

每題 2 分，答錯不倒扣

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1. Which microorganism is frequently used for plant transformation?
a) *Agrobacterium* b) *Streptomyces* c) *Bacillus* d) *Xanthomonas* e) *Lactobacillus*
2. Which enzyme is the key factor for cDNA synthesis?
a) T7 RNA polymerase b) reverse transcriptase c) DNA polymerase
d) telomerase e) DNA helicase
3. Which enzyme is the key factor for polymerase chain reaction?
a) T7 RNA polymerase b) reverse transcriptase c) *E. coli* DNA polymerase d) DNA helicase e) Taq DNA polymerase
4. What kind of molecular interaction is studied using Yeast two-hybrid system?
a) RNAs b) DNAs c) lipids d) proteins e) carbohydrates
5. What kind of antigen is currently used in Taiwan to prepare Influenza virus H1N1 vaccine?
a) M2e b) H1 c) N1 d) inactivated viruses e) attenuated viruses
6. Which step of gene expression is interfered by siRNA ?
a) transcription b) DNA methylation c) mRNA degradation d) posttranslational modification e) splicing
7. Which enzyme makes mRNA precursors and most snRNA?
a) RNA polymerase I b) RNA polymerase II c) RNA polymerase III
d) RNase P e) DNA polymerase I
8. Which microorganism is commonly used as a bio-insecticide in crop protection ?
a) *Agrobacterium tumefaciens* b) *Bacillus thuringiensis* c) *Clostridium thermosulfurogenes* d) *Lactococcus lactis* e) *Klebsiella pneumoniae*
9. Which is the causal agent of mad cow disease?
a) SARS coronavirus b) prion c) armyworm d) pathogenic amoeba
10. Which wavelength is normally used to determine the nucleic acid concentration?
a) 220nm b) 245nm c) 260nm d) 280nm e) 320nm
11. A DNA molecule has the structure:
TAC GGG AAT TAG AGT
ATG CCC TTA ATC TCA
The upper strand is the template strand, and is transcribed from left to right. What is the first amino acid of the peptide encoded in this DNA molecule?
a) Tyr b) Arg c) Met d) Ala e) Gly
12. Which of the enzyme listed below is involved in repair of both thymine dimmers and deaminate cytosine in *E. coli*?
a) DNA polymerase III b) photolyase c) Uracil N-glycosylase d) DNA polymerase I e) AP endonuclease
13. Which of the mechanism listed a cell would not use to increase the expression level of a particular mRNA?
a) increase in the stability b) activation of a strong promoter by a transcription factor c) replication of mRNA d) activation of transcription through binding of a hormone to its receptor e) RNA splicing
14. In which organisms is RNA the sole genetic material?
a) many plant and animal viruses b) *E. coli* c) yeast d) algae e) fungi
15. How many subunits are in *E. coli* RNA polymerase?
a) 5 b) 4 c) 3 d) 6 e) 8
16. Which subunit of *E. coli* RNA polymerase is responsible for correctly positioning the enzyme on a promoter?
a) sigma b) alpha c) beta d) rho e) NuSA protein

17. What consensus sequence is present in a large number of eukaryotic promoter?
a) GAGAAA b) TATAAAA c) UAUAAAA d) (T)_n e) (A)_n
18. Which RNA has catalytical activity?
a) t-RNA b) mRNA c) RNase P d) siRNA e) snRNA
19. What is the biological function of an IRES sequence within an mRNA?
a) translation terminator b) ribosome binding c) mRNA turnover d) t-RNA binding e) all of these
20. What ribonuclease is responsible for the production of siRNA?
a) RNase H b) RNase A c) agronaute d) dicer e) none of the above
21. Which of the followings is the first bacterial genome to be completely sequenced? a) *Escherichia coli*, b) *Bacillus anthracis*, c) *Haemophilus influenzae*, d) Phage X174, e) SARS bacterium .
22. Which statement concerning the structure of nucleic acid is incorrect? a) The building blocks of nucleic acids are nucleotides. b) Nucleic acids are usually negatively charged at normal, physiological pH. c) Hydrogen bonds are involved in the higher order structures. d) The difference between DNA and RNA is only that RNA contains U instead of T. e) None of the above.
23. Please choose the incorrect statement concerning the construction of recombinant DNA: a) Viruses can be used to carry foreign DNA into cells. b) Linear DNAs could be used to transform bacteria. c) The mRNAs may be used in recombinant DNA technology by first converting the mRNAs to cDNAs using reverse transcriptase. d) It is not necessary to use DNA ligase to ligate the target insert and the vector DNA ends. e) Restriction enzymes are never used in recombinant DNA technology.
24. Which of the following molecules is not known to server as genetic materials for living organisms? a) single-stranded ribonucleic acid; b) single-stranded fatty acid; c) double-stranded ribonucleic acids; d) single-stranded DNA; e) double-stranded DNA.
25. Please choose the incorrect statement concerning natural macromolecules. a) Starches are composed of monosaccharides. b) Proteins are made of amino acids. c) DNAs are composed of dideoxyribonucleotides. d) RNAs are made of ribonucleotides. e) Celluloses are composed of monosaccharides.
26. Which type of chromatography separates molecules on the basis of size alone? a) C-18 chromatography; b) affinity chromatography; c) ion-exchange chromatography, d) gel filtration chromatography; e) DEAE cellulose chromatography.
27. Ion exchange chromatography is used to separate proteins. The underlying principle is the partition based on a) Mass difference, b) Charge difference, c) Structure difference, d) Size difference e) Currency exchange rate difference.
28. The expression of most genes in prokaryotic systems is regulated primarily at the level of: a) Translation, b) Transcription, c) Transduction, d) Post translational modification, e) Post transcriptional modification.
29. Which of the following statements about protein synthesis is correct? a) Protein synthesis stops at the amino end. b) Transcription of mRNAs and translation into proteins are uncoupled in most eukaryotic systems. c) Protein synthesis proceeds in the 3' to 5' direction of the mRNA. d) Amino acids are linked by hydrogen bonds into polypeptides. e) Ribosome uses polypeptides as the template to synthesize more proteins.
30. After a partial sequence of a protein is determined, one can use the genetic code to determine the nucleotide sequence in a segment of the gene for the protein. Why is the set of degenerate oligonucleotides usually needed if one wants to probe a cDNA or genomic library for the gene? a) The protein was degraded. b) The genetic code is degraded. c) The protein may have undergone post-translational modification. d) The nucleotides serve to dilute out background non-specific hybridization. e) The genetic code is degenerate.

31. A restriction map for a plasmid: a) displays the sites of cleavage by one or several restriction enzymes and the number of fragments obtained after digestion with each enzyme. b) is used in the selection of plasmids for different regulations by the government. c) shows the way leading to the storage location of different plasmids. d) is generated by digestion of plasmids with proteases. e) all of the above.
32. Isoelectric focusing technique for the separation of proteins works on the principle of? a) Electrophoretic separation based on relative content of acidic and basic residues, b) Hydrophobicity and hydrophilicity of proteins, c) Mass of the protein molecules, d) Number of amino acids containing hydroxyl group, e) electrical capacity of protein molecules.
33. Isoelectric point is a point at which? a) The mass of protein is determined. b) The net charge of protein is at its maximum. c) The speed of mobility is increased. d) The protein turns into an isozyme. e) The net charge of a protein is zero.
34. Foreign genes cannot be delivered into plant or animal cells by which of the following methods: a) biolistic bombardment, b) viral vectors, c) electroporation, d) isoelectric focusing, e) micro-injection.
35. To evaluate the expression levels of the foreign genes delivered into the plant cells, you would not use: a) northern blotting, b) western blotting, c) reporter genes, d) enzyme-linked immunosorbent assay, e) nuclear chain reaction.
36. Which of the following techniques detects the nuclear spins, reorientation in an applied field and provided us with structural information of the test materials? a) ELISA, b) NMR, c) EIA, d) PCR, e) RIA
37. To prepare a 10 % sucrose solution, you would a) add 5 g of sucrose into 50 ml of pure water; b) add 100 ml of pure water to 10 g of sucrose; c) add 1 kg of pure water into 100 g of sucrose; d) dissolve 5 g of sucrose in 35 ml of pure water, and bring the final volume to 50 ml with pure water; e) add 5 g of glucose, 5 g of fructose into 100 g of pure water.
38. The CsCl gradient centrifugation will separate DNA molecules by: a) absorption, b) density, c) density, d) adhesion, e) charge.
39. What is required for T-DNA transfer in *Agrobacterium*-mediated transformation? a) Inverted repeat border sequences, b) Palindromic border sequences, c) Direct repeat border sequences, d) An *Att* site at the border sequence, e) Random border sequences.
40. The algorithm implemented in the BLAST program (Altschul et al., 1990. Journal of Molecular Biology 215:403-10) commonly used in the field of biotechnology tries to find which of the following types of alignment between the query sequence and subject sequence in the database: a) local, b) global, c) multiple, d) simple, e) dynamic.
41. Most of the publicly available sequence information concerning biological macromolecules could be found in which of the following database: a) GanBank, b) GenBank, c) PubMod; d) PubMad, e) GenBank.
42. Which of the following statement concerning the CT-value (cutoff threshold) in real-time RT-PCR experiments is true? a) The higher the value, the higher the initial target RNA amount. b) The lower the value, the higher the initial target RNA amount. c) Target RNA does not exist, if the value is larger than 30. d) Target RNA does not exist, if the value is lower than 30. e) CT-value is the value at which PCR products will be cut off.
43. Total mRNAs could be extracted using: a) oligo(dT) resins, b) RNase A resins, c) DEAE resins, d) poly(A) resins, e) RNase P column.
44. Ethanol is routinely used in the field of biotechnology mainly for: a) cooling, b) precipitation of inorganic acids, c) precipitation of organic solvents, d) precipitation of nucleic acids, e) mutation.
45. Which of the following nucleotides is/are usually added by Taq polymerase to the end of the polymerized DNA

- products? a) adenine, b) cytosine, c) guanine and cytosine, d) guanine and thymine, e) thymine.
46. Detection of blotted DNA molecules by labeled RNA probes is called a: a) northern blot analysis, b) Southern blot analysis, c) eastern blot analysis, d) western blot analysis, e) north-western blot analysis.
47. BT toxin has been widely used in transgenic maize and cotton to control insect pests. The BT toxin gene is originally derived from: a) *Baccillus thuringen*, b) *Bacterium thuringensis*, c) *Bacillus thuringiensis*, d) *Botulium tumefaciens*, e) *Escherichia coli*.
48. Small doses of Botox (Botulinum toxin) are commonly used in cosmetics to prevent the formation of wrinkles by paralyzing facial muscles. Botulinum toxin gene is encoded by: a) clostridial phages, b) clostridial fungi, c) *Bacillus thuringiensis*, d) *Botulium tumefaciens*, e) clostridia nematode.
49. A cosmid is a: a) circular RNA, b) Plasmid with unique Cos site, c) Larger plasmid, d) single stranded plasmid, e) chemical used in cosmetics.
50. Actinomyces, a subgroup of filamentous bacteria commonly used in the production of antibiotics is: a) Gram positive, b) Gram negative, c) Fuelgen positive, d) Fuelgen negative, e) Ames positive.