



## Dr.G.R.Damodaran College of Science

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CRISL rated 'A' (TN) for MBA and MIB Programmes

III BSC [2015-2018]

SEMESTER V

CORE: GENETIC ENGINEERING - 509B

Multiple Choice Questions.

1. Cloning is highly possible in \_\_\_\_\_

- A. bacteria
- B. virus
- C. fungi
- D. algae

ANSWER: A

2. How many hydrogen bonds are there between Adenine and Thymine?

- A. 2.
- B. 3.
- C. 4.
- D. 5.

ANSWER: A

3. \_\_\_\_\_ formulated double helical Deoxyribonucleic Acid (DNA) model.

- A. Einstein.
- B. Watson and Crick.
- C. Newton.
- D. Michael.

ANSWER: B

4. Specify the component of translation machinery in protein synthesis?

- A. Golgi apparatus.
- B. Ribosome.
- C. Mitochondria.
- D. Nucleus.

ANSWER: B

5. What is Bt-cotton?

- A. Cotton that can produce Bt.
- B. Cotton plant containing genes of Bt.
- C. Cotton which is found in place called Bt.
- D. Biotechnology cotton.

ANSWER: B

6. \_\_\_\_\_ is a peptide hormone, produced by beta cells in the pancreas, and is central to regulating carbohydrate and fat metabolism in the body.

- A. Insulin.
- B. Interferon.
- C. hGH.
- D. Interleukins.

ANSWER: A

7. The role of pili in cloning of bacteria in E.coli is \_\_\_\_\_.

- A. conjugation.
- B. transformation.
- C. tranfection.
- D. transduction.

ANSWER: A

8. Elaborate RAPD.

- A. Rapidly Amplified Polymorphic DNA.
- B. Rapid Amplification of Polymorphic DNA.
- C. Randomly Amplified Polymorphic DNA.
- D. Random Amplification of Polymorphic DNA.

ANSWER: C

9. Clones can be identified by hybridizing them with a/an \_\_\_\_\_.

- A. vector.
- B. antibody.
- C. virus.
- D. virus.

ANSWER: D

10. The first step in the polymerase chain reaction (PCR) is \_\_\_\_\_.

- A. denaturation.
- B. primer extension.
- C. annealing.
- D. cooling.

ANSWER: A

11. In a Polymerase Chain Reaction, a synthetic sequence of nucleotides is involved in \_\_\_\_\_.

- A. denaturing.
- B. heating.
- C. priming.
- D. renaturing.

ANSWER: C

12. Bacteria protect themselves from viruses by fragmenting viral DNA upon entry with \_\_\_\_.

- A. ligases.
- B. endonucleases.
- C. methylases.
- D. polymerases.

ANSWER: B

13. In preliminary screening of clones, it is common to use \_\_\_\_\_.

- A. restriction enzymes.
- B. dyes.
- C. antibiotics.
- D. radiation.

ANSWER: C

14. To identify an individual by DNA analysis of their blood, investigators look for \_\_\_\_\_.

- A. DNA fingerprinting.
- B. probes.
- C. nucleosomes.
- D. karyotyping.

ANSWER: A

15. All fragments cut by most restriction endonucleases have \_\_\_\_\_ ends.

- A. complementary double-stranded.
- B. supplementary single-stranded.

- C. double-stranded "sticky".
- D. complementary single-stranded.

ANSWER: D

16. \_\_\_\_\_ is also known as Kornbergs enzyme.

- A. DNA Ligase.
- B. Restriction endonucleases.
- C. DNA Pol I.
- D. RNA Pol.

ANSWER: C

17. Which of the following procedures would produce RFLPs?

- A. Incubating a mixture of single strand DNA from two closely related species.
- B. Incubating DNA nucleotides with DNA polymerase.
- C. . Incubating DNA with restriction endonucleases.
- D. . Incubating DNA fragments with sticky ends with ligase.

ANSWER: C

18. What are the three major steps of the PCR reaction in the CORRECT order?

- A. Annealing, Denaturation, Extension.
- B. Denaturation, Annealing, Extension.
- C. Extension, Denaturation, Annealing.
- D. Denaturation, Extension, Annealing.

ANSWER: B

19. Eukaryotic proteins cloned into overexpression vectors and expressed in prokaryotes are NOT always functional. Why might this be?

- A. Prokaryotes cannot glycosylate proteins the same way as eukaryotes.
- B. Prokaryotes have proteases specific for eukaryotic proteins.
- C. . Prokaryotes do not use the same genetic code as eukaryotes.
- D. Prokaryotes have different promoters than eukaryotes, and hence the eukaryotic proteins cannot initiate mRNA synthesis.

ANSWER: A

20. Which of the following is not found in a YAC?

- A. Centromere.
- B. Telomere.
- C. T-DNA.
- D. Marker gene.

ANSWER: C

21. A YAC is propagated as a \_\_\_\_\_ molecule in E. coli and as a \_\_\_\_\_ molecule in yeast.

- A. circular, circular
- B. linear, circular.
- C. circular, linear.
- D. linear, linear.

ANSWER: B

22. Which of the following is a likely primer for RT/PCR of a eukaryotic mRNA?

- A. oligo(dT).
- B. oligo(dA).
- C. oligo(dG).
- D. both (a) and (b).

ANSWER: A

23. Which of the following techniques was made possible or facilitated by the development of methods for the chemical synthesis of DNA?

- A. DNA sequencing.

- B. Southern blotting.
- C. Polymerase chain reaction.
- D. All the above.

ANSWER: D

24. The stringency of hybridization be increased by \_\_\_\_\_.

- A. Decreasing the salt concentration.
- B. Increasing the temperature.
- C. Using a probe with a higher content of guanosine and cytidine.
- D. Making a probe longer.

ANSWER: B

25. The shuttle vectors are available in cloning of E.coli with \_\_\_\_\_ . a.

- A. yeast.
- B. Bacillus sp.
- C. mammalian cell.
- D. all the above.

ANSWER: D

26. Which statement regarding restriction endonucleases is NOT correct?

- A. They recognize a specific base sequence in the DNA.
- B. They are produced by bacterial cells as a primitive immune system.
- C. They digest DNA by removing nucleotides from a free 3' end.
- D. They often generate short single stranded sequences.

ANSWER: C

27. Formation of what type of chemical bond is catalyzed by DNA ligase?

- A. Glycosidic.
- B. Hydrogen.
- C. Phosphodiester.
- D. Ester.

ANSWER: C

28. If you are using a vector with lacZ as a screenable marker, which of the following bacterial strains would you want to use as host cells?

- A. lac I.
- B. lac Z.
- C. lac A.
- D. Any of these.

ANSWER: B

29. What key feature of Taq polymerase allows PCR to be conveniently performed?

- A. It does not require primers.
- B. It does not require a template.
- C. It is not damaged by heating.
- D. It can work at very low temperatures.

ANSWER: C

30. What type of probe would you use for a Western blot experiment?

- A. A known DNA sequence.
- B. An RNA molecule.
- C. A purified protein.
- D. An antibody.

ANSWER: D

31. Site-directed mutagenesis \_\_\_\_\_.

- A. is a technique to produce specific mutants.
- B. can be used to alter gene function in specific ways.

- C. can create mutant genes to be studied in living organisms.
- D. All of these.

ANSWER: C

32. In recombinant DNA techniques, transformed bacterial cells can be screened by \_\_\_\_\_.

- A. restriction fragment length polymorphisms.
- B. using antibiotic resistance plasmid genes and antibiotic-containing media.
- C. sequencing each of the plasmids.
- D. using mRNA or information on the protein sequence.

ANSWER: B

33. Which of the following is NOT one of the objectives of the Human Genome Project?

- A. Creating detailed genetic map of every human chromosome, with an average of recombination frequency between markers.
- B. Obtaining a detailed physical map of every human chromosome, based on overlapping Recombinant DNA molecules cloned as yeast artificial chromosomes.
- C. Cloning of human beings.
- D. Determining the sequence of all expressed human genes by cDNA cloning and sequencing.

ANSWER: C

34. \_\_\_\_\_ enzyme causes breakdown of cellulose.

- A. Cellulase.
- B. Glucose oxidase.
- C. Pectinase.
- D. Ligase.

ANSWER: A

35. What is the charge imparted to protein if it is treated with SDS?

- A. Neutral.
- B. Zwitterions.
- C. Negative.
- D. Positive.

ANSWER: C

36. Where are ribosomes located?

- A. Cytoplasm.
- B. Plasma membrane.
- C. Golgi complex.
- D. Nucleus.

ANSWER: A

37. Which clotting factor is absent in Hemophilia A?

- A. Factor V.
- B. Factor VI.
- C. Factor VIII.
- D. Factor VII.

ANSWER: C

38. The yeast component of a yeast shuttle vector includes \_\_\_\_\_.

- A. ARS.
- B. CEN.
- C. yeast selectable marker.
- D. all the above.

ANSWER: D

39. Shuttle vectors include plasmids that can propagate in \_\_\_\_\_.

- A. prokaryotes.
- B. eukaryotes.

- C. both a and b.
- D. virus.

ANSWER: C

40. cDNA molecules are produced by which enzyme?

- A. DNA Pol.
- B. RNA Pol.
- C. Reverse transcriptase.
- D. Restriction enzyme.

ANSWER: C

41. A desirable feature common to all types of vectors is \_\_\_\_\_.

- A. one or more unique restriction sites.
- B. one or more selectable markers.
- C. a high copy number.
- D. all of these are desirable features.

ANSWER: D

42. Template for cDNA is \_\_\_\_\_.

- A. DNA.
- B. RNA.
- C. mRNA.
- D. protein.

ANSWER: C

43. Plasmid DNA is treated with restriction enzyme A, and three bands are seen on an agarose gel following electrophoresis. This plasmid therefore has \_\_\_ restriction sites for Enzyme A.

- A. 0.
- B. 1.
- C. 2.
- D. 3.

ANSWER: D

44. Dideoxynucleotides are used in \_\_\_\_\_ as molecular biology technique.

- A. Sanger's method.
- B. Maxam and Gilbert's method.
- C. Southern blotting.
- D. PCR.

ANSWER: A

45. A plasmid is treated with the restriction enzyme Pst I. To facilitate cloning a fragment of DNA from a bacterial chromosome into this plasmid, the chromosomal DNA should be treated with \_\_\_\_\_.

- A. Pst I.
- B. Pst II.
- C. Pst III.
- D. Eco RI.

ANSWER: A

46. The best vector in which to clone a 1.2 kb fragment of DNA is \_\_\_\_\_.

- A. YAC
- B. plasmid.
- C. BAC.
- D. PAC.

ANSWER: B

47. Bacteria that produce restriction enzymes protect their own DNA from attack by modifying it with \_\_\_\_\_.

- A. methylation.

- B. acetylation.
- C. phosphorylation.
- D. carboxylation.

ANSWER: A

48. Which restriction enzyme leaves sticky ends in the restricted DNA?

- A. Eco RI.
- B. Pst I.
- C. Bam HI.
- D. All the above.

ANSWER: D

49. \_\_\_\_\_ technique are DNA fragments physically separated according to their size.

- A. Southern blot.
- B. Agarose gel electrophoresis.
- C. SDS-PAGE.
- D. Northern blot.

ANSWER: B

50. RFLP analysis is a technique that \_\_\_\_\_

- A. uses hybridization to detect specific DNA restriction fragments in genomic DNA.
- B. is used to determine whether a gene is transcribed in specific cells. .
- C. measures the transfer frequency of genes during conjugation.
- D. is used to detect genetic variation at the protein level

ANSWER: A

51. How large is the human genome?

- A. 3 million bp.
- B. 5 million bp.
- C. 4 million bp.
- D. Not yet estimated.

ANSWER: A

52. Promoters for eukaryotic mRNA synthesis \_\_\_\_\_.

- A. can require binding of multiple transcription factors to form a transcription complex.
- B. have specific DNA sequences such as the TATA box that are recognized by proteins.
- C. are the stretches of DNA to which RNA polymerase binds to initiate transcription.
- D. all of these.

ANSWER: D

53. Which statement is NOT true about nucleic acid hybridization?

- A. It depends on complementary base pairing.
- B. A polysaccharide can hybridize with a DNA strand.
- C. A DNA strand can hybridize with another DNA strand.
- D. An RNA strand can hybridize with a DNA strand.

ANSWER: B

54. What is added to the 3'-end of many eukaryotic mRNAs after transcription?

- A. Introns.
- B. Poly A tail.
- C. A cap structure, consisting of a modified G nucleotide.
- D. Poly T tail.

ANSWER: B

55. mRNA will form hybrids only with the coding strand of DNA because \_\_\_\_\_.

- A. DNA will not reanneal at high temperatures.
- B. the salt concentration will affect DNA reannealing.
- C. DNA will not reanneal at low temperatures.

D. RNA:DNA hybridization follows the base-pairing rules.

ANSWER: D

56. The enzyme used in PCR reactions is derived from which organism?

- A. *Escherichia coli*.
- B. *Thermus aquaticus*.
- C. *Thermotoga agrobilium*.
- D. *Saccharomyces cerevisiae*.

ANSWER: B

57. For a PCR reaction which of the following is NOT required?

- A. Taq Pol.
- B. dNTP's.
- C. Probes.
- D. Template DNA.

ANSWER: C

58. In order to clone eukaryotic DNA into prokaryotic cells \_\_\_\_\_.

- A. DNA with both exons and introns must be used.
- B. DNA without introns must be added.
- C. RNA with both exons and introns must be used.
- D. introns must be added back to eukaryotic DNA.

ANSWER: B

59. cDNA is \_\_\_\_\_.

- A. DNA with both introns and exons that can be cloned into prokaryotes.
- B. DNA with only introns that can be cloned into prokaryotes.
- C. eukaryotic DNA with only exons that can be cloned into prokaryotes.
- D. used to make precursor mRNA.

ANSWER: C

60. Which of the following statements is NOT true of the hepatitis B vaccine?

- A. It is a recombinant vaccine.
- B. It consists of an internal protein from the virus.
- C. It is produced in a host yeast cell.
- D. Both (a) and (c).

ANSWER: B

61. \_\_\_\_\_ is/are required to produce the recombinant plasmid.

- A. Restriction endonuclease.
- B. DNA polymerase.
- C. DNA Ligase.
- D. Only a and c.

ANSWER: D

62. Which of the following could NOT be the recognition site of a restriction endonuclease?

- A. GAATTC CTTAAG.
- B. ATCGAT TAGCTA.
- C. CTGCAG GACGTC.
- D. GCTTGC CGAACG.

ANSWER: D

63. Human DNA cut with restriction enzyme A can be joined to \_\_\_\_\_.

- A. human DNA cut with restriction enzyme B.
- B. bacterial DNA cut with restriction enzyme A.
- C. bacterial DNA that is uncut.
- D. bacterial DNA cut with restriction enzyme B.

ANSWER: B



64. The population is said to be \_\_\_\_\_ for restriction enzyme fragment patterns.

- A. polymorphic.
- B. pleotropic.
- C. polygenic.
- D. monogenic.

ANSWER: A

65. RFLPs result because individuals in a population have \_\_\_\_\_.

- A. DNA sequence differences that create different proteins.
- B. different mutations that alter the length of their mRNA.
- C. DNA sequence differences that create different proteins.
- D. DNA sequence differences in the pattern of restriction sites.

ANSWER: D

66. Replication of DNA occurs in a \_\_\_\_\_ manner.

- A. Conservative.
- B. dispersive.
- C. semi-conservative.
- D. a & b.

ANSWER: C

67. Sticky ends are \_\_\_\_\_.

- A. single-stranded DNA sequences that are generated by staggered cuts.
- B. double-stranded DNA sequences that are generated by staggered cuts.
- C. different from cohesive ends.
- D. single-stranded DNA sequences that are generated by blunt cuts.

ANSWER: A

68. A probe is used in which stage of the gene transfer process?

- A. DNA cleavage.
- B. Recombination.
- C. Cloning.
- D. Screening.

ANSWER: D

69. Genetic engineering has successfully transferred genes from eukaryotic cells into \_\_\_\_\_.

- A. bacteria.
- B. plants.
- C. animals.
- D. all the above.

ANSWER: D

70. Gene transcription is initiated by \_\_\_\_\_.

- A. exons.
- B. RNA Pol.
- C. promoter.
- D. enhancers.

ANSWER: C

71. Which of the following is NOT a potential use for results of DNA microarray testing?

- A. Determining the probability that your offspring will carry the gene for a particular trait.
- B. Determining which genes are active in cells affected with cancer.
- C. Determining whether a particular drug will be toxic for you.
- D. All of the above are potential uses of DNA microarray testing.

ANSWER: D

72. Why are Type I and Type III restriction endonucleases so infrequently used in recombinant DNA

technology?

- A. They are more expensive to use than Type II nucleases.
- B. They only work on virus DNA, not bacterial or eukaryotic DNA.
- C. They don't cut the DNA in at specific recognition sequences.
- D. They are difficult to isolated.

ANSWER: C

73. Insertion of a plasmid into a bacterium is done by using \_\_\_\_\_.

- A. heat shock.
- B. injecting the bacteria into the plasmid.
- C. mixing in vitro bacterial chromosomal DNA and the plasmid.
- D. both a and b.

ANSWER: A

74. Which of the following vectors can carry the largest insert?

- A. Plasmids.
- B. Macroplasmids.
- C. YACs.
- D. BACs.

ANSWER: C

75. A piece of DNA is introduced into the ampicillin resistant gene of the plasmid, which also has a tetracycline resistant gene. Bacteria transformed with this plasmid will be \_\_\_\_\_.

- A. resistant to ampicillin only.
- B. resistant to both antibiotics.
- C. sensitive to tetracycline only.
- D. resistant to tetracycline only.

ANSWER: D

76. Restriction enzymes are involved in all of the following genetic engineering techniques EXCEPT \_\_\_\_\_.

- A. cloning DNA into vectors.
- B. mapping studies.
- C. identification of genetic markers.
- D. PCR.

ANSWER: D

77. A "YAC" is a useful \_\_\_\_\_.

- A. vector.
- B. screen.
- C. probe.
- D. library.

ANSWER: A

78. Chromosome walking is a technique used to \_\_\_\_\_.

- A. move chromosomes around the nucleus.
- B. move a fragment of chromosomal DNA from one area of a chromosome to another.
- C. recombination between chromosomal DNA of two different species.
- D. a method used to locate a gene using a set of clones from a DNA library.

ANSWER: D

79. The process by which plasmid vectors are introduced into bacteria is called \_\_\_\_\_.

- A. conjugation.
- B. plasmolysis.
- C. bacterial induction.
- D. transformation.

ANSWER: D

80. At the beginning of each cycle the temperature of the PCR reaction is raised in order to \_\_\_\_\_.

- A. elongate the primer.
- B. denature the double DNA strands.
- C. attach the primer.
- D. polymerize the DNA.

ANSWER: B

81. A primer is \_\_\_\_\_.

- A. a short DNA or RNA molecule that acts as starting point for 3' chain growth.
- B. an autonomously replicating piece of DNA that serve as a template.
- C. a regulator region a short distance from the 5' end of a gene.
- D. a long DNA or RNA sequence that elongates the template.

ANSWER: A

82. For PCR, DNA can be isolated from which of the following source?

- A. Frozen tissue.
- B. Fossil specimens.
- C. Preserved tissue.
- D. All the above.

ANSWER: D

83. In the Southern blot, which of the following component is labeled to visualize hybridization?

- A. Probe (single stranded DNA).
- B. Restriction enzymes.
- C. Hybridization bag.
- D. Gel used for DNA separation.

ANSWER: A

84. When DNA is electrophoresed in gel, DNAs that are small (20 base pairs or less) will \_\_\_\_.

- A. remain stationary.
- B. move through the gel more quickly than DNAs that are 100 bp long.
- C. be found near the top of the gel after the DNA has been electrophoresed.
- D. move through the gel more slowly than DNAs that are 100 bp long.

ANSWER: B

85. Gene that masks the effect of another gene is said to be \_\_\_\_\_.

- A. dominant.
- B. recessive.
- C. selectable.
- D. reporter.

ANSWER: A

86. Dideoxy nucleoside triphosphate \_\_\_\_\_.

- A. will terminate DNA synthesis when incorporated into a growing DNA strand.
- B. cannot bind to a growing DNA chain.
- C. can form a sugar phosphate bond with a new nucleoside triphosphate during DNA synthesis.
- D. has an oxygen at the 3' carbon.

ANSWER: A

87. Manual DNA sequencing gels are read from the \_\_\_\_\_.

- A. backside using infrared light.
- B. left side (when viewed from the loading wells).
- C. bottom up.
- D. top down.

ANSWER: C

88. The DNA sequence obtained by both the manual and automatic sequencing corresponds to the \_\_\_\_\_.

- A. template DNA strand.
- B. restriction sequences for certain restriction enzymes.
- C. complementary DNA strand.
- D. messenger RNA.

ANSWER: C

89. What are the advantages of using DNA microarrays over filter hybridization to screen for single nucleotide mutations?

- A. Hundreds of thousands of experiments can be done at the same time.
- B. Whole cells can be used for DNA template.
- C. No probes are necessary.
- D. Microarrays can be read visually.

ANSWER: A

90. RFLPs are NOT \_\_\_\_\_.

- A. used to construct linkage maps
- B. cut by restriction endonucleases.
- C. polymorphic DNA sequences.
- D. used in DNA sequencing.

ANSWER: D

91. Is it possible to use PCR to produce many copies of all DNA of one chromosome?

- A. Yes, if the correct primers are available.
- B. Yes, if the telomeres are present.
- C. No, PCR cannot copy DNA, only RNA.
- D. No, PCR copies short sequences of DNA only.

ANSWER: D

92. \_\_\_\_\_ organism is known as the rDNA 'Factory'.

- A. Escherichia coli.
- B. Bacillus subtilis.
- C. Saccharomyces cerevesiae.
- D. Thermus aquaticus.

ANSWER: A

93. \_\_\_\_\_ consists of recombinant cells containing different fragments of a foreign genome.

- A. DNA probes.
- B. Homologous recombinants.
- C. Genomic libraries.
- D. Knockout organisms.

ANSWER: C

94. Recombinant DNA technology methods began in the \_\_\_\_\_.

- A. 1950's.
- B. 1960's.
- C. 1970's.
- D. 1980's.

ANSWER: C

95. \_\_\_\_\_ are used to select genes of interest from a genomic library.

- A. Restriction enzymes.
- B. DNA Probes.
- C. Cloning vectors.
- D. Gene targets.

ANSWER: B

96. Which gene transfer technique involves the use of a fatty bubble to carry a gene into a somatic cell?

- A. Electroporation.

- B. Liposome transfer.
- C. Microinjection.
- D. Particle bombardment.

ANSWER: B

97. "Naked" DNA \_\_\_\_\_.

- A. is free of nucleic acids.
- B. is free of the cell.
- C. is free of protein.
- D. contains just the sugar-phosphate backbone.

ANSWER: C

98. The first drug produced using recombinant DNA technology is \_\_\_\_\_.

- A. streptokinase.
- B. tPA.
- C. insulin.
- D. penicillin.

ANSWER: C

99. Which of the following transgenic pharming products is incorrectly paired with the host organism that produces it?

- A. Hemoglobin- Rabbit.
- B. Human growth Hormone - rat.
- C. Lactoferrin- cow.
- D. Alpha-1-antitrypsin - sheep.

ANSWER: A

100. When was the first recombinant insulin molecule developed?

- A. 1975.
- B. 1962.
- C. 1999.
- D. 1982.

ANSWER: D

101. Human genome project began as researcher's mapped \_\_\_\_\_ and sites of cytogenetic abnormalities.

- A. RAPD's.
- B. RFLPs.
- C. PCRs.
- D. VNTRs.

ANSWER: B

102. The first organism to have its genome to be sequenced was \_\_\_\_\_.

- A. Haemophilus influenzae.
- B. Escherichia coli.
- C. Mycoplasma genitalium.
- D. Saccharomyces cerevisiae.

ANSWER: A

103. The Human Genome Project officially began in \_\_\_\_\_.

- A. 1988.
- B. 1990.
- C. 1992.
- D. 1995.

ANSWER: B

104. Funding for the Human Genome Project came from \_\_\_\_\_.

- A. NIH.
- B. DOE.

- C. NIH and DOE.
- D. NIH, DOE and ELSI.

ANSWER: C

105. Which of the two groups worked on the first draft sequence of the human genome?

- A. Francis Collins and the International Consortium skipped the BAC stage.
- B. Francis Collins led the effort by Celera Genomics.
- C. Craig Venter's group shot gunned multiple copies of entire genomes into small pieces and used a computer program to assemble the overlaps into larger pieces.
- D. Francis Collins first published their results.

ANSWER: C

106. DNA is separated on agarose based on its \_\_\_\_\_.

- A. length. .
- B. charge.
- C. Molecular weight.
- D. a & b

ANSWER: C

107. The lac repressor is a/an \_\_\_\_\_.

- A. RNA molecule.
- B. carbohydrate.
- C. protein molecule.
- D. lipid molecule.

ANSWER: C

108. Recombinant DNA is defined as DNA produced from \_\_\_\_\_.

- A. RNA and a protein.
- B. DNA and hemoglobin
- C. viral DNA and glucose.
- D. DNA of two different organisms.

ANSWER: D

109. Two sugars found in nucleic acids are \_\_\_\_\_.

- A. sucrose and ribose.
- B. glucose and fructose.
- C. deoxyribose and ribose.
- D. deoxyribose and glucose.

ANSWER: C

110. Which of the following best describes the function of mRNA?

- A. It stays in the nucleus and is copied by DNA.
- B. It carries amino acids to the growing polypeptide chain.
- C. It makes up the ribosomes and provides the site for protein synthesis.
- D. It is transcribed from the DNA and carries the information to the ribosome.

ANSWER: D

111. The first genetically engineered organism was \_\_\_\_\_.

- A. sheep.
- B. yeast.
- C. E.coli.
- D. Haemophilus influenzae Rd virus.

ANSWER: C

112. A genetically engineered organism that can pass on its new genes to its offspring is said to be \_\_\_\_\_.

- A. photogenic.
- B. transgenic.

- C. hygienic.
- D. bionic.

ANSWER: B

113. The first mammal to be successfully cloned was \_\_\_\_\_.

- A. human.
- B. sheep.
- C. goat.
- D. pig.

ANSWER: B

114. DNA technology has many medical applications. Which of the following is NOT DONE routinely at present?

- A. Production of hormones for treating diabetes and dwarfism.
- B. Production of viral proteins for vaccines.
- C. Introduction of genetically engineered genes into human gametes.
- D. Prenatal identification of genetic disease genes.

ANSWER: C

115. Expression of a cloned eukaryotic gene in a bacterial cell involves many challenges. The use of mRNA and reverse transcriptase is part of a strategy to solve the problem of \_\_\_\_\_.

- A. post-transcriptional processing.
- B. electroporation.
- C. post-translational processing.
- D. nucleic acid hybridization.

ANSWER: A

116. A paleontologist has recovered a bit of tissue from the 400-year-old preserved skin of an extinct dodo (a bird). The researcher would like to compare a specific region of the DNA from the sample with DNA from living birds. Which of the following would be most useful for increasing the amount of dodo DNA available for testing?

- A. RFLP analysis.
- B. Polymerase chain reaction (PCR).
- C. Electroporation.
- D. Gel electrophoresis.

ANSWER: B

117. Plants are more readily manipulated by genetic engineering than are animals because \_\_\_\_\_.

- A. plant cells have larger nuclei.
- B. more vectors are available for transferring recombinant DNA into plant cells.
- C. a somatic plant cell can often give rise to a complete plant.
- D. genes can be inserted into plant cells by microinjection.

ANSWER: C

118. The addition of a poly-A tail is what type of a modification?

- A. Post transcriptional modification.
- B. Post translational modification.
- C. a type of DNA modification.
- D. Viral modification of tRNA.

ANSWER: C

119. One of the most significant discoveries which allowed the development of recombinant DNA technology was the \_\_\_\_\_.

- A. discovery of antibiotics used for selecting transformed bacteria.
- B. identification and isolation of restriction endonucleases permitting specific DNA cutting.
- C. discovery of DNA and RNA polymerase allowing workers to synthesize any DNA sequence.
- D. Southern technique for separation and identification of DNA sequences.

ANSWER: B

120. Vector with replication origin sequence from two different organisms is called \_\_\_\_\_ vector.

- A. expression.
- B. replacement.
- C. insertion.
- D. shuttle.

ANSWER: D

121. In general, a second antibody or "conjugate" \_\_\_\_\_.

- A. binds HIV proteins.
- B. binds only to human anti-HIV primary antibodies.
- C. binds primary antibody.
- D. binds enzyme conjugate.

ANSWER: C

122. The Human Genome Project has the potential to \_\_\_\_\_.

- A. lead to treatments for inherited diseases.
- B. lead to treatments for contagious diseases.
- C. increase our understanding of the historical relationships among species.
- D. all the above.

ANSWER: D

123. Gel electrophoresis separates DNA molecules on the basis of \_\_\_\_\_.

- A. the nucleotide sequence of their sticky ends.
- B. the amount of adenine they contain relative to the amount of thymine they contain.
- C. their nucleotide sequences.
- D. their lengths.

ANSWER: D

124. What technique was used by Celera Genomics to quickly produce a draft of the nucleotide sequence of the human genome?

- A. Plasmid approach.
- B. Whole-genome shotgun approach.
- C. Genetic marker approach.
- D. Nucleic acid probe approach.

ANSWER: B

125. Approximately what percentage of the human genome consists of noncoding DNA?

- A. 77 % .
- B. 57 % .
- C. 87 % .
- D. 97 % .

ANSWER: D

126. Which of these statements can be logically inferred from the amount of DNA shared by chimpanzees and humans?

- A. Humans and chimpanzees share a relatively recent common ancestor.
- B. Humans are a more complex life form than chimpanzees.
- C. Humans evolved from chimpanzees.
- D. Humans are unique and different from all other life forms

ANSWER: A

127. Repetitive DNA can be found in \_\_\_\_\_.

- A. telomeres.
- B. nucleosomes.
- C. genetic libraries
- D. plasmids.

ANSWER: A



128. Restriction enzymes are obtained from \_\_\_\_\_.

- A. archaea.
- B. bacteria.
- C. DNA viruses.
- D. retroviruses.

ANSWER: B

129. Microarrays have evolved from membrane based \_\_\_\_\_.

- A. high density arrays.
- B. low density arrays.
- C. high density oligonucleotides arrays.
- D. low density oligonucleotides arrays.

ANSWER: B

130. Arrange the steps involved in the synthesis of recombinant insulin. 1. select cells containing desired gene. 2. collect and purify the recombinant protein insulin 3. Insert gene into bacterial cell. 4. obtain insulin gene from human DNA. 5. Induce bacteria to express foreign protein.

- A. 1,2,3,4,5.
- B. 4,3,2,5,1.
- C. 4,3,1,5,2.
- D. 4,3,1,2,5.

ANSWER: C

131. DNA Microarray is widely used for \_\_\_\_\_.

- A. studying gene expression.
- B. gene cloning.
- C. gene targeting.
- D. Manipulation of genes.

ANSWER: A

132. cDNA prepared from samples is labeled using \_\_\_\_\_ in microarray.

- A. acrodyes.
- B. green dye.
- C. different fluorescent dyes.
- D. red dye.

ANSWER: C

133. A DNA microarray contains PCR products of \_\_\_\_\_ size.

- A. 700 bp to 1 kb.
- B. 300 bp to 3 kb.
- C. 400 bp to 4 kb.
- D. 200 bp to 2 kb.

ANSWER: D

134. Insulin is secreted in the body in \_\_\_\_\_.

- A. liver.
- B. kidney.
- C. pancreas.
- D. stomach.

ANSWER: C

135. \_\_\_\_\_ is arrays as featured on the gene chip.

- A. 100 different probes.
- B. few thousand different probes.
- C. individual probes.
- D. 1000 different probes.

ANSWER: B

136. What is the full form of IPTG?

- A. Isopropyl beta-D-1- thiogalactopyranoside.
- B. Indolepropyl beta-D-1- thiogalactopyranoside.
- C. Isopropyl beta-D-1- thiogalactopyranosidase.
- D. Isopentyl beta-D-1- thiogalactopyranosidase.

ANSWER: A

137. Agarose is a polymer of \_\_\_\_\_.

- A. galactose.
- B. glucose
- C. fructose.
- D. dextrose.

ANSWER: A

138. Active insulin is made up of \_\_\_\_\_ polypeptide chains.

- A. 4.
- B. 2.
- C. 3.
- D. 1.

ANSWER: B

139. Insulin is made up of \_\_\_\_\_ aminoacids.

- A. 55.
- B. 58.
- C. 61.
- D. 51.

ANSWER: D

140. Direct uptake of DNA is \_\_\_\_\_.

- A. transformation.
- B. transfection.
- C. transduction.
- D. conjugation.

ANSWER: A

141. Expand X-gal.

- A. 5-chloro, 3-bromo 2-indoyl galactoside.
- B. 5-chloro, 3-bromo 2-indoyl galactosidase.
- C. 5- bromo, 4-chloro, 3-indoylgalactoside.
- D. 5- bromo, 4-chloro, 3indoylgalactosidase.

ANSWER: C

142. The dideoxy method of DNA sequencing was introduced by \_\_\_\_\_.

- A. Maxam.
- B. Sanger.
- C. Gilbert.
- D. Watson.

ANSWER: B

143. Which of the following methods were used for sequencing in the Human genome project?

- A. Shotgun sequencing.
- B. Chromosome walking.
- C. Chain termination method.
- D. All the above.

ANSWER: D

144. In which year was the complete genome sequence of Escherichia coli published?

- A. 2000
- B. 2001.
- C. 1997.
- D. 1999.

ANSWER: C

145. Match the following genome sizes. 1. Human a. 170,000,000. 2. Mouse b. 4,720,000. 3. Drosophila c. 3,500,000,000. 4. Escherichia coli d. 300,000,000.

- A. 1-a, 2-b, 3-c, 4-d.
- B. 1-c, 2-d, 3-a, 4-b.
- C. 1-b, 2-c, 3-d, 4-a.
- D. 1-c, 2-d, 3-b, 4-a.

ANSWER: B

146. HIV infection can be detected by \_\_\_\_\_.

- A. ELISA.
- B. Western Blot.
- C. Both (a) and (b).
- D. None of the above.

ANSWER: C

147. Who discovered that ssDNA could hybridize with RNA?

- A. Sol Spiegelman.
- B. Edward Hall.
- C. Craig Venter.
- D. Both (a) and (b).

ANSWER: D

148. When was the first recombinant human growth hormone introduced in the market?

- A. 1985.
- B. 1986.
- C. 1987.
- D. 1988.

ANSWER: A

149. The replica plating technique was introduced by \_\_\_\_\_.

- A. Esther and Joshua Lederberg.
- B. Benjamin Thompson.
- C. Heinz Wolff.
- D. Crick.

ANSWER: A

150. Which one of the following is not a restriction enzyme

- A. ECORI
- B. Hind III
- C. Sma I
- D. T4 Ligase

ANSWER: D

151. Restriction enzymes were discovered by \_\_\_\_\_ in the year \_\_\_\_\_.

- A. Lederberg, 1972.
- B. Arber, 1962.
- C. E.M. Southern, 1962.
- D. None of the above.

ANSWER: B

152. Nathan, Arber and Smith won the Nobel Prize for the discovery of restriction enzymes during the year \_\_\_\_\_.

- A. 1972.
- B. 1962.
- C. 1952.
- D. 1978.

ANSWER: D

153. Which of these is not a fluorescent dye?

- A. SYBER Green.
- B. Acridine orange.
- C. Methylene blue.
- D. Ethidium bromide.

ANSWER: C

154. Taq Pol used in PCR lacks \_\_\_\_\_.

- A. 5'-3' exonuclease activity.
- B. 3'-5- exonuclease activity.
- C. It possesses all activity.
- D. None of these.

ANSWER: B

155. Which of the following component is not found in native PAGE?

- A. SDS.
- B. Tris.
- C. TEMED.
- D. APS.

ANSWER: A

156. Which paper was initially used to blot RNA?

- A. Diazobenzyloxymethyl.
- B. Nylon membrane.
- C. Nitrocellulose membrane.
- D. Whattmann filter paper.

ANSWER: A

157. When was the southern blotting technique introduced?

- A. 1974.
- B. 1975.
- C. 1976.
- D. 1982.

ANSWER: B

158. . A polylinker is a/an \_\_\_\_\_.

- A. adaptor.
- B. linker.
- C. multiple cloning site.
- D. selectable marker.

ANSWER: C

159. What is the charge of the dye ethidium bromide?

- A. Positive.
- B. Negative.
- C. Neutral.
- D. Nil charge.

ANSWER: A

160. Ethidium bromide binds to DNA by \_\_\_\_\_.

- A. acetylation.
- B. covalent bonding.

- C. intercalation.
- D. intracalation.

ANSWER: C

161. Which method is also known as Chain termination method?

- A. Maxam and Gilbert's method.
- B. Pyro sequencing
- C. Chromosome walking
- D. Sanger's dideoxy method.

ANSWER: D

162. Restriction enzymes are a type of \_\_\_\_\_.

- A. Exonucleases.
- B. Endonucleases.
- C. DNA Polymerases.
- D. Reverse transcriptase.

ANSWER: B

163. Which type of restriction enzyme is most commonly used in rDNA technology?

- A. Type I.
- B. Type II.
- C. Type III.
- D. Type IV.

ANSWER: B

164. The first organism used in the DNA technology by many scientists is \_\_\_\_\_.

- A. Bacillus sp.
- B. E.coli.
- C. yeast.
- D. phages.

ANSWER: B

165. The solid support used in a microarray is \_\_\_\_\_.

- A. silicon.
- B. glass.
- C. alumina.
- D. Only (a) and (b).

ANSWER: D

166. The method of recombinant selection in pUC vectors is \_\_\_\_\_.

- A. physical selection.
- B. insertional inactivation.
- C. alpha complementation.
- D. indirect selection.

ANSWER: C

167. The polymerase chain reaction is a/an \_\_\_\_\_.

- A. molecular technique.
- B. biochemical technique.
- C. immunological technique.
- D. microbiological technique.

ANSWER: A

168. The human artificial chromosome was developed in 1997 by \_\_\_\_\_.

- A. H. Willard.
- B. M. Olson.
- C. Lederberg.
- D. C. Venter.

ANSWER: A

169. PAC vectors can be used to clone gene of size \_\_\_\_\_ kb.

- A. 5-25.
- B. 35-45.
- C. 200-2000.
- D. 100-300.

ANSWER: D

170. pBR322 plasmid contains \_\_\_\_\_.

- A. ampicillin resistance.
- B. tetracycline resistance.
- C. both ampicillin and tetracycline resistance.
- D. lac Z gene.

ANSWER: C

171. M13 phage vectors are suitable for cloning when the required product is \_\_\_\_\_.

- A. ds DNA.
- B. ss DNA.
- C. mRNA
- D. cDNA.

ANSWER: B

172. Transformation means \_\_\_\_\_.

- A. exchange of genetic material.
- B. crossing over.
- C. naked uptake of DNA from environment.
- D. selection of recombinants.

ANSWER: C

173. \_\_\_\_\_ is considered as 'nature's natural genetic engineer'.

- A. M13 bacteriophage.
- B. Lambda phage.
- C. Cosmids.
- D. Ti plasmids.

ANSWER: D

174. Increasing the concentration of agarose gel \_\_\_\_\_.

- A. increases the pore size.
- B. decreases the pore size.
- C. does not affect the pore size.
- D. decreases the melting point.

ANSWER: B

175. Which of the following are used to stain proteins?

- A. Coomassie brilliant blue.
- B. Bromo phenol blue.
- C. Xylene cyanol.
- D. Ethidium bromide.

ANSWER: A

176. What concentration of agarose is used to run PCR products?

- A. 1 %.
- B. 2 %.
- C. 0.8 %.
- D. 12 %.

ANSWER: B

177. Which among the following is not a DNA Microarray?

- A. Genome chip.
- B. Gene expression.
- C. DNA chip.
- D. Gene array.

ANSWER: B

178. The component of each spot in a microarray which corresponds to a single gene is \_\_\_\_\_.

- A. cancer cells.
- B. multiple copies of a unique mRNA sequence.
- C. multiple copies of a unique DNA sequence.
- D. healthy cells.

ANSWER: C

179. A disease of "genes gone bad" is \_\_\_\_\_.

- A. Down's Syndrome.
- B. hemophilia.
- C. cancer
- D. leukemia.

ANSWER: C

180. \_\_\_\_\_ instrument that spins at very high speed and separates materials by size or density.

- A. Vortex mixer.
- B. Centrifuge.
- C. DNA Microarray.
- D. Shaker.

ANSWER: B

181. Which among the following is not a type of RNA?

- A. Complementary RNA (cRNA).
- B. Messenger RNA (mRNA).
- C. Transfer RNA (tRNA).
- D. Ribosomal RNA (rRNA).

ANSWER: A

182. A handy tool for determining the differences between two cell types is \_\_\_\_\_.

- A. DNA Extraction.
- B. DNA Microarray.
- C. Gel Electrophoresis.
- D. Polymerase Chain Reaction.

ANSWER: B

183. Telomeric Equence are found in

- A. HAC
- B. BAC
- C. YAC
- D. PAC

ANSWER: C

184. Why do we have to make a complementary DNA? Why not just use mRNA?

- A. Because our sample is DNA.
- B. RNA is single stranded.
- C. DNA is much more stable than RNA.
- D. mRNA does not contain any genetic information.

ANSWER: C

185. Vectors with selectable markers are used to identify \_\_\_\_\_.

- A. recombinant clones.
- B. desired genes.
- C. vector DNA fragments.
- D. foreign genes.

ANSWER: A

186. A \_\_\_\_\_ material is used to analyze the data from microarray.

- A. Microarray Database.
- B. Microarray Scanner.
- C. Microarray Microscope.
- D. All the above.

ANSWER: C

187. The sequence of nucleotides in a gene is translated by cells to produce a chain of amino acids, creating \_\_\_\_\_.

- A. genes.
- B. chromosomes.
- C. ATP.
- D. proteins.

ANSWER: D

188. Genetic information is carried by \_\_\_\_\_ from cell to cell and from generation to generation.

- A. enzymes.
- B. protein.
- C. DNA.
- D. RNA.

ANSWER: C

189. Why does DNA comes out of the isopropyl alcohol?

- A. Because DNA is denser than the alcohol.
- B. Because DNA has alcohol content.
- C. Because DNA is double-stranded.
- D. Because DNA is not soluble in isopropyl alcohol.

ANSWER: D

190. The stain which binds to DNA and shows up fluorescent light is \_\_\_\_\_.

- A. CBB.
- B. sodium sulfide.
- C. ethidium bromide.
- D. bromophenol blue.

ANSWER: C

191. Which of the following attach to sites on the DNA strands that are at either end of the segment you want to copy?

- A. Primers.
- B. Salt.
- C. Mg<sup>2+</sup>.
- D. Taq polymerase.

ANSWER: A

192. Before the advent of heating lid, what was used to prevent evaporation from PCR tubes?

- A. Water.
- B. Mineral oil.
- C. Enzymes.
- D. None of the above

ANSWER: B

193. At what temperature do ds DNA get completely converted to ss DNA? .



- A. 65.
- B. 75.
- C. 85.
- D. 95.

ANSWER: D

194. \_\_\_\_\_ is a technique for creating amino acid changes in the DNA.

- A. Site directed mutagenesis.
- B. Polymerase Chain Reaction.
- C. RAPD.
- D. RFLP.

ANSWER: A

195. DNA Polymerase without 5'----- 3' exonuclease activity is \_\_\_\_\_.

- A. DNA POL II.
- B. DNA POL III.
- C. Klenow fragment.
- D. DNA POL I.

ANSWER: C

196. What is a cloning vector?

- A. An agent, such as a plasmid, used to transfer DNA from an in vitro solution into a living cell.
- B. The sticky end of a DNA fragment.
- C. The laboratory apparatus used to clone genes.
- D. The enzyme that cuts DNA into restriction fragments

ANSWER: A

197. The loss of helical structure of DNA is \_\_\_\_\_.

- A. renaturation.
- B. annealing.
- C. denaturation.
- D. disintergration.

ANSWER: C

198. The major RNA component of the cell is \_\_\_\_\_.

- A. tRNA.
- B. mRNA.
- C. rRNA.
- D. siRNA.

ANSWER: C

199. The okazaki fragments were discovered in \_\_\_\_\_ by Reiji Okazaki & colleagues.

- A. 1968.
- B. 1978.
- C. 1965.
- D. 1970.

ANSWER: A

200. Replication occurs in \_\_\_\_\_ direction.

- A. 3'---->5'.
- B. 5'-----> 3'.
- C. Both (a) and (b).
- D. in any direction.

ANSWER: B

201. Which form of DNA was discovered by Watson and Crick?

- A. A- form.
- B. B- form.

- C. C- form.
- D. Z- form.

ANSWER: B

202. Eukaryotic mRNA is \_\_\_\_\_.

- A. polycistronic.
- B. unicistronic.
- C. monocistronic.
- D. methylated.

ANSWER: C

203. The 'TATA Box' is also known as \_\_\_\_\_.

- A. Goldberg-Hogness box
- B. Pribnow Box.
- C. Both a and b.
- D. CAAT box.

ANSWER: C

204. In insertional inactivation if foreign DNA is inserted, the beta galactosidase marker is \_\_\_\_\_.

- A. inactivated, and the colonies turn blue.
- B. activated, and the colonies remain white.
- C. activated, and the colonies turn blue.
- D. inactivated, and the colonies remain white.

ANSWER: D

205. The lac z gene marker codes for \_\_\_\_\_.

- A. beta- galactosidase, which splits x-gal.
- B. beta- galactosidase, which makes x-gal resistant to splitting.
- C. ampicillin resistance.
- D. white colonies.

ANSWER: A

206. The smaller the DNA fragment \_\_\_\_\_.

- A. the closer to the origin it will appear.
- B. the brighter color it produces with ethidium bromide.
- C. the faster it migrates during separation by electrophoresis.
- D. the slower it migrates during separation by electrophoresis.

ANSWER: C

207. The purpose of the Southern Blot test is to \_\_\_\_\_.

- A. look for a specific nucleotide sequence in the DNA being tested.
- B. to determine how closely two organisms are related.
- C. to identify the size of the fragment that contains the sequence.
- D. both a and c.

ANSWER: C

208. M13 phage contains \_\_\_\_\_.

- A. ss DNA.
- B. ds DNA.
- C. ss RNA.
- D. ds RNA.

ANSWER: A

209. MCS stands for \_\_\_\_\_.

- A. Multiple Cloning Segment.
- B. Multiple Cloning Site.
- C. Multiple Cloning Sequence
- D. Methylated Cloning Site.

ANSWER: B

210. To carry out Sanger sequencing a mixture is needed containing \_\_\_\_\_.

- A. single-stranded DNA .
- B. DNA polymerase.
- C. four deoxy ribonucleotides A, T, C, G.
- D. all the above.

ANSWER: D

211. Which of the following is start codons?

- A. AGT, AGC & AGG.
- B. GUC, CUG & UGC.
- C. CTC, TTT & CTT.
- D. AUG, ATT & GUG.

ANSWER: D

212. Which of the following are stop codons?

- A. CCC, GGG & AAA.
- B. UUG, UGG & GUG.
- C. UAG, UAA & UGA.
- D. ATT, CCC & GGG.

ANSWER: C

213. The start codon AUG codes for the amino acid \_\_\_\_\_.

- A. Cystine.
- B. Glycine.
- C. Methionine.
- D. Arginine.

ANSWER: C

214. Prokaryotic mRNA is \_\_\_\_\_.

- A. monocistronic.
- B. polycistronic.
- C. unicistronic.
- D. has a poly-A tail.

ANSWER: B

215. Expand the full form of RACE PCR.

- A. Random amplification of cDNA ends.
- B. Rapid amplification of cDNA ends.
- C. Reverse amplification of cDNA ends.
- D. Remote amplification of cDNA ends.

ANSWER: A

216. Which of the following statements about RNA splicing is FALSE?

- A. It removes the introns.
- B. It shortens the RNA molecule.
- C. It always occurs in the nucleus.
- D. All of the above statements are true.

ANSWER: D

217. The charge of DNA molecules is \_\_\_\_\_.

- A. positive.
- B. negative.
- C. neutral.
- D. Dependent on the source of DNA.

ANSWER: B

218. The negative charge on the DNA is due to the presence of \_\_\_\_\_.

- A. ribose.
- B. deoxyribose.
- C. phosphate group.
- D. nucleotides.

ANSWER: C

219. What is the purpose of agarose gel electrophoresis?

- A. Protein separation.
- B. DNA separation.
- C. Carbohydrate separation.
- D. Lipid separation.

ANSWER: B

220. A virus with cos site is \_\_\_\_\_.

- A. lambda phage.
- B. P1- phage
- C. Cosmids.
- D. M13 phage.

ANSWER: D

221. Microarray analysis has allowed scientists to view what phenomenon?

- A. The genome sequence in a cell.
- B. The cDNA of a cell.
- C. The RFLPs of a cell.
- D. The expression of specific genes in a cell.

ANSWER: D

222. Why is glycerol a component of the gel loading dye?

- A. To provide density to DNA to remain in the well.
- B. To provide colour to DNA.
- C. To enhance the rate of migration.
- D. To retard the migration of RNA.

ANSWER: A

223. A gene which allows host cells containing the vector to be selected from amongst those which do not, usually by conferring resistance to a toxin is \_\_\_\_\_.

- A. selectable marker.
- B. DNA probe.
- C. recombinant DNA.
- D. plasmid.

ANSWER: A

224. YACs were first discovered by \_\_\_\_\_.

- A. Murray.
- B. Barry Hall.
- C. Murray and Stozak.
- D. Collins and Hons.

ANSWER: C

225. YACs are more stable than BACs as they produce \_\_\_\_\_.

- A. replicative sequences.
- B. chimeric effects.
- C. dimer formation.
- D. effective transcriptional sites

ANSWER: B

226. Types of YAC include \_\_\_\_\_.

- A. BACs and Cosmid.
- B. cosmid and Phagemids.
- C. phagemids and Yips.
- D. Yips and Yeps.

ANSWER: D

227. YACs contain \_\_\_\_\_.

- A. two Eco RI sites.
- B. two Bam HI sites.
- C. one Eco RI and one Bam HI sites.
- D. no restriction sites.

ANSWER: C

228. After the DNA to be inserted is cleaved, YAC is cleaved using \_\_\_\_\_.

- A. EcoRI site.
- B. BamHI site.
- C. EcoRI and BamHI site.
- D. Ampr Marker.

ANSWER: C

229. BACs are generally used for \_\_\_\_\_.

- A. genome projects.
- B. modeling infectious diseases.
- C. produce infectious clones.
- D. All the above.

ANSWER: D

230. Various types of insulin are used to treat diabetes and include \_\_\_\_\_.

- A. Rapid-acting insulin.
- B. Short-acting insulin.
- C. Intermediate-acting insulin.
- D. All the above

ANSWER: D

231. What can be cloned using BACs?

- A. RNA viruses
- B. DNA viruses.
- C. RNA and DNA viruses.
- D. No viral genetic matter can be cloned.

ANSWER: C

232. BAC is used for \_\_\_\_\_ purposes in bacteria.

- A. transforming.
- B. cloning.
- C. transforming and cloning.
- D. None of above.

ANSWER: C

233. A confirmation of BAC insertion is \_\_\_\_\_.

- A. growth of cells on media with Amp.
- B. growth of cells on media with Tet.
- C. blue colonies production.
- D. white colonies production.

ANSWER: D

234. BACs are based on \_\_\_\_\_.

- A. E.coli DNA.
- B. pBR322 plasmid.

- C. Hfr.
- D. functional fertility plasmid.

ANSWER: D

235. BAC was first constructed by \_\_\_\_\_.

- A. Hiroaki Shizuya.
- B. Barry Hall.
- C. Murray and Stozak.
- D. Collins and Hons.

ANSWER: A

236. BAC promotes genetic information by \_\_\_\_\_.

- A. conjugation.
- B. transformation.
- C. transduction.
- D. replication.

ANSWER: A

237. BAC is more advantageous than YAC due to \_\_\_\_\_.

- A. High efficiency.
- B. Easy to manipulate.
- C. Stably maintained.
- D. All the above.

ANSWER: D

238. In Cohen and Boyer's recombinant DNA experiments, restriction endonucleases were used to

- \_\_\_\_\_.
- A. created a recombinant molecule and transformed into an E.coli cell.
  - B. isolate fragments of frog DNA that contained an rRNA gene.
  - C. cleave the bacterial plasmid.
  - D. All of these are correct.

ANSWER: A

239. SV40 viruses are \_\_\_\_\_ viruses.

- A. animal.
- B. plant.
- C. bacterial.
- D. insect.

ANSWER: A

240. Gene transfer in bacteria by transformation has which of the following characteristics?

- A. A majority of the donor genes are transferred.
- B. It involves a plasmid.
- C. It depends on phage infection of the recipient cell.
- D. It can be carried out using free DNA extracted from the donor.

ANSWER: D

241. What is the function of alkaline phosphatase?

- A. Elongate DNA.
- B. Add phosphate group.
- C. Remove phosphate group.
- D. Form phosphodiester bond.

ANSWER: C

242. The amount of a specific DNA sequence can be increased more than  $10^6$  fold by using which of the following chemical reactions?

- A. Restriction endonuclease reaction.
- B. Ligation reaction.

- C. Polymerase Chain Reaction.
- D. Reverse translation

ANSWER: C

243. Which polymerase made widespread use of PCR possible?

- A. DNA polymerase I.
- B. Thermus aquaticus (Taq) polymerase.
- C. DNA polymerase III.
- D. RNA Pol.

ANSWER: B

244. Sickle cell anemia occurs due to replacement of \_\_\_\_\_.

- A. Val by Glu.
- B. Glu by Val.
- C. Val by Asp.
- D. Glu by Ala.

ANSWER: B

245. One of the most useful methods for identifying a specific gene is \_\_\_\_\_.

- A. thin layer chromatography.
- B. Southern Blotting.
- C. Western Blotting.
- D. Eastern blotting.

ANSWER: B

246. The expansion of YAC is \_\_\_\_\_.

- A. Yeast Artificial Chromosome.
- B. Young Artificial Chromosome.
- C. Yeast Artificial Capsomere.
- D. Yeast Artificial Capsule.

ANSWER: A

247. BAC stands for \_\_\_\_\_.

- A. Baculo Artificial Chromosome.
- B. Bacterial Artificial Chromosome.
- C. Bacterial Artificial Capsomere
- D. Bacterial Autonomous Chromosome.

ANSWER: A

248. Current applications of gene cloning include \_\_\_\_\_.

- A. cleaning up toxic waste.
- B. incorporating pest resistance in plants.
- C. manufacturing human growth hormone.
- D. All the above.

ANSWER: D

249. The first licensed drug generated using recombinant DNA technology was human insulin. It was developed by \_\_\_\_\_ and licensed by \_\_\_\_\_.

- A. Biocon Ltd, India.
- B. Dr. Reddy's Lab, India.
- C. Shantha Biotech, India.
- D. Genentech, Eli Lilly and Company.

ANSWER: D

250. Which of the following set of enzymes are primarily needed to produce recombinant DNA?

- A. Restriction enzyme, ligase.
- B. DNA polymerase, topoisomerase.
- C. Polymerase, ligase.

D. Transcriptase, ligase.

ANSWER: A

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