Section - A

1. Which of the following is TRUE for acetyl-CoA?
   (a) It is an acetyl group attached to a type of coenzyme.
   (b) It is another name for oxaloacetate.
   (c) It is a protein.
   (d) It is an acetyl group joined with a form of cobalt.

2. The role of DNA ligase in DNA replication is:
   (a) Addition of new nucleotides to the leading strand.
   (b) Addition of new nucleotides to the lagging strand.
   (c) Formation of a phosphodiester bond between the 3'-OH of one Okazaki fragment and the 5'-phosphate of the next on the lagging strand.
   (d) Base pairing of the template and the newly formed DNA strand.

3. A buffer contains 10% glucose, 20 mM Tris, and 50 mM HCI. For making 1 litre of buffer from the following stock solutions – 50% glucose, 1M Tris, and 1 M HCI, the CORRECT combination of volume each of the stock solutions will be:
   (a) 200 ml, 50 ml, 20 ml
   (b) 50 ml, 100 ml, 10 ml
   (c) 50 ml, 50 ml, 50 ml
   (d) 200 ml, 20 ml, 50 ml

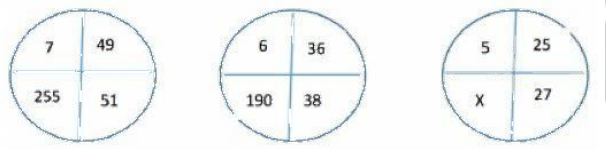
4. In enzyme kinetics, if the enzyme concentration in doubled:
   (a) K_m becomes double
   (b) K_m does not change
   (c) K_m becomes half
   (d) K_m increases 4-fold

5. During growth, the diameter of a Staphylococcus bacterial cell increases by 5%. The specific surface area (defined as surface area per unit volume):
   (a) Increase approximately by 5%
   (b) Decreases approximately by 5%
   (c) Decreases approximately by 4π%
   (d) Increases approximately by 4π%

6. The enzyme used in glucometers to estimate blood glucose levels is:
   (a) Glucose isomerase
   (b) Insulin
   (c) Qlucose oxidase
   (d) Hexokinase

7. Which of the following is a method of investigating the sequence specificity of DNA- binding proteins in vitro?
   (a) gene targeting
   (b) DNA footprinting
   (c) polymerase chain reaction
   (d) Southern hybridization

8. What is the CORRECT value of X?



   (a) 100
   (b) 135
   (c) 155
   (d) 145

9. Using only random VDJ recombination, from 40 V, 30 D and 6 J gene segments, the number of possible variable regions of the resulting antibody would be:
   (a) 7,200
   (b) 76
   (c) 40
   (d) 1.4 x 106

10. The fruit of a particular tree species formed the predominant diet of the dodo. After dodo became extinct, that tree species also became extinct. Which of the following is the most likely cause for the tree's extinction?
(a) The dodo habitat was destroyed.
(b) The seeds of that tree required passage through the digestive system of the dodo for germination.
(c) By living close to the tree, the dodo protected the tree from other birds.
(d) Other birds ate the fruit of that tree, as well as fruit of other trees, and dispersed more seeds than the dodo did.

11. What is the frequency with which a 4bp cutter will cut the DNA, assuming random distribution of base in the genome?
(a) 1/254
(b) 1/64
(c) 1/256
(d) 4.1/4096

12. Keshav and Kunal are good in Maths and Chemistry. Sumit and Keshav are good in Maths and Biology. Vineet and Kunal are good in Cricket and Chemistry. Sumit, Vineet and Rohit are good in Football and Biology. Who is good in Biology, Cricket, Chemistry and Football?
(a) Vineet
(b) Keshav
(c) Kunal
(d) Sumit

13. The molecular weight of Val and Ser are 117 Dalton and 105 Dalton, respectively. Val and Ser form a dipeptide Val-Ser. The molecular weight (in Daltons) of the dipeptide is:
(a) 204
(b) 222
(c) 186
(d) 240

14. Which of the following is **NOT** a rational grouping of amino acids bases on their polarity properties?
(a) Val and Leu
(b) Met and Leu
(c) Asn and Gin
(d) Glu and Ile

15. Mr. Thomas invested an amount of Rs. 13,900 divided in two different schemes A and B at the simple interest rate of 14% p.a. and 11% p.a., respectively. If the total amount of simple interest earned in 2 years was Rs. 3508, what was the amount invested in Scheme B?
(a) Rs. 6400
(b) Rs. 7200
(c) Rs. 7500
(d) Rs. 6500

16. Someone tells you that the pH of a solution is minus 2. Which one of the following is **FALSE**?
(a) Concentration of $H_3O^+$is 100 m.
(b) Such a value of pH is possible in theory.
(c) Such a value of pH is unlikely to occur in practice.
(d) Such a value of pH is impossible even in theory.

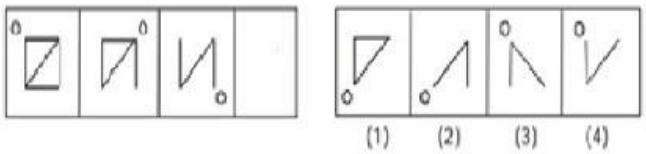
17. How much sodium hydroxide will you weigh to prepare 0.25 L of 3 M solution?
(a) 40 μg
(b) 80 g
(c) 40 Kg
(d) 30 g

18. Which of the following is/are critical for genome replication?
(a) All of the given options are correct
(b) Polymerase
(c) Ligage
(d) Helicase

19. A student made 0.15 M solution of copper sulphate. The absorbance of the solution was found to be 0.3 when using cuvette with a path length of 1 cm. Copper sulphate solution made by a second student gave an absorbance of 0.45 using the same cuvette at the same wavelength. What is the concentration of the copper

sulphate solution made by the second student?
(a) 1.0.425 M
(b) 0.125 M
(c) 0.225 M
(d) 0.325 M

20. Choose the CORRECT alternative from the series on the right to complete the missing figure in the series on the left:



(a) (4)
(b) (2)
(c) (3)
(d) (1)

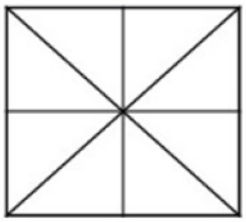
21. Bacteria protect themselves from phages by producing the following enzymes which fragment the phage genome:
(a) Endonucleases
(b) Methylases
(c) Topoisomerases
(d) Exonucleases

22. Two particles are moving back and forth in a 10 m long tube. Particle 'P' is moving at a speed of 5 m/s and particle 'Q' at a speed of 2 m/s. Consider that both P and Q start at the same time in the same direction. How much times will 'P' cross 'Q" by the time 'Q' reaches the end of the tube?
(a) 5
(b) 0
(c) 2
(d) 1

23. The most important step of an automated DNA sequencing reaction is:
(a) Specific and systematic termination of the amplified DNA.
(b) Ligation of DNA template.
(c) Addition of calcium chloride.
(d) Cleavage of template DNA.

24. Chlorine is assigned and atomic weight of 35.5. This is due to:
(a) Presence of half of proton.
(b) None of the given options.
(c) Presence of isotopes.
(d) Presence of half a neutron.

25. The number of squares and triangles in the following figure is:



(a) 16 triangles, 4 squares
(b) 16 triangles, 5 squares
(c) 12 triangles, 5 squares
(d) 12 triangles, 4 squares

26. Histones
(a) Contain high amount of basic amino acids.
(b) Contain both $\alpha - helix$ and $\beta - pleated$ sheet.
(c) Have molecular weights in excess of 100,000 Da.
(d) Are negatively-charged globular proteins.

27. A mixture of homotetramer 'X' and heterodimer 'Y' with identical molecular weight were resolved on SDS-PAGE. It gives three bands on a gel with molecular weights 40 kDa, 60 kDa, and 100 kDa, The native molecular wight (in kDa) of the homotetramer 'X' is:
(a) 160
(b) 240
(c) 320
(d) 100

28. Find the next number in the series 23, 30, 38, 47, 57:
(a) 65
(b) 69
(c) 67
(d) 68

29. What is the probability of getting 53 Sundays in a 'Leap' year?
(a) 2/7
(b) 1/7
(c) 3/7
(d) 4/7

30. Synthesis of majority of lipids in a cellular system occurs in the
(a) Mitochondria
(b) Lysosomes
(c) Nucleus
(d) Endoplasmic reticulum

31. What will be the generation time of a culture with a specific growth rate constant of 0.01 min^{-1} ?
(a) 1.155 h
(b) 11.55 h
(c) 0.693 min
(d) 6.93 min

32. Ligands 'A' and 'B' bind to protein 'P' with dissociation constants of 1 nM and 100 nM, respectively. Which of the following TRUE?
(a) 'A' binds 'P' with more affinity.
(b) Dissociation constant is not related to affinity.
(c) 'B' binds 'P' with more affinity.
(d) Both 'A' and 'B' bind 'P' with equal affinity.

33. The Freund's complete adjuvant is a mixture of:
(a) Oil, water, dried bacterial spores.
(b) Oil, water and dried Mycobacterium cells.
(c) Amino acids, detergent and dried S. aureus cells.
(d) Qlucose, oil and dried E. coli cells.

34. The aluminium bronze alloy consists of copper and aluminium in the ratio of 10:1 by weight. If an object made of this alloy weighs 77 Kilograms (Kg), how many Kg of aluminium does it contain?
(a) 70.7
(b) 7.7
(c) 7.0
(d) 0.7

35. Primary cilia biogenesis typically starts at the:
(a) S phase of the cell cycle.
(b) S and G2 phase of the cell cycle.
(c) G2 phase of the cell cycle.
(d) G1/G0 phase of the cell cycle.

36. Which of the following is **NOT** TRUE ?
(a) Prokaryotes are unicellular organisms
(b) Eukaryotes can be either multicellular or unicellular organisms
(c) Prokaryotic cells lack nucleus whereas eukaryotic cells have a nucleus
(d) Ecells are evolutionarily more ancient than prokaryotic cells

37. Trypsin cleaves a protein at the:

(a) C – terminus side of Arg/Lys residues.
(b) N – terminus side of Arg/Lys residues.
(c) C – terminus side of Val/lle residues.
(d) N- terminus side of Val/lle residues.

38. A, B, C, and D are to be seated in a row, But C and D **CANNOT** be together. Also B cannot be at the third place. Which of the following must be **FALSE**?
(a) A is at the second place
(b) A is at the first place
(c) A is at the third place
(d) A is at the fourth place

39. Single stranded DNA can be separated from double stranded DNA efficiently using:
(a) Hydrophobic interaction chromatography
(b) RP-HPLC
(c) Hydroxyapatite chromatography
(d) Urea PAGE

40. Eight 3rd year students can finish an experiment in 15 days and eighteen 1st year students can complete the same experiment in 10 days. If all these students work together, in how many days will the experiment get completed?
(a) 1.6.67
(b) 2.7.67
(c) 3.6.33
(d) 4.6.00

41. The temperature of media post sterilization drops from 100°C to 60°C in 40 min by simply keeping it on the lab bench and allowing slow atmospheric cooling to take place at an ambient temperature of 20°C. In the next 40 min, the approximate temperature (°C) of the media would be around:
(a) 1.40°C
(b) 20°C
(c) 50°C
(d) 30°C

42. Which of the following is a non-reducing sugar?
(a) Fructose
(b) Qalactose
(c) Ribose
(d) Sucrose

43. Denaturation of DNA is a:
(a) temperature-independent process
(b) linear process
(c) cooperative phenomenon
(d) neither linear nor a cooperative process

44. The egg white protein, ovalbumin, is denatured in a hard-boiled egg. Which of the following i least affected?
(a) Quaternary structure of ovalbumin.
(b) Primary structure of ovalbumin.
(c) Secondary structure of ovalbumin.
(d) Tertiary structure of ovalbumin.

45. Enzymes bind their substrates via:
(a) Hydrogen bonds
(b) Hydrophobic interactions
(c) All of the given options are correct
(d) Shape complementarity

46. Nucleic acid structures are stabilized by:
(a) Hydrophilic interactions.
(b) Covalent interactions.
(c) Covalent and hydrophilic interactions.
(d) Hinteractions and hydrogen bonding.

47. How many peptide fragments can be generated from the complete digestion of the polypeptide AGRCDKCQANRSLMNF with trypsin?
(a) 1.6
(b) 2.4
(c) 3.3
(d) 4.2

48. While working in the lab, you forgot to keep enzymes back in the fridge. Which of the following enzyme will be least affected on being left outside at room temperature?
(a) Topoisomerase
(b) Taq DNA polymerase
(c) DNA ligase
(d) BamHI restriction enzyme

49. The genetic codon is a triplet and there are 64 codons. How many codons would be possible if the codon is a doublet?
(a) 24
(b) 16
(c) 8
(d) 64

50. In the first semester course work at the Biotech Institute, 50 students signed up for both Genetics and Statistics, and 90 students signed up for either Genetics or Statistics. If 25 students are taking Genetics but are **NOT** taking Statistics, how many students are taking Statistics but not taking Genetics?
(a) 1.65
(b) 2.25
(c) 3.15
(d) 4.35

Section - B

1. Opsonization is the process of:
(a) Coating of foreign substances by antibody.
(b) Coating of foreign substances by MHC.
(c) Coating of foreign substances by TCR.
(d) None of the given options is correct.

2. Fragile X syndrome is caused by a fragile site at the end of the long arm of X chromosome. Such a disorder is:
(a) X-linked
(b) All the given options
(c) Dominant
(d) Caused by loss -of-function of FMR1 gene

3. Which of the following is **NOT** an arboviral infection?
(a) Dengue fever
(b) COVID-19
(c) Chikungunya fever
(d) Zika virus disease

4. The enzyme-linked immunospot (ELISPOT) assay is highly sensitive because it can measure
(a) Total concentration of secreted cytokine.
(b) RNA copy number of the secreted cytokine.
(c) Size of the cytokine secreting cells.
(d) Frequency of cytokine secreting cells at the single cell level.

5. During Agrobacterium infections, plant cell begins to synthesize Arginine derivatives called:
(a) Acetobenzylpurine
(b) Opines
(c) Acetosyringone
(d) Hygromycin

6. Which of the following disorders does **NOT** show sex-linked inheritance?
(a) Haemophilia B

(b) Duchenne muscular dystrophy
(c) Haemophilia A
(d) Tay-Sachs disease

7. What is Endoreduplication?
(a) Replication of DNA in the nuclei and endocytosis of one copy to another organelle.
(b) M of DNA into ER and replication of DNA in the ER.
(c) Splitting up of endoplasmic reticulum (ER) to form rough and smooth ERS.
(d) Recurrent DNA replication without subsequent mitosis and cytokinesis.

8. Which of the following are **NOT** transcribed by RNA polymerase II ?
(a) miRNA and some snRNA
(b) mRNA and snoRNA
(c) miRNA and snoRNA
(d) tRNA and 5S rRNA

9. Hepatitis B is caused by a:
(a) Fungal infection
(b) Viral infection
(c) Protozoan infection
(d) Bacterial infection

10. Digestion of a 5 Kb linear DNA with BamHI leads to the generation of two fragments of size 2 Kb and 3 Kb, while digestion of the same DNA with Hind ill generates 3 fragments of 0.7, 0.8 and 3.5 kb. When the same DNA is cut with both BamHI and Hind ill enzymes the fragments generated are of 0.7, 0.8, 1.3 and 2.2 Kb. The right order of the recognition sites for the two enzymes is:
(a) One Hind ill site between two BamHI sites.
(b) Two Hind ill sites followed by one BamHI site.
(c) One BamHI site between two Hind ill sites.
(d) Two BamHI sites followed by one Hind ill site.

11. The probe used to analyze glycoproteins is:
(a) Interferons
(b) Cytokine
(c) Iectins
(d) Qlutens

12. The mature anther wall comprises an epidermis followed by a layer of radially elongated cells with fibrous bands of Callose called endothecium whose function is?
(a) Mechanical
(b) Protection
(c) Dehiscence
(d) Nutrition

13. Proteins are commonly purified by ion exchange chromatography (IEC) as a final step. Which of the following statements is **NOT** TRUE?
(a) Above the isoelectric point, the proteins bind to cation exchangers
(b) Even proteins of similar isoelectric point can be conveniently separated by IEC, Because interaction with the support is determined by the surface charge distribution of the protein rather than the net charge.
(c) In general, proteins can be eluted by increasing ionic strength.
(d) Above the isoelectric point, the proteins bind to anion exchangers.

14. For a microbial culture, if the doubling time is 0.231 h, the specific growth rate (in h^{-1}) will be (assume that the endogenous metabolism is negligible)
(a) 1.1.0
(b) 2.2.5
(c) 3.0.3
(d) 4.3.0

15. Which one of the following involves RNA Editing?
(a) Deletion, insertion or chemical modification of nucleotides that are present in the mRNA
(b) Joining of exons from one pre-mRNA molecule to form mRNA
(c) Deletion, insertion or chemical modification of nucleotides in the gene encoding the mRNA
(d) Joining of exons from two different pre-mRNA molecules to form Mrna

16. The following cellular process involves formation of double membrane vesicles that engulf and degrade

the cellular organelles and macromolecules.

(a) Necrosis
(b) Autophagy
(c) Macro pinocytosis
(d) Apoptosis

17. If a nonsense mutation is present in the Lacz gene of the lac operon, the mRNA of β- galactosidase would:
(a) be expressed in response to binding of the lac repressor to the CAP protein
(b) be expressed in response to the presence of lactose
(c) not be expressed at all
(d) always be expressed

18. The first drug approved by FDA of USA, that was produced through genetic engineering was:
(a) Somatotropin
(b) Insulin
(c) Penicillin
(d) Interferon

19. A shuttle vector is a vector that:
(a) Can replicate in the cells of more than one organism.
(b) Helps in transporting proteins from one cell to the adjacent cell.
(c) Helps in conjugation of bacterial cells.
(d) Moves between two organisms automatically.

20. Which of the following represents a quantitative measure of the structural similarity between two proteins?
(a) Revised mode square deviation
(b) Root mean square distance
(c) Standard deviation
(d) Root mean square deviation

21. 'Golden rice' is genetically engineered by altering the biosynthetic pathway for the production of:
(a) Carotenoids
(b) Chlorophylls
(c) Flavonoids
(d) Phycocyanins

22. Which part of a plant would be most suitable for raising virus-free plants for micropropagation?
(a) Node
(b) Bark
(c) Vascular tissue
(d) Apical meristem

23. Which one of the following can be extended by Klenow enzyme upon addition of dNTPs and Mg^{2+}?
(a) Restriction fragment with a 5' overhang.
(b) Restriction fragment with a 3' overhang.
(c) Single-stranded DNA.
(d) Restriction fragment with blunt ends.

24. Wetlands are very rich and diverse ecosystems and must be preserved. Which convention signed in Iran protects this specific ecosystem (wetlands) on a global basis?
(a) 1.Ramsar Convention
(b) 2 Vienna Convention
(c) Geneva Convention
(d) Basel Convention

25. Which post-translational modification is observed most commonly in signal transduction?
(a) Nitrosylation
(b) phosphorylation
(c) carbonylation
(d) acetylation

26. In the cloverleaf structure of tRNA, the cognate amino acid is attached at:
(a) Acceptor stem
(b) T loop

(c) Anticodon arm
(d) D loop

27. The mucopolysaccharide hyaluronic acid is composed of:
(a) N-acetyl D-glucosamine only.
(b) D-glucuronic acid only.
(c) Neither N-acetyl D-glucosamine nor D-glucuronic acid.
(d) Both N-acetyl D-glucosamine and D-glucuronic acid.

28. In the DNA helix, the GC and AT base pairs:
(a) Stack on top of each other, parallel to the helix axis.
(b) Stack on top of each other, perpendicular to the helix axis.
(c) Stack sideways, perpendicular to the helix axis.
(d) Stack sideways, parallel to the helix axis.

29. The equation for aerobic production of acetic acid from ethanol is: $CH_2OH+O_2 \rightarrow CH_3CO_2H+H_2O$. (ethanol) (acetic acid) Acetobacter aceti bacteria are added to vigorously-aerated medium containing 10 g.14 ethanol. After some time, the ethanol concentration is 2 g.-2 and 7.5 g.11 of acetic acid is produced. What is the observed yield (Yoing-) and theoretical yield (Yting-8") of acetic acid from ethanol?
(a) $Y_0 = 0.94, Y_T = 1.5$
(b) $Y_0 = 0.69, Y_T = 1.0$
(c) $Y_0 = 0.79, Y_T = 1.1$
(d) $Y_0 = 0.94, Y_T = 1.3$

30. Which of the following floral whorls are absent in agamous (ag) mutant of Arabidopsis?
(a) Petals and stamens
(b) Sepals and petals
(c) Stamens and carpels
(d) Sepals and carpels

31. The biological sample used for diagnosis of Giardiasis is:
(a) blood
(b) sputum
(c) urine
(d) stool

32. The primary structure of a protein is stabilized by:
(a) The angle formed between plane ABD and plane ACD.
(b) Covalent bond.
(c) Ionic bond.
(d) Hydrogen bonds.

33. The malarial parasite that has caused recent outbreaks of Monkey malaria in humans is:
(a) Plasmodium berghei
(b) Plasmodium vivax
(c) Plasmodium knowlesi
(d) Plasmodium malariae

34. Embryonic stem cells are:
(a) Unipotent
(b) Totipotent
(c) Pluripotent
(d) Differentiated

35. Which of the following represents the CORRECT sequence of steps in pathogenesis?
(a) Adhesion, exposure, infection, invasion.
(b) Adhesion, infection, exposure, invasion.
(c) Invasion, infection, adhesion, exposure.
(d) Exposure, adhesion, invasion, infection.

36. Which of the following is a chemotherapeutic drug obtained from marine source?
(a) Adriamycin
(b) Avastin
(c) Trabectedin
(d) Abraxane

37. Which of the following marine phototrophs can utilise carbon-dioxide as the carbon source?
(a) Green sulfur bacteria

(b) Halobacteria
(c) Chloroacidobacteria
(d) Hellobacteria

38. The amino acid residue with the least preference for any quadrant in the Ramachandran map is:
(a) Valine
(b) Glycine
(c) Serine
(d) Alanine

39. In an exponentially growing batch culture of Saccharomyces cerevisiae, the cell density is 30 $gL^{-1}(DCW)$, the specific growth rate (μ) is $0.4h^{-1}$ and substate uptake rate (q) is $18gL^{-1}h^{-1}$. The cell yield coefficient $Y_{x/s}$ will be
(a) 0.50
(b) 0.32
(c) 0.45
(d) 0.67

40. Which class of phytochromes is highly abundant in etiolated seedlings and is also light labile?
(a) Phytochrome D
(b) Phytochrome B
(c) Phytochrome A
(d) Phytochrome C

41. The broad- spectrum herbicide glyphosate, the active ingredient of Roundup, inhibits this enzyme:
(a) Shikimate dehydrogenase
(b) 5-enolpyruvylshikimate-3-phosphate synthase
(c) 3.Chorismate synthase
(d) 3-deoxy-7-phosphoheptulonate synthase

42. Which histone is **NOT** a part of the nucleosomes?
(a) H2B
(b) H2A
(c) H3
(d) H1

43. For a tetranucleotide sequence, the number of possible combination using A, T and G are:
(a) 512
(b) 81
(c) 27
(d) 256

44. Which of the following amino acids is most likely to disrupt an $\alpha - helix$?
(a) Proline
(b) Valine
(c) Lysine
(d) Arginine

45. BLOSUM matrix is used for:
(a) homology modelling
(b) alignment of protein sequence
(c) surface electrostatics
(d) DNA homology

46. In a plants , the cell adjacent to the egg cell in an ovule are known as:
(a) Synergids
(b) Antipodals
(c) Polar nuclei
(d) Sperm cell

47. Small/short interfering RNA (siRNA) is a commonly used RNA tool that causes:
(a) Duplication of protein encoding genes.
(b) Delection of protein encoding genes.
(c) Permanent silencing of protein coding genes.
(d) Short-term silencing of protein coding genes.

48. Synthesis of which of the following liquids is completed in the Golgi bodies?
(a) Phosphatidyserine
(b) Phosphatidylcholine
(c) Sphingolipids
(d) Cholesterol

49. Which type of post- translational modification **DOESNOT** occur in plastids?
(a) s-nitrosylation
(b) Qlycosylation
(c) Acetylation
(d) Phosphorylation

50. To maintain soil fertility, the most sustainable agricultural practice is:
(a) Crop rotation.
(b) Burning the crop waste in the field.
(c) Repeated use of fertilizers.
(d) Growing same crop.

51. Sam was investigating impact of lactate dehydrogenase knockout on glycolytic pathway. What will be the net NADH production that he would expect in conversion of Glucose to pyruvcate in this case?
(a) 4 NADH
(b) 3 NADH
(c) 0 NADH
(d) 2 NADH

52. Which of the following plant horomones employs a phosphorelay system to regulate gene expression?
(a) Barassinosteroid
(b) Cytokinin
(c) Auxin
(d) Ethylene

53. Which of the following is associated with SARS-CoV-2 infection?
(a) Lymphopenia
(b) All of the given option are correct
(c) Cytokine storm
(d) Pneumonia

54. 5thjune is observed as:
(a) World Forest Day
(b) World pollution Day
(c) Wold Wildlife Day
(d) World Enviroment Day

55. If neurons that produce the neurotransmitter dopamine could be generated from stem cells grown in culture, it might be possible to treat patient suffering with:
(a) Cystic fibriosis
(b) Parkinson's Disease
(c) Diabetes
(d) Amytrophic lateral sclerosis

56. One centimorgan is defined as the genetic distance between two loci with a statistically CORRECTED recombination frequency of:
(a) 10 %
(b) 1%
(c) 0.5 %
(d) 0.1%

57. The method utilized to determine the three dimentional structure of proteins are:
(a) Cyro-Electron Microscopy
(b) X-ray Crystallography
(c) all the given options
(d) Nuclear Magnetic Resonance

58. The Innate immune system recognizes Pathogen Associated Molecular Patterns (PAMPs) through activation of:

(a) Cell recpetors
(b) Fc recpeptor
(c) Toll-like receptor
(d) T cell receptor

59. Two film theory of mass transfer considers:
(a) Variable resistance at the interface.
(b) Maximum resistance at the interface.
(c) 50 % resistance at the interface.
(d) Negligible resistance at the interface.

60. Two amino acids with negatively charged side chains are:
(a) Aspartic acid and glycine.
(b) Aspartic acid and lysine.
(c) Lysine and glutamic acid.
(d) Aspartic acid and glutamic acid.

61. Which of these procedures poses the least risk to an unborn child?
(a) Embryoscopy&fetoscopy
(b) Amniocentesis
(c) Alpha-feto protein sampling
(d) Chronic villi sampling

62. Which of the combination of gases is finally produced during anaerobic digestion?
(a) $CH_{4+}CO_2$
(b) $N_2 + NH_3$
(c) $CO + N_2$
(d) $CO_2 + CO$

63. Phylogenetic tree provides information about:
(a) Evolution relationships between organisms.
(b) Environmental relationships between organisms.
(c) Ecological relationships between organism.
(d) None of the given options.

64. Which of the following processes is used to produce biodiesel?
(a) Transamidation
(b) Interesterification
(c) Transglycosylation
(d) Transesterification

65. Which of the following organelle is **NOT** a site for Reactive Oxygen Species (ROS) generation?
(a) Nucleus
(b) Mithochondria
(c) Peroxisomes
(d) Endoplasmic reticulum

66. A stirred tank bioreactor of $\mathbf{2.7m^3}$ is agitated using a Rushton turbine with diameter 0.5 m and stirrer speed of $\mathbf{1\ s^{-1}}$. If the fermentation broth has viscosity and density of $\mathbf{10^{-2}\ pa.\ s}$ and $\mathbf{1000kg.\ m^{-3}}$ respectively, the mixing time (in seconds) for the bioreactor will be:
(a) 33.3
(b) 15.0
(c) 66.7
(d) 25.5

67. The $\boldsymbol{\beta - sheet}$ rich structure of prion protein represents the:
(a) Abnormal disease-causing protein.
(b) Soluble form of the protein.
(c) Normal functional protein.
(d) Intermediator state of the protein.

68. The fluid property, due to which, mercury does **NOT** wet the glass is
(a) Surface tension
(b) Specific gravity
(c) Polarity

(d) Viscosity

69. A major organism used in commercial bioleaching for copper recovery is:
(a) Thiobacillusferrooxidans
(b) Desulfovibriodesulfuricans
(c) Pseudomonas aeruginosa
(d) Aspergillusniger

70. A covalently closed circular DNA was in a relaxed state in water at 30^0C. What will happen if the water temperature increases to 60^0C or decreases to 10^0C?
(a) DNA will undergo positive supercoiling at 60^0C and negative supercoiling at 10^0C.
(b) DNA will be relaxed at 60^0C and positively supercoiled at 10^0C.
(c) DNA will be negatively supercoiled at both 60^0C and 10^0C.
(d) DNA will undergo negative supercoiling at 60^0C and positive supercoiling at 10^0C.

71. Pruning helps in making the hedge dense because:
(a) It frees axillaery buds fromapical dominance.
(b) More root growth supports more shoot branches.
(c) The apical shoot grows slower after pruning.
(d) It induces the differentiation of new shoots from the rootstock.

72. The location of a proteins in cells can be studied using:
(a) X-ray crystallography
(b) Western blotting
(c) Fluorescent microscopy
(d) NMR spectroscopy

73. A fermentation medium is being cooled from 70^0C to 32^0C in a double pipe heat exchanger. Fluid flowing counter currently with this stream in heated from 20^0C to 46^0C. The log mean temperature difference (in^{0}C) for the two streams is
(a) 8.5
(b) 17.3
(c) 12.6
(d) 4.8

74. In a DNA molecule, two antiparallel strands that are complementary in their nucleotide sequence are paired to form a:
(a) None of the given oprions.
(b) Right handed double helix with 8 nucleotide pairs per helical turn.
(c) Right handed double helix with 10 nucleotide pairs per helical turn.
(d) Left handed double helix with 10 nucleotide pairs per helical turn.

75. Consider a bacterium that grows with doubling time of 20 min in the exponential phase of its growth cycle and acquire 10 random mutrations in its genome in every generation. How many mutations will it acquire after 48 hr of growth in exponential phase?
(a) 1440
(b) 1404
(c) 1000
(d) 1044

76. During genome engineering process, the role of flippase enzyme in the next round of modification in the target gene is to:
(a) Add frt sequence
(b) Remove frt sequence
(c) Remove the antibiotic cassette
(d) Add the antibiotic cassettd

77. An energy generatioin process in which organic compounds act as both electron donors and terminal electron acceptor in a microbe is called:
(a) Photosynthesis
(b) Biomass formation process
(c) Aerobic process
(d) Fermentation process

78. Which of the following process does **NOT** contribute to conversion of a proto-oncogene to oncogene?
(a) De-activating mutation in tumor suppressor
(b) Activating mutation in proto-oncogene

(c) Increased expression of proto-oncogene
(d) De-activating mutation in proto-oncogene

79. The artificial sweetener, aspartame, is enzymatically produced using:
(a) β-galactosidase
(b) rennin
(c) lipase
(d) Thermolysin

80. The sequence CGAATTTGG is matched globally with four sequences in a database. The sequence that will give the highest similarity score taking match=1, mismatch=0 and gap penalty=minus1 is:
(a) CGTATCG
(b) CGTTTGG
(c) CGATTCG
(d) CAATGAG

81. In which organelle of seeds are stored oils converted to fatty acids and glycerol during germination?
(a) Endoplasmic reticulum
(b) Amyloplast
(c) Mitochondria
(d) Glyoxysome

82. Met-Ile-Val-His-Tyr was the sequence of a hypothetical peptide. Assuming that there are two possible codons each for His, val and Try, one possible codon for Met, and four possible codons for Ile, the number of possible nucleotide sequences coding for this peptide would be:
(a) 11
(b) 32
(c) 13
(d) 66

83. What is the use of Aminopterin in hybridoma production?
(a) To kill unfused myeloma cells.
(b) To kill non-antibody secreting hybrids.
(c) To kill unfused splenic cells.
(d) To kill non-specific antibody secreting hybrids.

84. How many linkage groups would be there in a plant with 2n=20?
(a) 20
(b) 5
(c) 40
(d) 10

85. A bacterial population, growing in batch culture, increases from 1000 cells to 10,00,000 cells in 5 hours. What is the generation time of the bacteria?
(a) 9 min
(b) 30 min
(c) 22 min
(d) 45 min

86. In large scale fermentation processes, corn steep liquor is mainly used as a:
(a) nitrogen source
(b) carbon source
(c) vitamin and micronutrient source
(d) carbon and vitamin source

87. Aqueous two phase partitioining (ATPS) is used for the recovery of an enzyme from the cell free culture fitrate. On addition of PEG-2000 and dextran, the mixture separates into two phases with a partition coefficient for the enzyme as 4.2. The maximum possible enzyme recovery, when the volume ratio of the upper to lower phases in 5.0, will be
(a) 95%
(b) 68%
(c) 76%
(d) 85%

88. Which interactions are generally observed at the core of stable protein-protein complexes?
(a) Salt bridges
(b) Hydrogen bonds
(c) Disulfide bonds

(d) Hydrophobic

89. The genetic disease familial Hypercholesterolemia that leads to an increase in blood cholesterol is caused due to:
(a) Consuming cholesterol rich foods.
(b) Mutation in the low-density lipoprotein (LDL) receptor.
(c) Increased hydrolysis of stored intracellular cholesteryl esters.
(d) Increased de novo cholesterol synthesis.

90. If four atoms A, B, C, and D are connected linearly and there is rotation possible along bond BC, dihedral angel on this bond is described as:
(a) The angel between AB and CD.
(b) The angel formed between plane ABD and plane ACD.
(c) The angel formed between plane ABC and plane BCD.
(d) The angel between ACand BD.

91. Computational Prediction of protein folding assumes that:
(a) The folded state is a global free energy minima.
(b) Folding takes place at the monomeric level.
(c) All the given options are correct.
(d) Contributioins of Potential Energy parameters to fold stability are reliable.

92. The Budapest Treaty related to the international patent process concern with:
(a) Non-living materials
(b) Higher plants
(c) Human subjects
(d) Microorganisms

93. What is agent Orange?
(a) Hazardous chemical used in luminous paints
(b) Biodegradable insecticide
(c) Herbicide containing dioxin
(d) Color used in fluorescent lamps

94. Match the polysaccharides (L.H.S.) with the microbial cultures (R.H.S.) associated with their industrial production:

	Polysaccharide		Microbial culture
A	Cellulose	i	Pseudomonas aeroginosa
B	alginate	ii	Alcaligenes faecalis
C	curdalan	iii	Gluconacetobacterhansenii
D	Poly-hydroxy butyrate	iv	Ralstoniaeutropha

(a) A-i, B-iii, C-ii, D-iv
(b) A-iii, B-i, C-ii, D-iv
(c) A-i, B-ii, C-iii, D-iv
(d) A-ii, B-i, C-iv, D-iii

95. The comparison of the structures of haemoglobin and myoglobin shows that they have:
(a) Different primary structure butsimmilar tertiary structure.
(b) Similar primary structure but different tertiary structure.
(c) Different primary and tertiary structures.
(d) Similar primary and tertiary structures.

96. All the vaccines mentioined below are attenuated or inactivated whole pathogen except:
(a) Oral polio vaccine
(b) Hepatits A vaccine
(c) Rotavirus vaccine
(d) Tetanus vaccine

97. A combination of gametes that can be formed by the genotype AaBbCcDdEeFfGg are:
(a) 32
(b) 64
(c) 16
(d) 128

98. Which of the following microorganism is used for commercial production of dextran?
(a) Baciluspolymyxa

(b) Streptomyces olivaceus
(c) Leuconostocmesenteroides
(d) Bacillus thuringiensis

99. A dilution of a microbial culture was prepared by adding 1 ml of the culture to 9 ml of sterile blank. Further, 200 μL from the diluted culture was spread on an agar plate; and 150 colonies were observed after the incubation period. Calculate the CFU/mL of the original sample:
(a) 7500
(b) 75000
(c) 750
(d) 4.75

100. At what condition Does the specific growth rate of the microorganisms decline in a constant volume fed-batch culture?
(a) Cell biomass increasing
(b) Cell biomass is equal to zero
(c) Cell biomass remains constant
(d) Cell biomass decreasing

101. Cyclosporine, as immunosuppressive drug, given to avoid transplant rejection acts by:
(a) Complement inhibition
(b) B cell inhibition
(c) T cell inhibition
(d) NK cell inhibition

102. Which of the following is **NOT** a suitable material for a depth filter used in air sterilization?
(a) Glass fiber (pore size =2-8 μm).
(b) Muslin cloth (pore size =40-50 μm).
(c) Glass wool (pore size <10 μm).
(d) Norite (pore size =0.1-4 μm).

103. A protein with 1000 amino acids was tagged with GFP. The molecular weight of GFP is 26 KDa What will be the most likely molecular weight of the fused target protein?
(a) 100 KDa
(b) 126 KDa
(c) 136 KDa
(d) 150 KDa

104. The temperature (℃) of liquid nitrogen used for cryopreservation of plant samples is:
(a) -170 ℃
(b) -120 ℃
(c) -196 ℃
(d) -100 ℃

105. Which of the following methods first ionizes a protein before separation and detection?
(a) Mass spectrometry
(b) Nuclear magnetic resonance
(c) Reverse phase chromatography
(d) Fluorescence spectroscopy

106. The first organic acid to be produced industrially is:
(a) Aspartic acid
(b) Gibberellic acid
(c) Acetic acid
(d) Lactic acid

107. In the design of a fermenter, which one of the following is **NOT** the intended use of baffles?
(a) Improve aeration efficiency.
(b) To reduce shear sensitivity of microorganism.
(c) Prevent eddy/vortex formation.
(d) Increase the effect of agitation.

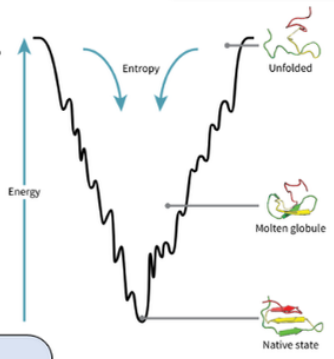
108. Which one of the following statements is TRUE regarding the magnesium porphyrin ring and the phytol chain of a chlorophyll molecule?
(a) Magnesium porphyrin ring is hydrophilic whereas phytol chain is lipophilic.

VEDEMY'S CAPSULE (VEDEMY'S SPECIAL NOTES)

Amino acid Classes

Essential	**M**y **V**ery **T**alented **F**riend **I**s **W**aiting **F**or **K**ajo**L**
Semi-essential	**R**ahu**L**
Non-Polar	**GAV** के लोग **PILW** लेकर **FM** सुन रहे थे
Polar Uncharged	**CN**(कार्टून नेटवर्क) pe **STY**(सत्य) **Q**ues पूछते है
Negative charged	Ye **DE**kh
Positive charged	**R**a**H**u**L** bola
Gluco-ketogenic	**I**tni **T**alented **WYF** (wife)
Ketogenic	**K**ajo**L**

Protein Folding Curve



Energy profile-

High
- **U**- Unstructured
- **M**- molten globule
- **D**- discrete structure
- **N**- native
- **A**- amorphous
- **A**- amyloid

Low

Urmila Matoldkar ka DNA Achha hai

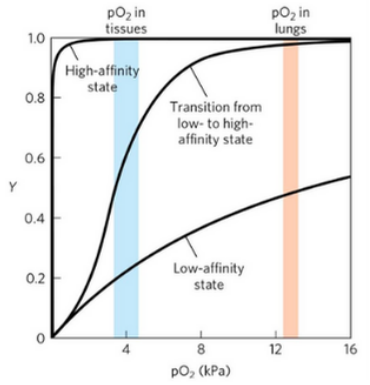
Hemoglobin

State of Hb – MOLD

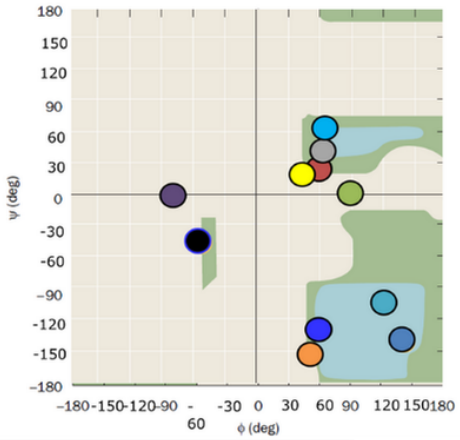
- **M**ore acidic (Relaxed state)
- **O**xy Hb
- **L**ess acidic (Tensed state)
- **D**eoxy Hb

Affinity of Curve – DRIL

- **H+, Temp. BPG, CO_2** → **I**ncrease → **L**eft shift
- **D**ecrease → **R**ight shift

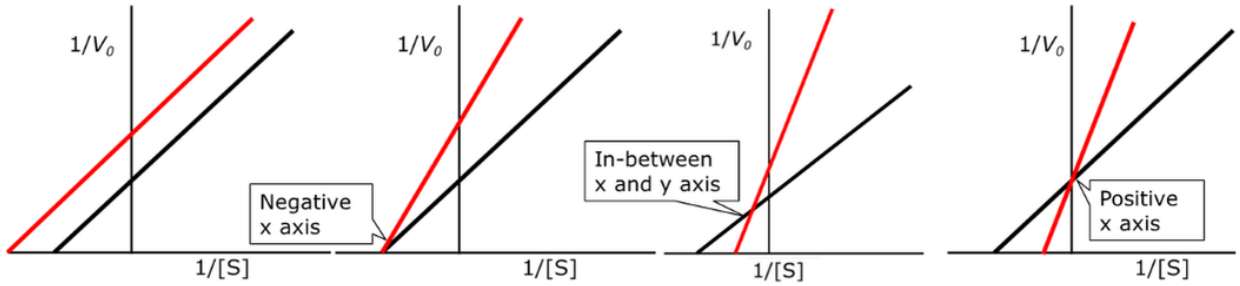


Ramachandran plot



Secondary Structure	Phi	Psi
AP β Sheet	+140⁰	-135⁰
P β Sheet	+120⁰	-115⁰
CTH	+50⁰	-150⁰
L-α-H	-60⁰	-50⁰
R-α-H	+60⁰	+50⁰
Type-I i+1	+60⁰	+30⁰
Type-I i+2	+90⁰	0⁰
Type-II i+1	+60⁰	-120⁰
Type-II i+2	-80⁰	0⁰

Enzyme Inhibition Curve



Uncompetitive Inhibition
Decrease K_m = increased $1/K_m$
Decreased V_{max}= increased $1/V_{max}$

Noncompetitive Inhibition
Decreased V_{max}= increased $1/V_{max}$

Mixed Inhibition
K_m increase
V_{max} decrease

Competitive Inhibition
Increase K_m = decreased $1/K_m$

UP ke **NaNa** patekar **MI** ka **PC** lekar aaye

- **U**ncompetitive → Parallel
- **N**on-competitive → Negative x axis
- **M**ixed → In-between x and y axis
- **P**ositive x axis
- **C**ompetitive

(b) Both magnesium porphyrin ring and phytol chain are hydrophilic.
(c) Both magnesium porphyrin ring and phytol chain are lipophilic.
(d) Magnesium porphyrin ring is lipophilic whereas phytol chain is hydrophilic.

109. Synthetic seeds are mostly derived from:
(a) Zygotic embryos
(b) Fruit of coconut
(c) Aseeds
(d) Somatic embryos

110. A supramolecular complex that serves to degrade damaged or unneeded proteins in the cell is called as:
(a) Lysosome
(b) Flagella
(c) Proteasome
(d) Ribosome

111. A mixture of three proteins (X, Y, and Z) was loaded on a size exclusion column. The molecular weight (<W) and pl of the proteins are as follows:

Protein	MW (KD)	Pl
X	140.75	5.5
Y	22.3	10.1
Z	88.6	2.8

(a) X, Z, Y
(b) X, Y, Z
(c) Y, X, Z
(d) Y,Z, X

112. Baroreceptors are responsible for sensing human:
(a) Temperature
(b) Blood pressure
(c) Oxygen saturation
(d) Heart rate

113. ATP with γ^{-32}p can be used for which of the following type of reaction?
(a) All of the given options are correct.
(b) Reverse transcription.
(c) End-labeling.
(d) Nick translation.

114. Epicatechin gallate (ECG) is a type of flavonoid found in which of the following?
(a) Orange
(b) Green tea
(c) Berries
(d) Carrot

115. What are the cellular sites for protein glycosylation?
(a) Endoplasmic reticulum and golgi body.
(b) Endoplasmic reticulum and lysosomes.
(c) Mitochondria and lysosomes.
(d) Endoplasmic reticulum and mitochondria.

116. 'Cybrids' are produced by
(a) In vitro fusion of cytoplasm.
(b) In vitro fusion of gametes.
(c) Fusion of plastids.
(d) Fusion of nuclear genomes.

117. Two proteins of molecular weights 1.0 x 10^5 and 1.0 x 10^4 Daltons were eluted from a gelfiltration column at 220 ml and 300 ml respectively. The molecular weight of an unknown protein that elutes at 140 ml under the same conditions, will be:
(a) 1.1.00x 10^6
(b) 5.00 x 10^5
(c) 1.00 x 10^5
(d) 5.00 x 10^6

118. Sequence-specific recognition of DNA by proteins occurs primarily through the:
(a) Major groove

(b) Minor groove
(c) Histones
(d) Polyphosphate backbone

119. Choose the CORRECT order in terms of pka
(a) Acetic acid > TFA > HCI < H_2SO_4.
(b) Acetic acid > TFA <HCI < H_2SO_4.
(c) Acetic acid < TFA <H_2SO_4<HCI.
(d) Acetic acid > TFA > HCI > H_2SO_4.

120. Which of the following is **NOT** a feature of bacterial DNA replication?
(a) Semi-conservative.
(b) Semi-discontinuous.
(c) Chain growth in the 5' -> 3' direction.
(d) Unidirectional.

121. A student added a 5' exonuclease enzyme instead of a restriction enzyme to digest his purifiedplasmid DNA sample. What is he likely to observe when he runs his plasmid digest on anagarose gel?
(a) Free nucleotides from the 5' end only.
(b) Free nucleotides from both ends.
(c) No digestion of plasmid DNA.
(d) Plasmid DNA will be digested similar to the restriction enzyme.

122. A CDNA encoding a human protein of interest was cloned in a bacterial expression vector and introduced into bacterial cells for expression. However, no expression of the human protein of interest was obtained. This could be because of?
(a) Bacterial ribosomes were unable to bind to the mRNA corresponding to the Humanprotein of interest.
(b) Presence of introns in the gene encoding the human protein.
(c) E. coli RNA polymerase cannot transcribe the sequence encoding the human protein ofinterest.
(d) Codon bias.

123. Only 10 % of babies with Edward syndrome survive beyond 5 years. This is a genetic diseasearising due to:
(a) Absence of chromosome 18
(b) Absence of chromosome Y
(c) Trisomy 18
(d) Trisomy 13

124. Which autoimmune disease is caused by production of autoantibodies and autoreactive T cellsagainst DNA and chromatin proteins?
(a) Systemic lupus erythematosus
(b) Graves' Disease
(c) Sjögren syndrome
(d) Multiple Sclerosis

125. Immobilization of enzymes to water insoluble, anionic porous carriers often results in an apparent shift in the pH optima of the enzyme. The physico-chemical interaction likely to cause such a behaviour is:
(a) Enzyme deactivation
(b) Partitioning effect
(c) Internal mass transfer limitation
(d) External mass transfer limitation

126. Nucleosides isolated from a Caribbean sponge, Cryptotethyacrypta, were the basis for the synthesis of the antiviral:
(a) Avarol
(b) Amantadine
(c) Abacavir
(d) Acyclovir

127. What is Single Nucleotide Polymorphism (SNP)?
(a) Variation at a single nucleotide position observed in 100% population
(b) Variation at a single nucleotide position observed in at least 1% population
(c) Variation at a single nucleotide position observed in more than 10% population
(d) Variation at a single nucleotide position observed in at least 10% population

128. Accuracy of Protein Structure Prediction can be assessed using tools like:

(a) WHATIF
(b) COOT
(c) BLAST
(d) PHENIX

129. A class of temperature sensitive E. coli mutants defective in DNA replication were identified that ceased replication immediately upon increase in temperature. Which of the following processes are likely to be defective in these mutants?
(a) Elongation step of DNA replication.
(b) Segregation step of DNA replication.
(c) Initiation of DNA replication.
(d) Termination of DNA replication.

130. A set of closely linked genetic markers present on a single chromosome, which are **NOT** easilyseparable by recombination and tend to be inherited together are termed as:
(a) 1.Haplotypes
(b) 2 Allotypes
(c) Isotypes
(d) Alleles

131. Cellulose is a linear polymer of glucose with:
(a) Beta-1,4-glycosidic linkage.
(b) Alpha1,4-glycosidic linkage.
(c) Beta-1,3-glycosidic linkage.
(d) Alpha-1,3-glycosidic linkage.

132. The specific energy source for the reaction ADP + phosphate → ATP by the enzyme ATP synthetase (CF1 Coupling Factor) in thylakoid membranes is:
(a) Higher concentration of H^+ inside versus outside the thylakoid membranes.
(b) Movement of electrons between photosystem II and photosystem.
(c) Oxidation of water.
(d) Oxidation of NADPH.

133. Which of the following is **NOT** used for producing vitamins industrially?
(a) Ashbyagossypii
(b) Corynebacterium sp.
(c) Propionibacterium freudenreichii
(d) Pseudomonas aeruginosa

134. In Transmission Electron Microscope (TEM), a beam of electrons interact with the specimen to form image as:
(a) Reflection
(b) Diffraction
(c) Shadow
(d) Scattering

135. Which one of the following approaches is generally **NOT** used for identifying an SNP?
(a) Protein sequencing
(b) Molecular beacons
(c) Microarrays
(d) RNA Seq

136. DNA glycosylases are DNA repair enzymes involved in:
(a) Base excision repair
(b) Negative supercoiling of DNA
(c) SOS response
(d) DNA replication

137. What will be the molarity of a 4 mg/ml solution of NaOH?
(a) 1.1M
(b) 2 0.1 M
(c) 3. 4 M.
(d) 4.0.0844 M

138. A humanised antibody is one in which the:
(a) Antibody heavy chain is from human and light chain is from mouse.
(b) Antibody heavy and light chains are from human.

(c) Complementarity-determining regions (CDRs) are from mouse and the rest is from human.
(d) Antibody light chain is from human and heavy chain is from mouse.

139. Identify the **INCORRECT** pair
(a) DNase I : Cleaves only double stranded DNA.
(b) Alkaline Phosphatase : Removes 5' phosphate from the DNA.
(c) RNA polymerase: Transcription.
(d) DNA Polymerase 1: Nick Translation.

140. Genes related through vertical descent from a common ancestral gene are called:
(a) Heterologous
(b) Xenologous
(c) Paralogous
(d) Orthologous

141. Which of the following is **NOT** used as a biopesticide?
(a) Nuclear Polyhedrosis Virus
(b) Bacillus thuringiensis
(c) Trichoderma harzianum
(d) Xanthomonascampestris

142. Which of the following does **NOT** have a quaternary structure?
(a) Collagen
(b) RNA polymerase
(c) Haemoglobin
(d) Myoglobin

143. The technique used to locate specific genes in chromosomes:
(a) Colony hybridization
(b) Dot blot technique
(c) In-situ hybridization
(d) Western blotting

144. Which is the CORRECT arrangement of the polarity of solvents?
(a) Water>DMSO>DME>THE
(b) Water < DMSO > DMF <CH3CN
(c) Water > DMSO < DMF >CH3CN
(d) Water DMSO >DMF >CH3CN

145. A protein of 100 KDa would have approximately how many amino acids?
(a) 100
(b) 1000
(c) 800
(d) 900

146. Which of following is a trisaccharide?
(a) Kestose
(b) Cellobiose
(c) Trehalose
(d) Mannose

147. The first stable product of C3 cycle is:
(a) Ribulose bisphosphate
(b) Dihydroxy acetone phosphate
(c) 3-phosphoglycerate
(d) Phospho enol phosphate

148. Which of the following yeast is used for the production of riboflavin?
(a) Saccharomyces rouxii
(b) Saccharomyces cerevisiae
(c) Eremotheciumashbyi
(d) Candida utilis

149. Ananda Chakrabarty received the first U.S. patent for a GM organism. This organism was
(a) Cloned E. coli.
(b) Dolly the cloned sheep.
(c) Transgenic mouse expressing the growth hormone gene..
(d) Pseudomonas engineered to degrade petroleum

150. Deficiency of this macronutrient causes older leaves to turn dark green or reddish purple
(a) Calcium
(b) Phosphorous
(c) Nitrogen
(d) Magnesium

DBT-BET-JRF 2020 ANSWER KEY

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
a	c	d	b	b	c	b	b	a	b	c	a	a	d	a	d	d	a	c	b
21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
a	d	a	c	b	a	a	d	a	d	a	a	b	c	d	d	a	b	c	d
41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
a	d	c	b	c	d	b	b	b	c	a	b	b	d	b	d	d	d	b	c
61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
c	c	a	d	a	b	b	b	a	d	a	d	a	a	b	a	d	b	d	c
81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
d	b	c	c	d	c	a	b	d	c	b	d	b	a	b	a	d	c	b	a
101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120
d	b	b	d	b	b	c	c	d	d	c	a	a	d	a	a	a	a	a	a
121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140
a	c	b	c	a	c	d	d	d	b	d	b	a	d	b	a	a	d	b	b
141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160
c	d	c	b	a	d	d	c	a	a	a	b	c	c	a	d	b	a	d	c
161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180
a	b	c	b	a	a	a	a	a	d	c	d	c	a	b	d	b	a	a	a
181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200
a	a	d	c	a	a	b	c	a	d	d	d	c	a	d	a	c	c	d	b