

## BIOTECHNOLOGY

- Which of the following does not contribute to the initiation of the stationary phase of bacterial growth?  
A) Depletion of nutrients and oxygen                      B) Accumulation of organic acids  
C) The generation time of the dividing organisms        D) A drop in the pH of the growth medium
- Microorganisms that are sometimes found growing in jellies, syrups, and brines are known as what?  
A) Acidophiles    B) Halophiles            C) Neutrophiles        D) Osmophile
- Exponential phase of growth curve of bacteria is of limited duration because  
A) rise in cell density                      B) Accumulation of toxic material  
C) Exhaustion of nutrients                D) All of the above
- The hydrogen donor in bacterial photosynthesis is usually  
A) Water    B) Ammonia    C) Sulphur    D) Hydrogen sulphide
- The process that convert nitrates ( $\text{NO}_3^-$ ) back to nitrogen gas ( $\text{N}_2$ ) there by replenishing  $\text{N}_2$  in the atmosphere is called  
A) Nitrification            B) Denitrification        C) Deamination            D) Nitrogen fixation
- Which of the following organism play a key role in the transformation of rock to soil.  
A) Cyanobacteria    B) Bacillus spp            C) Pseudomonas spp    D) clostridium spp
- Normally DNA molecule has A-T, G-C pairing. However these bases can exist in alternative valency status, owing to rearrangements called  
A) point mutation                      B) frame shift mutation  
C) analogue substitution                D) tautomerisational mutation
- Which of the following point mutations would be most likely to affect protein function?  
A) TAA to TGA            B) CAA to TAA    C) AGG to AGA        D) CTT to CTC
- In the Ames test:  
A) Mutagens cause lethal mutations, reducing the number of colonies.  
B) Mutagens cause mutations that disrupt the ability of the cell to produce histidine.  
C) Mutagens will cause an increase in the number of revertants.

D) Only mutagens that cause transitions can be identified

10. The end result of F factor mediated conjugation:

A) is that both strains are F+

B) involves transfer of the entire bacterial chromosome.

C) converts the recipient strain to F+ and the donor to F-.

D) A and B.

11. Tertiary structure is maintained by

A) peptide bond

B) hydrogen bond

C) di-sulphide bond

D) all of the above

12. What secondary messenger is generated as a result of the action of nitrous oxide?

A) GTP

B) Cyclic GMP

C) ATP

D) Cyclic AMP

13. Some Enzymes require the presence of a non-protein substance if they are to catalyse a reaction. Which of the following terms is the best general term for such a substance?

A) Prosthetic group

B) Cofactor

C) Co-enzyme

D) Modulator

14. Which of the following is not a substrate –specific enzyme?

A) Glucokinase

B) Fructokinase

C) Hexokinase

D) Phosphofructokinase

15. Yellowing of plants is due to absence of

A) Calcium.

B) Chlorophyll.

C) Magnesium.

D) Nitrogen.

16. End product of glycolysis is

A) Glucose.

B) Pyruvic acid.

C) Citric acid.

D) Glycogen.

17. The sodium-potassium pump passes

A) more Na<sup>+</sup> out than K<sup>+</sup> in

B) K<sup>+</sup> out and Na<sup>+</sup> in on a one-for-one basis

C) Na<sup>+</sup> out and K<sup>+</sup> in on a one-for-one basis

D) K<sup>+</sup> and Na<sup>+</sup> in the same direction

18. A lipid bilayer

A) permits water soluble molecules to pass through it

B) facilitates the passage of water soluble molecules through it

C) inhibits the passage of water soluble substances through it

D) actively transports water soluble molecules through it.

19. Red blood cells have a characteristic concave shape because of

A) spectrin

B) dextrin

C) hemoglobin

D) hemocyanin

20. Which of the following transport induces conformational change in protein

- A) Simple Diffusion
- B) ATP driven active transport
- C) Facilitated diffusion
- D) iron driven active transport

21. The cell Cycle of a germinal cell has

- A) Two successive mitotic division
- B) Two successive reduction divisions
- C) Very short prophase in first division
- D) One reduction division followed by one mitotic division.

22. Which one of the following statements best describes the mechanism by which the "cell cycle control system" regulates events of the cell cycle?

- A)  $Ca^{++}$  and cAMP are leased into the nucleus at particular times.
- B) Protein activity is regulated through phosphorylation and dephosphorylation.
- C) Specific hormones signal when it's time to move to each stage of the cell cycle.
- D) Changes in membrane potential signal progress of the cell cycle.

23. Which term describes two centrosomes arranged at opposite poles of the cell?

- A) telophase
- B) anaphase
- C) prometaphase
- D) metaphase

24. The nucleosome consists of histone

- A) Octamer and 146 bp of DNA
- B) Tetramer and 146 bp of DNA
- C) Hexamer and 146 bp of DNA
- D) None of the above

25. Newly synthesized DNA contains

- A) both new strands.
- B) both old strands.
- C) one new and one old strand.
- D) only one strand.

26. Promoters for tRNAs are located

- A) upstream from the start codon
- B) downstream from the start codon
- C) both (A) and (B)
- D) none of these

27. The major function of RNA polymerase's sigma factor is

- A) Recognition of the translational stop sequence
- B) Recognition of the transcriptional start sequence
- C) Recognition of the transcriptional stop sequence
- D) Recognition of the translational start sequence

28. Which of the following conditions would cause the release of the lac repressor protein from the lac operator site on DNA?

- A) Presence of glucose in the growth media
- B) Presence of lactose in the growth media
- C) Presence of IPTG (isopropyl thiogalactoside) in the growth media
- D) Both (b) and (c) .

29. VNTRs represents-

- A) New terminal regions in DNA
- B) Functional genes in the DNA
- C) Split genes in the sample DNA
- D) Specific non-coding sequences with unique tandem repeats

30. Beer may be produced by

- A) germinating barley.
- B) fermenting grape.
- C) fermentation of rice.
- D) all of these.

31. which of the following aminoacids is not converted to Acetyl Co-A upon metabolism

- A) Tyrosine
- B) Leucine
- C) Tryptophan
- D) Valine

32. which of the following separation method is suited method for a protein sample with large differences in molecular mass

- A) dialysis
- B) salting out process
- C) density gradient centrifugation
- D) rate zonal centrifugation

33. Which one of the following techniques is not ideal for immobilized cell free enzymes?

- A) physical entrapment by encapsulation
- B) physical bonding by flocculation
- C) covalent chemical bonding by cross linking the precipitate
- D) covalent surface bonding to surface carriers

34. Microorganisms remove metals by

- A) adsorption and complexation
- B) adsorption and precipitation
- C) adsorption and volatilization
- D) all of these

35. Name the first organic acid produced by microbial fermentation

- A) citric acid
- B) lactic acid
- C) acetic acid
- D) none of the above

36. The lowest biomass yield in a culture of Escherichia coli will be in

- A) an aerated batch culture containing a initial high concentration of glucose  
 B) an aerated batch reactor containing an initial low concentration of glucose  
 C) an aerated fed-batch reactor having a low glucose concentration  
 D) an aerated continuous reactor having a low glucose concentration
37. Immobilized cell reactors for wastewater treatment have the advantage of having/being  
 A) higher cell concentration  
 B) more stable and prevent washout  
 C) higher dilution rate before the cells washout  
 D) all of the above
38. A continuous reactor has a dilution rate of  $0.5 \text{ h}^{-1}$ . Its residence time would be  
 A)  $\ln(2)/0.5$   
 B)  $\ln(2) \times 0.5$   
 C)  $0.5 \text{ h}$   
 D)  $2 \text{ h}$
39. Which of the following plant cell will show totipotency?  
 A) Xylem vessels  
 B) Sieve tube  
 C) Meristem  
 D) Cork cells
40. Which of the following metabolites are implicated in stress tolerance?  
 A) Proline  
 B) Betaines  
 C) Both (A) and (B)  
 D) Citrate
41. Which of the following compounds has been produced in transgenic plants to improve tolerance to salt stress and water deficit?  
 A) Sucrose  
 B) Mannitol  
 C) Nicotine  
 D) Octopine
42. Artificial seeds are  
 A) seeds produced in laboratory condition  
 B) seeds encapsulated in a a gel  
 C) somatic embryos encapsulated in a gel  
 D) zygotic embryos encapsulated in a gel
43. The cell line used for the production of polio vaccine was  
 A) Primate kidney cell line  
 B) CHO cell line  
 C) Dog kidney cell line  
 D) mouse fibroblast cell line
44. The technique used in animal biotechnology for the rapid multiplication and production of animals with a desirable genotype is  
 A) protoplast fusion and embryo transfer  
 B) hybrid selection and embryo transfer  
 C) in vitro fertilization and embryo transfer  
 D) all of these
45. In animal cell cultures, the addition of serum to media is essential for providing?  
 A) growth factors  
 B) amino acid for protein synthesis

- C) nucleotide for DNA synthesis      D) all of these
46. Aminopterin is used during the production of hybridoma cells because it
- A) Blocks the salvage pathway      B) Prevents the growth of B cells
- C) Prevents the growth of myeloma cells      D) Blocks the synthesis of Ig by B cells
47. The ability of the immune system to recognize self antigens versus nonself antigen is an example of:
- A) Specific immunity    B) Tolerance    C) Cell mediated immunity    D) Humoral immunity
48. In order to insert a foreign gene into a plasmid, both must \_\_\_\_\_
- A) have identical DNA sequences      B) originate from the same type of cell
- C) be cut by the same restriction enzyme      D) be of the same length
49. Which type of restriction enzymes do not usually require ATP?
- A) Type I      B) Type II      C) Type III      D) Type IV
50. Problems in obtaining large amounts of proteins encoded by recombinant genes can often be overcome by using
- A) BACS      B) Expression vectors      C) YACS      D) all of these
51. A genomic library is
- A) a database where the sequence of an organism's genome is stored
- B) a collection of many clones possessing different DNA fragments from the same organisms bound to vectors
- C) a book that describes how to isolate DNA from a particular organism
- D) a place where the information of the genetic organization of organisms are kept.
52. All the statements are true regarding RFLP and RAPD except
- A) RAPD is a quick method compared to RFLP
- B) RFLP is more reliable than RAPD
- C) Species specific primers are required for RAPD
- D) Radioactive probes are not required in RAPD
53. A comprehensive database for the study of human genetics and molecular biology is
- A) PDB      B) STAG      C) OMIM      D) PSD
54. DNA molecule model or ionic model is an example of
- A) Static physical model      B) Dynamic physical model

C) Static mathematical model                      D) Dynamic mathematical model

55. Triton X-100 is a surfactant that forms micellar structure in aqueous solutions. One can form reverse micelles of the surfactants easily by

- A) Addition of salt                                      B) Making the pH acidic from alkaline  
C) Addition of heavy metal ions                      D) Addition of non polar solvents

56. If you discovered a bacterial cell that contained no restriction enzymes, which of the following would you expect to happen?

- A) The cell would be unable to replicate its DNA.  
B) The cell would create incomplete plasmids.  
C) The cell would be easily infected and lysed by bacteriophages.  
D) The cell would become an obligate parasite

57. Which of the following methods of introducing DNA into cells can be used on intact tissues?

- A) Electroporation                                      B) Protoplast fusion  
C) protoplast fusion and electroporation                      D) injection

58. The first step in the Monte Carlo Simulation process is to

- A) Generation random numbers                      B) Set up cumulative probability distributions  
C) Establish random number intervals                      D) Simulate trials

59. Which of the following statistical methods are commonly used to analyze simulation results?

- A) t-test    B) Regression analysis  
C) Analysis of Variance                                      D) All of the above

60. 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.

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