likely increase melting temperature of your reaction because you would like to improve which character between your primer and template.

a. complexity
b. specificity
c. reproducibility
d. quantity
e. quality
f. none of the above.

接背面

31. Which statement is correct about RNAs?

a. Most of RNA population is *t*RNA that lacks poly(A).
b. Most of RNA population is *r*RNA with poly(A).
c. mRNA with poly(A) is small proportion of RNA
d. mRNA with poly(A) is the major proportion of RNA
e. none of the above is correct.

32. Repetitive DNA is defined by its relatively rapid rate of

a. renaturation
b. denaturation
c. sequence simplicity
d. complexity
e. none of the above.

33. In characterizing transcription activator functions, VP 16 is normally linked to a

a. a DNA-binding motif
b. an activation domain
c. an acidic activator
d. a basic activator
e. none of the above

34. Three DNA components are measured by reassociation kinetics and have the result below.
A. 25% of genome ; $Cot_{1/2}$=0.0013
B. 30% of genome ; $Cot_{1/2}$= 1.9
C. 45% of genome ; $Cot_{1/2}$ = 630
Now, E. coli DNA with 4.2×10^6 bp reassociates with $Cot_{1/2}$=4.0
What would be the complexity of C component ?

a. 2.6×10^9
b. 1.2×10^9
c. 3.0×10^8
d. 6.0×10^8
e. 6.0×10^5
f. none of the above.

35. Which nucleosides has -NH2 group ? Please choose the best ?

a. uridine
b. thymidine
c. cytidine
d. adenosine
e. guanosine
f. cytidine and adenosine
g. cytidine and guanosine
h. thymidine and adenosine
i. adenosine and guanosine
j. uridine and thymidine
k. uridine and adenosine
l. uridine and guanosine
m. cytidine, guanosine, and thymidine
n. cytidine, guanosine and adenosine
o. thymidine, guanosine and adenosine
p. uridine, guanosine, and thymidine
q. cytidine, guanosine, thymidine and adenosine
r. thymidine, guanosine, uridine and adenosine
s. uridine, guanosine, cytidine and adenosine
t. thymidine, guanosine, uridine and cytidine

接次頁

u. none of the above

36. repetitive DNA often lie in

a. heterochromatin
b. centromere
c. telomere
d. satellite
e. a and b
f. a, b, and c
g. a, b, c and d
h. b, and c
i. b, c and d
j. a, b and d
k. a, c and d
l. b and d
m. c and d
n. a and c

37. For a fragment of 5498 bp DNA sequence, how may frames can this sequence have by computer program ?

a. 1
b. 2
c. 3
d. 4
e. 5
f. 6
g. 7
h. 8
i. 9
j. 10
k. 12
l. none of the above.

38. Which may bring RNA PolII to the assembling transcription complex ?

a. TFIID
b. TFIIA
c. TFIIB
d. TFIIF
e. TFIIE
f. TFIIH
g. TFIIJ
h. TBP

39. Which is usually not acting by dimer formation ?

a. Homeoprotein
b. RXR
c. HLH
d. Leucine zippers
e. none of the above

40. Which statement about splicing is correct ?

a. splicing occurs in cytoplasm
b. introns removed in a sequential order as soon as transcript synthesized
c. Group II introns autosplice not via lariat formation
d. the apparatus for splicing is tissue specific

接背面

e. none of the above.

41. Tumor suppressor gene has the property of being

a. viral gene.
b. recessive
c. loss-of-function
d. gain-of-function
e. dominant
f. a and b are correct.
g. b and c are correct.
h. d and e are correct.
i. a and c are correct
j. a and d are correct

42. UAS can not function
a. in either orientation
b. at variable distance upstream of the promoter
c. when located downstream of a gene
d. none of the above.

43. The bahaviour of SL1 for RNA polymerase I resembles
a. rho protein
b. sigma factor
c. TFIIIA
d. TFIIIC
e. TFIID
f. TFIIA
g. None of the above.

44. Which eukaryotic initiation factor binds to 5' cap ?

a. eIF-4B
b. eIF-4G
c. eIF-4E
d. eIF-3
e. eIF-5
f. eIF-2B
g. none of the above.

45. The core particle of nucleosome has DNA length of
a. 200 bp
b. 148 bp
c. 146 bp
d. 154 bp
e. 164 bp
f. none of the above.

46. Zinc finger proteins can
a. bind to DNA
b. bind to rRNA
c. bind to mRNA
d. bind to initiation codon
e. bind to viral RNA
f. a, b, are correct
g. a, b, c are correct
h. a, c are correct
i. a, b, c, d are correct
j. a, b, c, d, e are correct

接次頁

47. Which description about splicing enhancer is the best ?

a. it acts as transcription enhancer can function in both upstream and downstream of 3' splice site.
b. it acts as transcription enhancer can function in both upstream and downstream of 5' splice site.
c. It is found in the exon upstream of the 5' splice site and assists U2AF in binding to the branch site.
d. It is found in the exon upstream of the 3' splice site and assists U2AF in binding to the branch site.
e. None of the above.

48. For steroid receptor, which of the following statement is correct ?

a. the first finger controls specificity of DNA bidning; the second finger control specificity of dimerization.
b. the first finger controls specificity of of dimerization; the second finger control specificity DNA bidning
c. both a and b are correct dependent on different cases of steroid receptors
d. both a and b are incorrect.

49. Receptor tyrosine kinase without extracellular domain can be a
a. dominant negative
b. loss-of-function
c. suppressor
d. constitutive
mutation.

50. About *v*-oncogene ?
a. it is endogenous viral gene.
b. it is the cellular gene carried by virus
c. can be a gag-*v-onc* fusion gene
d. the virus carry *v*-oncogene has autonomous infection ability
e. a, b are incorrect
f. a, c are incorrect
g. a, d are incorrect
h. c, d are incorrect
i. b, c are incorrect

51. Which is correct ?
a. P53 promotes genome instability
b. P53 represses genome instability
c. P53 activates cell cycle arrest through RB
d. P53 promotes apoptosis in G1 phase
e. None of the above.

52. The average periodicity over the nucleosome is
a. more than
b. less than
c. equal to
the 10.5 bp/turn of DNA is solution.

53. Methylation of Histone can not occur at
a. Lys
b. Ser
c. His
d. Arg
e. a, b, c and d

54. Which factor listed below binds along the bent face of DNA due to TBP binding ?
a. TFIID
b. TFIIA
c. TFIIB

接背面

d. TFIIC
e. TFIIE
f. none of the above.

55. What would be the consequences if the single EcoRI site in a DNA fragment is cut and treated with Klenow fragment and relegated ?

a. a +1 bp insertion will be produced.
b. a +2 bp insertion will be produced.
c. a +3 bp insertion will be produced.
d. a +4 bp insertion will be produced.
e. a +5 bp insertion will be produced.
f. a +6 bp insertion will be produced.
g. a +7 bp insertion will be produced.
h. a +8 bp insertion will be produced.
i. a +9 bp insertion will be produced.
j. a +10 bp insertion will be produced.
k. a +12 bp insertion will be produced.
l. a –1 bp deletion will be produced.
m. a –2 bp deletion will be produced.
n. a –3 bp deleltion will be produced
o. a –4 bp deletion will be produced.
p. a –5 bp deletion will be produced.
q. a –6 bp deletion will be produced.
r. None of the above.

56. The central kernel of nucleosome consists of

a. $H3_2 \cdot H4_2$
b. $H2A_2 \cdot H2B_2$
c. $H2A_2 \cdot H3_2$
d. $H2B_2 \cdot H4_2$
e. none of the above.

57. One effect of streptomycin is to

a. increase the level of proofreading
b. increase the level of misreading
c. increase the efficiency of translation
d. increase the affinity of aa-tRNA binding to A site
e. none of the above.

58. Which can function as translocase dependent on GTP hydrolysis ?

a. EF-G
b. eEF-3
c. eEF-4
d. eEF-2
e. EF-Tu
f. a and b
g. a and c
h. a and d
i. a and e
j. b and c
k. b and d
l. b and e
m. a, b, and c
n. a, b, and d
o. a, b, and e
p. b, c, and d

接次頁

q. b, c, and e
r. c, d, and e
s. a, b, c, and d
t. b, c, d, and e
u. a, b, c, d, and e

59. Which statement about steroid receptor is correct ?

a. GR, MR, AR can form heterodimers because they form "head to tail" dimerization pattern.
b. GR, MR, AR form homodimers because they form "head to head" dimerization pattern.
c. GR, MR, AR form heterodimers because they form "head to head" dimerization pattern.
d. GR, MR, AR form homodimers because they form "head to tail" dimerization pattern.
e. none of the above.

60. Which does not have SH2 domain ?

a. GRB2
b. c-Src
c. c-Abl
d. Sos
e. GAP
f. PI3K
g. none of the above.

61. Which protein mutation occur in 50% of human cancers ?

a. Ras
b. Src
c. P53
d. RB
e. TGFβ type II receptor
f. a and b
g. a and c
h. a and d
i. a and e
j. b and c
k. b and d
l. b and e
m. c and d
n. c and e
o. d and e
p. none of the above.

62. About P53,
a. P53 was originally classified as an oncogene because its missense mutation can inhibite wild type P53 activity
b. P53 was clsssified as a tumor suppressor gene because the loss of both alleles produces phenotype similar to that occurred when wild type p53 is inhibited by missense mutation
c. P53 has a N-terminal DNA binding domain,
d. P53 has a C-terminal DNA binding domain
e. a and b are correct.
f. a and c are correct
g. b and c are correct
h. b and d are correct
i. b, c, and d are correct
j. a, b, and d are correct
k. a, c, and d are correct
l. a, b, c, and d are correct
m. none of the above is correct.

接背面

63. The sequence

a. UAACUAC
b. UACUAAC
c. AAUAAA
d. GTNNNAG
e. TATATA
is required for cleavage to generate a 3' end for polyadenylation of mRNA.

64. Which is not a RNA binding protein ?

a. SR protein
b. ASF
c. SF2
d. Tat
e. Tar
f. none of the above.

65. To prove nucleosome positioning, experiment operations are listed
a. restriction enzyme digestion
b. removing proteins by phenol
c. micrococal nuclease treatment
d. electrophoresis
e. probe hybridization.

The order for a proper manipulation would be
f. a-b-c-d-e
g. a-c-e-d-b
h. c-a-b-d-e
i. c-b-a-e-d
j. c-b-a-d-e
k. none of the above

66. The length of a long stretch of homopolymorphic run of dTn:dAn can be changed by replication slippage. As a general rule, the increase of

a. specificity
b. processivity
c. quantity
d. reproducibility
e. affinity
f. efficiency
of DNA polymerase can reduce the likelihood of such events.

67. DNA ligase seals nicks between adjacent nucleotides by employing an intermediate that is

a. enzyme-ATP
b. enzyme-ADP
c. enzyme-AMP
d. enzyme-GTP
e. enzyme-GDP
f. enzyme-GMP.

68. In mammalian system where the DNA polymerase does not have a 5'-3'exonuclease activity, Okazaki fragments are removed by a two step process.

a. First RNAase H1 and second a 5'-3' exonuclease called FEN1 removes the DNA.
b. First RNAase H1 and second a 3'-5' exonuclease called FEN1 removes the DNA.
c. First RNAase H1 and second a 5'-3' exonuclease called FEN1 removes the RNA.
d. First RNAase H1 and second a 3'-5' exonuclease called FEN1 removes the RNA.

接次頁

e. First Klenow fragment and second a 5'-3' exonuclease called FEN1 removes the DNA.
f. First Klenow fragment and second a 3'-5' exonuclease called FEN1 removes the DNA.
g. First Klenow fragment and second a 5'-3' exonuclease called FEN1 removes the RNA.
h. First Klenow fragment and second a 3'-5' exonuclease called FEN1 removes the RNA.

69. During splicing process, the 5' splice site can be paired with snRNA

a. U1
b. U2
c. U3
d. U4
e. U5
f. U6
g. U1 and U2
h. U1 and U3
i. U1 and U4
j. U1 and U5
k. U1 and U6
l. U2 and U3
m. U2 and U4
n. U2 and U5
o. U2 and U6
p. U3 and U4
q. U3 and U5
r. U3 and U6
s. U4 and U5
t. U4 and U6
u. U5 and U6

70. Which HLH proteins do not have DNA binding region ?
a. MyoD
b. Id
c. E12
d. AC-S
e. Emc
f. Da
g. a, b, c, d, e, and f
h. a, b, d, e and f
i. a, d, e and f
j. a, d and e
k. a and d
l. d, e and f
m. d and e
n. e and f
o. a, b, c, e and f
p. a, b, c and f
q. a, b and c
r. a and b
s. b, c, d and e
t. b, c and d
u. b and c
v. b and d
w. b and e
x. c and d
y. c and e