1. A beaker is filled to the brim with water at 4°C. This water will overflow if its temperature is:
   (a) Increased
   (b) Reduced
   (c) Either increased or reduced
   (d) None of these options is correct

2. Mangoes can be ripened quickly by using:
   (a) Calcium carbide
   (b) Calcium carbonate
   (c) Calcium chloride
   (d) Calcium sulphide

3. Which colour of insulation covering is there on the earth wire that goes from the main switchboard to our rooms?
   (a) Red
   (b) Black
   (c) Green
   (d) Yellow

4. A relationship between two biological organisms, where one organism benefits while the other remains unaffected, is termed:
   (a) Predation
   (b) Commensalism
   (c) Mutualism
   (d) Parasitism

5. Ethanol as a viable bio-fuel can be obtained from:
   (a) Potato
   (b) Rice
   (c) Sugarcane
   (d) Wheat

6. Activated charcoal can be used to remove colouring matter from pure substances by:
   (a) Adsorption
   (b) Bleaching
   (c) Oxidation
   (d) Reduction

7. Which of the following is CORRECT regarding the explanation of blue colour of the sky?
   (a) The blue light is more scattered by the air molecules in earth atmosphere giving it a blue appearance.
   (b) The red light is more scattered by the atmospheric air molecules and becomes invisible, leaving only the blue light reach the observer.
   (c) Dr. CV Raman was awarded the Nobel prize for describing this phenomenon.
   (d) The blue colour of the sky is due to the reflection of light from the oceans and seas.

8. Which of the following metals is an important constituent of the water purification agent zeolite?
   (a) Aluminium
   (b) Gold
   (c) Silver
   (d) Copper

9. Which of the muscles in our body has a name that relates it to tailoring?
   (a) Peroneus

(b) Hamstrings
(c) Trapezius
(d) Sartorius

10. What colour is the best to wear to stay cool on a hot and sunny day?
    (a) Black
    (b) Blue
    (c) Orange
    (d) White

11. A herpetologist would be studying which of the following?
    (a) Butterfly
    (b) Snake
    (c) Blood
    (d) Liver

12. Which of the following metals is commonly used to increase the strength of steel alloys?
    (a) Bismuth
    (b) Boron
    (c) Molybdenum
    (d) Tin

13. Leather is prepared from which portion(s) of the skin?
    (a) Dermis alone.
    (b) Both dermis and epidermis.
    (c) Dermis and subcutaneous fatty tissue.
    (d) Subcutaneous fatty tissue and underlying muscle.

14. Humans have the ability to detect and discriminate at least 10,000 different odorants because we have one of the most evolved____system:
    (a) Auditory
    (b) Gustatory
    (c) Olfactory
    (d) Tactile

15. The pH of gastric acid (HCI) in the human stomach lumen can be as low as 1.5. Still, normally, it **DOESNOT** corrode the gastric mucosa because:
    (a) This pH is non-corrosive for the cells of the stomach.
    (b) Mucosa secretes protective mucus that lines the surface.
    (c) Humans take acid-lowering medications all the time to keep pH high.
    (d) Gastric secretions contain milder acids as well which neutralize the strong acid (HCI).

16. A picture (year 1720) of personal protective equipment (PPE) is shown: To which epidemic was this related?

(a) Influenza
(b) Smallpox
(c) Epidemic typhus
(d) Plague

17. A key tool used for determining the age of prehistoric samples is:
(a) Forensic calibration
(b) Bone age determination
(c) Radiocarbon dating
(d) Todd's method

18. The Nobel Prize in Medicine is actually named as Nobel Prize in:
(a) Medicine or Surgery
(b) Physiology or Medicine
(c) Medicine or Pathology
(d) Chemistry or Medicine

19. Which of the following is an egg laying mammal?
(a) Racoon
(b) European badger
(c) Three-toed sloth
(d) Duck billed platypus

20. The full form of RT-PCR is:
(a) Reverse-time polymerase chain reaction.
(b) Reverse transcriptase polymerase chain reaction.
(c) Real-transcription polymerase chain reaction.
(d) Real-time polymerase chain reaction.

21. Which among the following radiofrequencies is most commonly used in global air navigational systems?
(a) Very Low Frequency (VLF).
(b) Very High Frequency (VHF).
(c) Tetra-Hertz Frequency (THF).
(d) Ultra-High Frequency (UHF).

22. Which part of the earth is suitable to witness the natural phenomena of dynamic light displays called 'aurora'?
(a) Near the arctic and Antarctic

(b) Closer to the equatorial regions
(c) Sahara Desert
(d) Mongolia

23. A mixture of oxygen with this gas reduces oxygen density and can be used in hospitals?
(a) Nitrous oxide
(b) Sevoflurane
(c) Nitric oxide
(d) Helium

24. Which of the following provided the major clue that led to the recognition of the double helical structure of DNA?
(a) X-ray crystallography images.
(b) Electron microscopy of dividing cells.
(c) Transmission electron microscopy of meiosis.
(d) Polarizing microscopy.

25. Alfred Nobel, the founder of Nobel prizes was once called the 'merchant of death' for which of the following inventions?
(a) Gun powder
(b) Cyanide
(c) Dynamite
(d) Hydrogen bombs

26. Which of the following is the primary reason for the tremendous energy generated from the Sun and the other stars?
(a) Nuclear fusion
(b) Nuclear fission
(c) Electromagnetic effect
(d) Combustion of inert gases, especially helium

27. Which of the following is **NOT** a component of oral rehydration solution?
(a) Sodium chloride
(b) Sodium carbonate
(c) Potassium chloride
(d) Glucose

28. Most abundant organic polymer on earth is:
(a) Collagen
(b) Starch
(c) Cellulose
(d) Alginate

29. Which of the following salts is soluble in water at pH 7.0?
(a) Copper sulphate
(b) Barium Sulphate
(c) Silver Chloride
(d) Lead Sulphate

30. Which of the following microbe helps termites digest Cellulose?
(a) Fibrobacter succinogenes
(b) Ruminococcus flavefaciens
(c) Trichonympha campanula
(d) Pseudomonas putida

31. The Xanthophyte (Yellow Green Algae) cell walls are typically made up of:
    (a) Chitin
    (b) Cellulose and pectin
    (c) Starch
    (d) Xylan and chitin

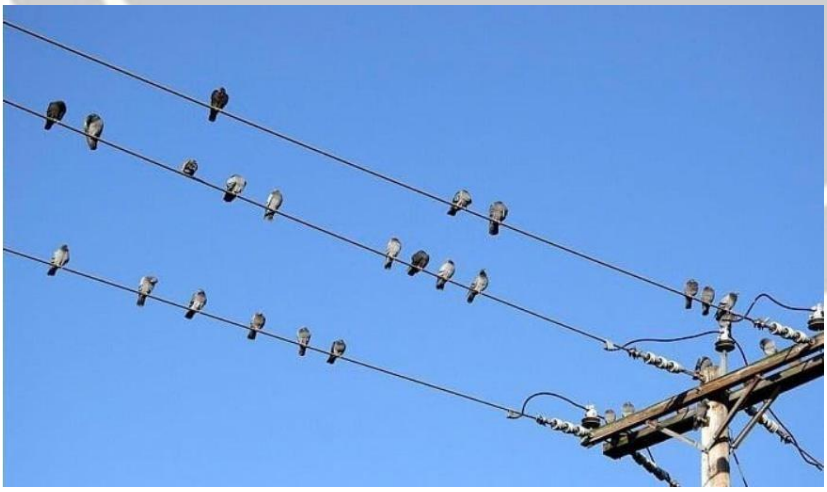
32. Spectacles used for viewing 3D films have:
    (a) Polaroids
    (b) Concave lens
    (c) Convex lens
    (d) Bifocal lens

33. Acrylamide is a substance that forms through a natural chemical reaction between sugars and asparagine in plant-based foods during high-temperature cooking, such as frying, roasting, and baking. It is important to know about this chemical because:
    (a) High levels of acrylamide caused cancer in laboratory animals.
    (b) Low levels of acrylamide caused cancer in humans in laboratory conditions.
    (c) Low levels of acrylamide were shown to protect against cancer in both humans and animals.
    (d) High levels of acrylamide were shown to protect against cancer in both humans and animals.

34. A diverse mixture of sound waves extending over a wide frequency range or a constant background noise especially one that drowns out other sounds is called:
    (a) Pink noise
    (b) Brown noise
    (c) White noise
    (d) Physiological noise

35. It is well-known that plants can survive for short periods without light. This process of adaptation is termed:
    (a) Chlorophyll formation
    (b) Photosynthesis
    (c) Etiolation
    (d) Chlorosis

36. Pigeons sitting on electric wires is a common site as shown below:



    (a) Their feet are strong insulators of electricity.
    (b) For electricity to flow voltage difference is needed.
    (c) Pigeons are naturally resistant to electric current.
    (d) The wires automatically stop conducting once a bird sits on them.

37. A student asks his science teacher whether he can catch fire if he runs very fast. The teacher replies that scientists have shown that one needs to run at speeds of about 6000 km/hour for this. What is the major reason for generation of heat if one runs at high speeds?
    (a) Friction of the body with the air.
    (b) Compression of air molecules in front of the runner.
    (c) Friction of the clothes with the air.
    (d) Generation of heat by the runner's body.

38. A caricature is shown below with three-headed dog and a symbol. This shows dangers of which of the following:

    (a) Radiation
    (b) Drugs of abuse
    (c) Global warming
    (d) War

39. We know that we are made of particles. But when the universe began, no particles had mass; they all sped around at the speed of light. It is believed that stars, planets and life could only emerge because particles gained their mass from a fundamental mass-giving field. The existence of this field was confirmed with the discovery of:
    (a) Neutrino
    (b) Graviton
    (c) Higgs boson particle
    (d) Magnetic photon

40. There is a legend that the when the inventor of chess showed it to the ruler, the latter was so pleased that he asked the inventor to ask for any prize. The inventor is supposed to have asked that he may be given one grain for the first square, two for the second, four for the third, and so on; doubling the number of grains for each subsequent square. According to the legend, the ruler laughed at it saying it is such a small prize. But when the treasurers started to calculate, they found that this would require such huge number of wheat grains which they **DONOT** have. This legend illustrates:
    (a) The vast number of possibilities in chess.
    (b) Ignorance of the inventor.
    (c) The inability of humans to learn the game.
    (d) How quickly exponential sequences grow.

41. If a child "x" is said to be having weight above 70^{th} percentile. What does it mean?
    (a) 30% of the children are above the weight of "x".
    (b) 70% of the children are above the weight of "x".
    (c) 30% of the children are below the weight of "x".
    (d) 70% of the children have the same weight as "x".

42. The mean of 20 observations is 6.21. Later on, it was discovered that the two items +5 and +3 were taken as -5 and -3. Find the CORRECT mean:
    (a) 7.01

(b) 7.1
(c) 6.01
(d) 6.1

43. The statistical term to represent the most frequently selling commodity of a shop?
(a) Mode
(b) 95th Percentile
(c) 1st quartile
(d) Probability

44. Which one of the following is unaffected by outliers?
(a) Mean
(b) Interquartile range
(c) Standard deviation
(d) Range

45. One study intended to compare 12-hour nursing shifts to 8-hour shifts to assess the effects on patient outcomes in the different wards of a hospital. The most suitable design would be:
(a) Retrospective case-control (trohoc) study
(b) Cluster randomized trial
(c) Cohort study
(d) Cross-sectional study

46. Modification of behaviour by study participants in response to their knowledge that they are being observed is known as:
(a) Placebo effect
(b) Neyman's bias
(c) Berkson's bias
(d) Hawthorne effect

47. In a study, 5000 patients are randomly divided into two groups, one is administered 100 mg of a drug, the other gets placebo. The study endpoint is comparison of the incidence of stroke among the two groups at the end of 5 years. The statistical test most appropriate would be:
(a) Chi-square test
(b) Mann-Whitney U test
(c) Unpaired t-test
(d) Wilcoxon signed-rank test

48. Which of following guidelines should be followed while reporting the results from a randomized clinical trial?
(a) CONSORT
(b) PRISMA
(c) STARD
(d) STROBE

49. Which of the following example represents nominal data in statistics?
(a) Colours of a rainbow.
(b) Blood pressure recordings.
(c) Age.
(d) Degree of pain graded as mild, moderate, and severe.

50. The players of a football team (excluding substitutes) were advised to stand as per the ascending order of their height. The median height of the football team would be?
(a) That of the 6th person.

(b) The sum of the height of the fifth and sixth player.
(c) Average of the height of the fifth and sixth player.
(d) Average of the height of the fifth, sixth and the seventh player.

51. All of the following are examples of gram-negative bacilli, **EXCEPT:**
(a) Enterococcus faecalis
(b) Escherichia coli
(c) Klebsiella pneumoniae
(d) Proteus mirabilis

52. Which of the following is **NOT** an acid-fast parasite?
(a) Cyclospora cayetanensis
(b) Isospora belli
(c) Entamoeba histolytica
(d) Cryptosporidium parvum

53. All of the following are RNA viruses, **EXCEPT:**
(a) Hepatitis B virus
(b) Hepatitis A virus
(c) Hepatitis C virus
(d) Hepatitis E virus

54. Cetrimide agar is used as selective medium for:
(a) Klebsiella
(b) Pseudomonas
(c) Shigella
(d) Salmonella

55. Enterobius vermicularis is commonly known as:
(a) Pinworm
(b) Roundworm
(c) Whipworm
(d) Hookworm

56. mcA39n organism whose genome has been altered by the introduction of one or more foreign DNA sequences from another species by artificial means is known as:
(a) Transgenic
(b) Humanized
(c) Monoclonal
(d) Inbred

57. Excretion of drugs in the urine involves three distinct processes: glomerular filtration, active tubular secretion, and reabsorption:
(a) Passive tubular secretion
(b) Active tubular reabsorption
(c) Enterohepatic circulation
(d) Passive tubular reabsorption

58. Pharmacological agents targeting dopamine receptors are used in the treatment of which of the following?
(a) Alzheimer's disease
(b) Haemorrhagic stroke
(c) Meningo-encephalitis
(d) Schizophrenia

59. If a hypertensive patient complains of pedal oedema, he could likely be on:
    (a) Enalapril
    (b) Amlodipine
    (c) Metoprolol
    (d) Hydrochlorothiazide

60. Which of the following is an antimalarial drug?
    (a) Adenosine
    (b) Amiodarone
    (c) Artemisinin
    (d) Amitriptyline

61. For converting mg/ml into molar units for a drug, you need to know:
    (a) Valency
    (b) Solubility
    (c) Molecular size
    (d) Gram molecular weight

62. Which lobe of the brain is responsible for receiving and interpretating visual information?
    (a) Frontal lobe
    (b) Parietal lobe
    (c) Temporal lobe
    (d) Occipital lobe

63. Glycated haemoglobin (HbA1C) reflects average plasma glucose over the previous:
    (a) 4-6 weeks
    (b) 8-12 weeks
    (c) 20-24 weeks
    (d) 2-4 weeks

64. The hormone erythropoietin stimulates red blood cell production in the red bone marrow. Where in the body is erythropoietin produced?
    (a) Spleen
    (b) Kidney
    (c) Liver
    (d) Thyroid

65. Which of the following blood vessels offer the greatest resistance to blood flow through the arterial system?
    (a) Arteries
    (b) Arterioles
    (c) Capillaries
    (d) Veins

66. If the genetic code consisted of four bases per codon instead of three bases per codon, then what will be the possible number of codons that code for 20 types of amino acids (Given the stop codons are same)?
    (a) 64
    (b) 253
    (c) 61
    (d) 256

67. Acid guanidinium thiocyanate-phenol-chloroform extraction (AGPC) is an extraction method is used for isolation of:
    (a) RNA only
    (b) RNA, DNA as well as proteins
    (c) Proteins only
    (d) DNA only

68. RPMI 1640 growth medium used for cell culture contains all of the following, **EXCEPT:**
    (a) Growth Factors
    (b) Salts
    (c) Glucose
    (d) Vitamins

69. Which of the following is the most probable explanation for higher lability of RNA than DNA?
    (a) Presence of metal ions like Mg^{2+} in its secondary and tertiary structure.
    (b) Single stranded nature of RNA in contrast to double strand in DNA.
    (c) Hydroxyl groups in the ribose backbone lowering activation energy of hydrolysis.
    (d) Collections of short helices packed together into its structure.

70. Which of the following is **NOT** a feature of flow cytometry?
    (a) Sample should be in monodisperse suspension.
    (b) The Core stream consists of sheath fluid only.
    (c) Pressure of the stream presents cells in a single file to the laser beam.
    (d) Cells scatter the light and are excited by beam and emit fluorescent light.

71. Statement I: Aspirin and paracetamol belong to the class of non-narcotic analgesics.
    Statement II: Aspirin inhibits the synthesis of chemicals known as prostaglandins which stimulate inflammation in the tissue and cause pain:
    (a) Statement I and Statement II both are correct.
    (b) Statement I and Statement II both are incorrect.
    (c) Statement I is correct but Statement II is incorrect.
    (d) Statement I is incorrect but Statement II is correct.

72. HbS (Sickle Cell Anaemia) is a result of:
    (a) Transversion mutation
    (b) Transition mutation
    (c) Non-sensitive mutation
    (d) Frameshift mutation

73. RNA interference (RNAi) or Post-Transcriptional Gene Silencing (PTGS) is a conserved biological response to:
    (a) Double-stranded RNA
    (b) DNA-RNA hybrid
    (c) Single stranded DNA
    (d) Methylated double stranded DNA

74. Databases such as CATH and SCOP are used to identify:
    (a) The structural family to which a protein belongs.
    (b) The genetic family to which a protein belongs.
    (c) Homologous proteins.
    (d) Analogous proteins.

75. What is the function of Chaperonins?
    (a) Conformation prediction

(b) Protein folding
(c) Complex & slow conformation stability
(d) Stability analysis

76. A population of insects exists in which black coloration is dominant to white. If there are 64 black insects and 36 white insects in the population, what is the recessive allele frequency?
(a) 0.16
(b) 0.4
(c) 0.6
(d) 0.36

77. Which of the following choices are likely to change the allele frequencies of the indicated populations?
A. A geographic barrier isolating a small subset of a larger population.
B. The introduction of a predator that only preys upon the homozygous dominant members of the population.
C. A population that displays completely random mating.
(a) C only
(b) A, B and C
(c) B only
(d) A and B

78. Which of the following are examples of codominance?
I. A person with blood type AB.
II. A flower that displays a red and white spotted phenotype (both colours are attributed to the same gene; homozygosity for either colour makes a flower that is completely red or white).
III. A flower that displays a pink phenotype (a homozygous dominant flower is red and a homozygous recessive flower is white).
IV. An organism whose heterozygous phenotype is identical to the homozygous dominant phenotype.
(a) III and IV
(b) IV only
(c) I and II
(d) I, II and III

79. Crossing foxes that are double heterozygotes for two genes regulating coat colour yields 27 grey, 12 red and 9 black offspring. What mechanism explains the ratio of coat colour observed in the offspring?
(a) Mendelian inheritance
(b) Epistasis
(c) Pleiotropy
(d) Chromosomal linkage

80. What is Orthology in the context of genome comparisons?
(a) A homologous DNA sequence that was derived from a gene duplication event.
(b) A homologous DNA sequence that was derived from the same ancestral sequence.
(c) A gene that has the same DNA sequence as that in another species.
(d) A gene that has the same function as another gene sequence.

81. Mutation in CFTR gene in cystic fibrosis results in the loss of_____amino acid at the 508th position on protein:
(a) Histidine
(b) Tryptophan
(c) Tyrosine

(d) Phenylalanine

82. Balbiani rings occur in:
(a) Lampbrush chromosomes
(b) Polysomes
(c) Polytene chromosomes
(d) Sex chromosomes

83. A human male can ejaculate as many as 500 million spermatozoa at one time. So, how many spermatocytes would be involved in producing this number of spermatozoa?
(a) 500 million
(b) 125 million
(c) 150 million
(d) 200 million

84. A recessive mutation was discovered in a small island population (1,000 individuals). The mutation was observed in the heterozygous state but never in the homozygous state. What is the possible explanation for this observation?
(a) Only individuals with opposite alleles at this locus are reproduced.
(b) Heterozygous state is fixed in this population.
(c) Recessive allele is lethal in homozygous state.
(d) Population size is too small to give an explanation to this phenomenon.

85. In humans, Down Syndrome is mainly caused due to three copies of chromosome 21. Assuming complete randomness of chromosome segregation, what would be the expected progeny from the mating between a normal male and a Down Syndrome female as the ratio of Down Syndrome and normal children?
(a) Ratio 1:1
(b) Ratio 1:2
(c) Ratio 2:1
(d) Ratio 3:1

86. In the arterial blood gas analysis, an increase in $PaCO_2$ will indicate the presence of:
(a) Respiratory acidosis
(b) Respiratory alkalosis
(c) Metabolic acidosis
(d) Metabolic alkalosis

87. Which of the following structures is responsible for the formation of cerebrospinal fluid?
(a) Choroid plexus
(b) Arachnoid plexus
(c) Arachnoid villus
(d) Arachnoid mater

88. Extrinsic pathway in blood coagulation is triggered by the release of:
(a) Tissue factor
(b) Factor VII
(c) Tissue plasminogen inhibitor
(d) Factor X

89. In an organism, if the normal diploid number of chromosomes is 8, how many chromatids are present in each daughter cell at the end of meiosis I?
(a) 2
(b) 4

(c) 8
(d) 16

90. Which of the following chromosomes is **NOT** commonly involved in Robertsonian translocation?
(a) 7
(b) 13
(c) 21
(d) 22

91. Which cell component is stained by supravital staining in the reticulocytes?
(a) DNA
(b) Cell membrane
(c) Mitochondria
(d) Ribonucleoproteins

92. Which part of the compound microscope that helps in gathering and focusing light rays on the specimen to be viewed?
(a) Objective lens
(b) Magnifying lens
(c) Condenser lens
(d) Eyepiece lens

93. TAE buffer commonly used for DNA gel electrophoresis contains which of the following?
(a) Tris, EDTA, Acetic Acid
(b) Tris, EDTA, Alcohol
(c) Tris, Ethanol, Acetic Acid
(d) Tris, Alcohol, Ethanol

94. A piece of DNA was analyzed and 15% of its nucleotides were adenine. What percentage would be uracil?
(a) 0 percent
(b) 15 percent
(c) 30 percent
(d) 35 percent

95. Which of the following techniques would be the best to quantify the amount of protein in a sample?
(a) Southern Blot
(b) Quantitative PCR
(c) Coimmunoprecipitation
(d) Bradford Assay

96. Which of the following is a protein modification that can initiate the degradation of the modified protein?
(a) Ubiquitination
(b) Palmitoylation
(c) Myristylation
(d) Glycosylation

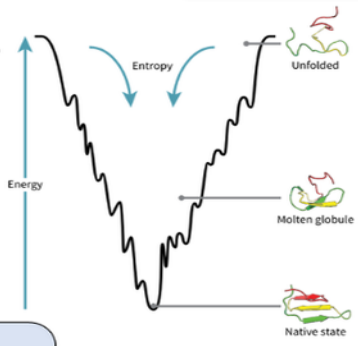
97. If a double strand break (DSB) is **NOT** repaired during G_1 phase of the cell cycle, what type of replication error would result during S phase at the site of the DSB?
(a) Gap in the newly replicated DNA strand.
(b) Collapsed replication fork.
(c) Catenane formations.
(d) Reversed replication fork.

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	**RaHuL** 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**

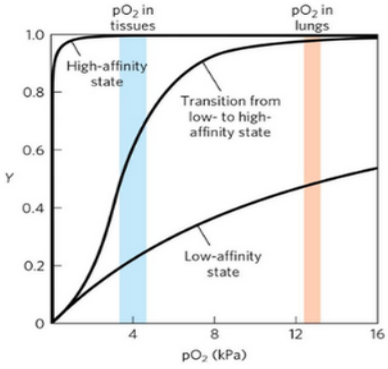
Low

Urmila Matoldkar ka DNA Achha hai

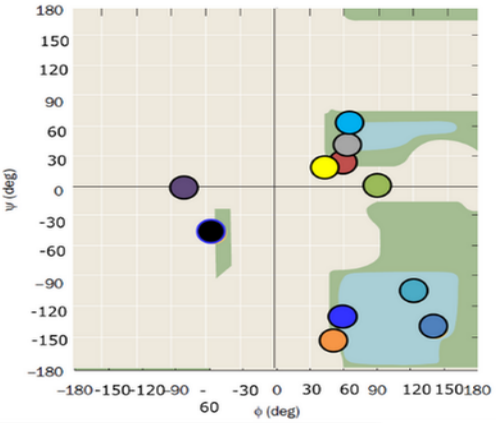
Hemoglobin

State of Hb – MOLD
- **Oxy Hb** – **Less acidic (Tensed state)**
- **Deoxy Hb** – **More acidic (Relaxed state)**

Affinity of Curve – DRIL
- **H+, Temp. BPG, CO_2** – **Increase** – **Left shift**
- **Decrease** – **Right shift**

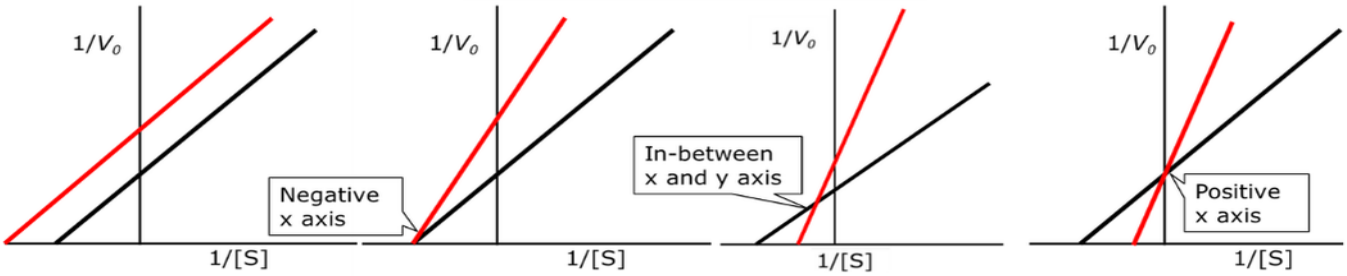


Ramachandran plot



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 $1/K_m$

Parallel – Uncompetitive
UP ke NaNa patekar
Negative x axis – Non-competitive
In-between x and y axis – Mixed
MI ka PC lekar aaye
Positive x axis – Competitive

98. What approximate percentage of total RNA content in a cell is messenger RNA (mRNA)?
    (a) 25-30 percent
    (b) 2-5 percent
    (c) 80-85 percent
    (d) 45-50 percent

99. A scientist has been working with a new species of plant. He has found that there are two separate genes, which segregate according to standard Mendelian genetics, that are capable of producing the same phenotype. A single dominant allele from either gene confers red coloration of the plant's flowers. Without any dominant alleles the flowers are white. If he crosses two plants heterozygous for both traits, what will be the resulting phenotypic ratios of the offspring?
    (a) 15 red:1 white
    (b) 9 red:6 pink: 1 white
    (c) 3 red:1 white
    (d) 16 red:0 white

100. In spectral karyotyping (SKY), how many sets of FISH probes are utilized?
    (a) 28
    (b) 26
    (c) 22
    (d) 24

101. How many genes are present in human mitochondrial genome?
    (a) 24
    (b) 37
    (c) 32
    (d) 64

102. Estimation of gamma-glutamyl transferase is useful to detect which one of the following clinical conditions?
    (a) Infective hepatitis
    (b) Alcohol abuse
    (c) Kidney failure
    (d) Myocardial infection

103. Which of the following amino acids is present at every third position in collagen molecule?
    (a) Hydroxyproline
    (b) Lysine
    (c) Proline
    (d) Glycine

104. Which component of proteins absorb UV light at 280 nm?
    (a) Peptide bonds.
    (b) SH group of cysteine.
    (c) Imidazole group of tryptophan.
    (d) Indole group of tryptophan.

105. Which of the following enzyme participates in both the citric acid cycle and the electron transport chain?
    (a) NADH dehydrogenase
    (b) Malate dehydrogenase
    (c) Succinate dehydrogenase
    (d) Isocitrate dehydrogenase

106. Each turn of an α-helix in secondary structure of protein contains:
(a) 3.6 amino acids
(b) 3.4 amino acids
(c) 3.2 amino acids
(d) 3.0 amino acids

107. Nucleotide bases and aromatic amino acids absorb light respectively at:
(a) 260 and 280 nm
(b) 280 and 260 nm
(c) both at 280 nm
(d) 260 and 270 nm

108. A 62-year-old man is admitted with emphysema and acute upper respiratory infection. Oxygen is ordered at 2 L/min. The reason for low-flow oxygen is to:
(a) Facilitate oxygen diffusion of the blood.
(b) Prevent excessive drying of secretions.
(c) Prevent depression of the respiratory drive.
(d) Compensate for increased airway resistance.

109. The physician has ordered mannitol IV for a patient with head injury. What should be closely monitored because the patient is receiving mannitol?
(a) Urine output
(b) Deep tendon reflexes
(c) Pulse rate
(d) Level of orientation

110. The serum potassium level of a patient is 2.5 mEq/L (2.5 mmol/L). Which of the following will **NOT** be seen on the electrocardiogram (ECG)?
(a) U waves
(b) Tall T waves
(c) Depressed ST segment
(d) Widened QRS complex

111. Which of the following is a potassium sparing diuretic?
(a) Mannitol
(b) Spironolactone
(c) Furosemide
(d) Acetazolamide

112. Which part of the body best represents the core body temperature?
(a) Oral cavity
(b) Axilla
(c) Nasal cavity
(d) Rectum

113. Assume that there are 6 types of nitrogen bases available and 40 types of amino acids are available for protein synthesis, then in genetic code each codon made up by minimum how many nitrogen bases?
(a) 3
(b) 4
(c) 5
(d) 2

114. The cylindrical channels in gap junctions are made of:

(a) Connexin
(b) Collagen
(c) Fibronectin
(d) N-CAM

115. Which of the following is **NOT** used as a vector in Molecular cloning?
(a) Plasmid
(b) Cosmid
(c) Artificial Chromosome
(d) Hapten

116. The major donor of carbon atoms of the one-carbon pool is:
(a) Serine
(b) Tyrosine
(c) Threonine
(d) Proline

117. The computational methodology that tries to find the best matching between two molecules, a receptor and ligand is called:
(a) Molecular matching
(b) Molecular docking
(c) Molecular fitting
(d) Molecule affinity checking

118. A sample of DNA is found to have the base composition (mole ratio) of A= 40, T = 22, G = 21 and C = 17. This suggests:
(a) DNA is circular duplex
(b) DNA is linear duplex
(c) DNA is single-stranded
(d) DNA has high melting point

119. In eukaryotic cell transcription, RNA splicing and RNA capping take place inside?
(a) Ribosomes
(b) Nucleus
(c) Endoplasmic reticulum
(d) Dictyosomes

120. A few chromosomes having a small fragment called the satellite, have:
(a) Non-staining secondary constriction at random location.
(b) Staining secondary constriction at constant location.
(c) Non-staining secondary constriction at constant location.
(d) Staining secondary constriction at random location.

121. Microtubule and microfilament are composed of which type of protein?
(a) Tubulin and Actin, respectively.
(b) Tubulin and Flagellin, respectively.
(c) Actin and Tubulin, respectively.
(d) Tubulin and Dynein, respectively.

122. When an alkali metal is dissolved in NH_3, it forms a blue coloured solution. The colour is due to:
(a) Ammonia
(b) Ammoniated electron
(c) Ammoniated ion
(d) Metal

123. CD40L, an early activation marker is predominantly expressed on which of the following lymphocyte subset?
(a) Helper T lymphocyte
(b) B lymphocyte
(c) Natural killer (NK) cells
(d) Cytotoxic T lymphocyte

124. Natural killer (NK) cells recognize target cells for a cytotoxic response by which of the following mechanisms?
(a) Absence of major histocompatibility complex (MHC) Class II molecules.
(b) Absence of major histocompatibility complex (MHC) Class I molecules.
(c) Presence of major histocompatibility complex (MHC) Class II molecules.
(d) Absence of CD16 molecules.

125. Which of the following autoantibodies is characteristically associated with limited scleroderma?
(a) Anti-centromere antibody.
(b) Anti-RNA polymerase III.
(c) Anti-DNA topoisomerase I.
(d) Anti-histidyl aminoacyl-tRNA synthetase.

126. T lymphocytes in a lymph node are concentrated in which of the following anatomical locations?
(a) Medulla.
(b) Paracortex adjacent to lymphoid follicle.
(c) Germinal centre of lymphoid follicle.
(d) Mantle zone of lymphoid follicle.

127. All of the following are housekeeping genes, **EXCEPT:**
(a) β-actin
(b) GAPDH
(c) p53
(d) β-globulin

128. All are the functions of macrophages, **EXCEPT:**
(a) Maintenance of tissue homeostasis.
(b) Clearance of apoptotic neutrophils.
(c) Wound repair.
(d) Antigen presentation to naïve T cells.

129. Which of the following cells release histamine and other vasoactive substances in response to allergens?
(a) Monocytes
(b) Dendritic cell
(c) Neutrophils
(d) Mast Cells

130. When a person is lying down face up in the anatomical position, the individual is said to be:
(a) Proximal
(b) Supine
(c) Prone
(d) Rostral

131. The alimentary canal of frog is short, due to its:
(a) Herbivorous nature

(b) Carnivorous nature
(c) Omnivorous nature
(d) Sanguvivorous nature

132. Find out **INCORRECT** match related to the earth worm:
(a) Spermatheca: 6^{th}-9^{th} segment.
(b) Testes: 5^{th}-9^{th} segment.
(c) Seminal vesicle: 11^{th}-12^{th} segment.
(d) Ovary: 13^{th} segment.

133. Which of the following amino acid is the precursor for the thyroid hormones T3 and T4?
(a) Tryptophan
(b) Lysine
(c) Tyrosine
(d) Histidine

134. The colour of earthworm body is brown due to:
(a) Haemoglobin
(b) Hemocyanin
(c) RBC
(d) Porphyrin

135. Which of the following disease is **NOT** due to protein misfolding?
(a) Alzheimer disease
(b) Parkinson disease
(c) Prion disease
(d) Wernicke-Korsakoff syndrome

136. Which community remains stable as long as the environment remains unchanged?
(a) Pioneer
(b) Climax
(c) Seral
(d) Both Pioneer and Climax

137. When a dry piece of tissue is fully burnt, all the carbon compounds are oxidized to gaseous form and the remaining is called 'ash'. The ash contains all of the following, **EXCEPT:**
(a) Calcium
(b) Magnesium
(c) Sulphur
(d) Nucleic acid

138. Which is the first zone of purification in a sand bed?
(a) Heterotrophic zone
(b) Schmutzdecke zone
(c) Electrolytic zone
(d) Autotrophic zone

139. Which of the following type of pollution is Cultural eutrophication?
(a) Noise pollution
(b) Thermal pollution
(c) Soil pollution
(d) Water pollution

140. Which of the following is **NOT** the landfilling method?

(a) Bangalore method
(b) Area method
(c) Depression method
(d) Trench method

141. Which of the following occurs only in plants and a few filamentous fungi?
(a) Glyoxysomes
(b) Peroxisomes
(c) Periplasmic space
(d) Ribosomes

142. Assertion: Cleistogamous flowers produce assured seed-set even in the absence of pollinators.
Reason: Cleistogamous flower **DONOT** open at all.
(a) Both Assertion and Reason are correct and Reason is the correct explanation of Assertion.
(b) Both Assertion and Reason are correct and Reason is not the correct explanation of Assertion.
(c) Assertion is correct but the Reason is not correct.
(d) Assertion is not correct but the Reason is correct.

143. Greenhouse effect is due to:
(a) Accumulation of O_3 and depletion of CO_2.
(b) Accumulation of both O_2 and CO_2.
(c) Accumulation of CO_2, CH_4, CFC and N_2O.
(d) Presence of green plants on the Earth.

144. How many of the following are Mendelian disorders?
Sickle cell anaemia, Haemophilia, Cri-du chat syndrome, Thalassaemia, Down's syndrome, Colour blindness, Phenylketonuria, Turner's syndrome:
(a) Four
(b) Five
(c) Six
(d) Seven

145. Monascus purpureus is a yeast used commercially in the production of:
(a) Ethanol
(b) Streptokinase for removing clots from the blood vessels
(c) Citric acid
(d) Blood cholesterol lowering statins

146. In a research study, a scientist decided to use the 98% confidence interval to interpret his results. Which of the following would be TRUE regarding the p-value to assign statistical significance?
(a) A p value of <0.05 will be still considered significant
(b) The researcher should use a p-value <0.02 to assign significance
(c) The researcher can choose either of the p-values
(d) The researched should use a p value of <0.5

147. The function of a sedimentation tank in sewage treatment is to:
(a) Disinfect sewage
(b) Remove water content
(c) Aerate the sewage
(d) Remove suspended solids

148. Rusticles or 'rivers of rust' are structures that run down the sides of the sunken ships. They are formed by the action of:

(a) Bacteria feeding off the iron.
(b) Sharks gnawing at the metal.
(c) Small fish eating the iron.
(d) Flows of water currents.

149. The charity provides support for pet owners who **CANNOT** afford private veterinary treatment is:
(a) Red cross
(b) Yellow cross
(c) Blue cross
(d) Green cross

150. The highest seismic domain in India is in:
(a) The Western Ghats
(b) The Dharwar Craton
(c) The Indo-Gangetic plains
(d) The Himalayas

ICMR-BRET-JRF 2023 ANSWER KEY

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
c	a	c	b	c	a	a	a	d	d	b	c	c	c	b	d	c	b	d	b
21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
b	a	d	a	c	a	b	c	a	c	b	a	a	c	c	b	b	a	c	d
41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
a	a	a	b	b	d	a	a	a	a	a	c	a	b	a	a	d	d	b	c
61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
d	d	b	b	b	b	b	a	c	b	a	a	a	a	b	c	d	c	b	b
81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
d	c	b	c	a	a	a	a	c	a	d	c	a	a	d	a	b	b	a	d
101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120
b	b	d	d	c	a	a	c	a	b	b	d	a	a	d	a	b	c	b	c
121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140
a	b	a	b	a	b	c	d	d	b	b	b	c	d	d	b	d	b	d	a
141	142	143	144	145	146	147	148	149	150										
a	a	c	b	d	b	d	a	c	d										