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VISIT

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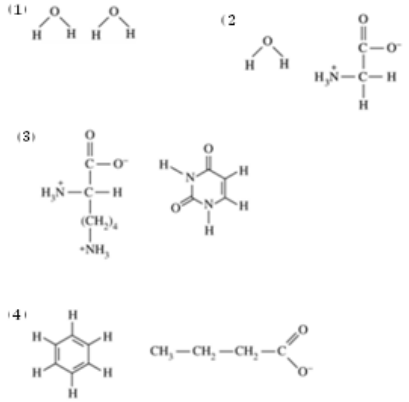
1. The forest cover of the country is placed at 633 397 sq km according to the forest surve of India assessment (1997). This presents _____of India's total geographical areas.
(1) 11.21 % (2) 19.27 %
(3) 21.23 % (4) 35.21 %

2. The ion product for liquid water, *K*w, varies with temperature (T), as indicated by the change in p*K*w shown in the table above. The definition of neutrality is $[H^+] = [OH^-]$. Which of the following is the pH of water at neutrality at 50°C ?

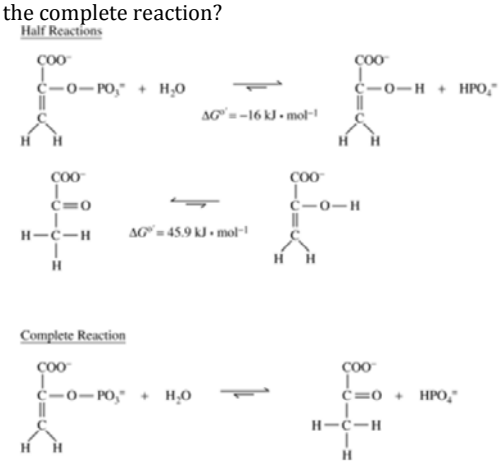
T(°C)	pK_w
0	14.94
25	14.00
50	13.28
75	12.71

(1) 6.35 (2) 6.64
(3) 7.00 (4) 7.40

3. Which of the following pairs of molecules could NOT hydrogen bond with each other?



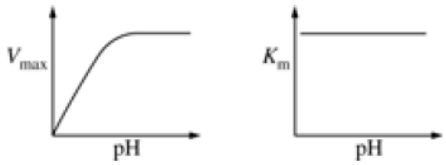
4. In glycolysis, the hydrolysis of phosphoenol pyruvate is thermodynamically driven by the highly exergonic enol-to-keto conversion of pyruvate. From the two half reactions shown below, what is the Δ *G* of the complete reaction?



(1) 61.9 kJ - mol^{-1} (2) 29.9 kJ - mol^{-1}
(3) −29.9 kJ - mol^{-1} (4) −61.9 kJ _ mol^{-1}

5. Which of the following best predicts the direction of a chemical reaction?
(1) *S* (entropy change)
(2) *H* (enthalpy change)
(3) *E* (internal energy change)
(4) *G* (Gibbs free energy change)

6. Thyroxine labeled with ^{131}I is administered to a patient for the purpose of imaging the thyroid gland. The radioactive half-life of the isotope is 8 days. The biological half-life (the time required for half of the compound to be eliminated from the body) is 2 days. The time at which 3/4 of the original radioactivity will no longer be detectable in the body is closest to
(1) 2.0 days (2) 3.2 days
(3) 4.0 days (4) 4.8 days



7. The pH dependencies of *V*max and *K*m for an enzyme are shown above. These data are most consistent with the requirement for
(1) a general base in catalysis
(2) a general acid in catalysis
(3) a dissociable cofactor in catalysis
(4) a basic residue in substrate binding

8. In the amino acid GLY, the Cα atom is connected to one carboxyl group, one amino group and two hydrogen bonds. The H-Cα-H bond angle is likely to be close to-
(1) 180^0 (2) 90^0
(3) 109.5^0 (4) 120^0

9. In which of the following structure, you are likely to see non-watson crick base pairs-
(1) B-DNA (2) A-DNA
(3) Z-DNA (4) t-RNA

10. In the structure of ideal Watson–crick B-DNA
(1) Base pairs are perpendicular to the helix axis
(2) Base pairs are parallel to the helix axis
(3) Base pairs are inclined with respect of the helix axis
(4) Hydrogen bond between bases are perpendicular to the helix axis

11. The monthly rain fall (mm) of a city in the Northern hemisphere is given below.

JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEP	OCT	NOV	DEC
100	87	01	0	0	0	0	0	0	0	2	75

From this data, one can infer that
(1) summer is a dry season
(2) winter is a dry season
(3) distribution of rainfall is bimodal
(4) annual precipitation is 100 mm.

12. Carbon dioxide is a greenhouse gas that can cause global warming and sea level rise. If we have enough financial resources and technology, we can completely remove CO_2 from the atmosphere. However, this may not be desirable mainly because
(1) the earth may go into an ice-age
(2) it will have an adverse effect on bio-diversity.
(3) plants may become extinct followed by animals and humans
(4) The pH of the rain water will increase.

13. The chief source of atmospheric heat is
(1) incoming solar radiation
(2) infrared radiation from the earth.
(3) ultraviolet radiation absorbed by the ozone layer.
(4) ultraviolet radiation absorbed by clouds.

14. The hypothesis for the origin of life envisaged that the primitive atmosphere was
(1) having abundant nitrogen and oxygen
(2) reducing and contained essentially NH_3, CH_4 and H_2 but not CO_2 or O_2.
(3) having only free oxygen and hydrogen which combined to give water to oceans.
(4) having only sulfur dioxide and water vapour.

15. A small pebble is dropped into the deep sea from a floating glacier mass. The pebble falls down, and is then likely to hit the sea bottom with
(1) an accelerating velocity
(2) a decelerating velocity
(3) a uniform velocity (4) a pulsating velocity

16. In which one of the following pairs the species have similar geometry?
(1) CO_2 and SO_2 (2) NH_3 and BH_3
(3) CO_3^{2-} and $SO3^{2-}$ (4)SO_4^{2-} and ClO_4^-

17. An element 'X' emits successively two β particles, one α particle, one positron and one neutron. The mass and atomic numbers of the element are decreased by, respectively,
(1) 4 and 1 (2) 5 and 1
(3) 3 and 2 (4) 3 and 1

18. The electrical conductivity of a crystalline solid increases with temperature. The solid is a
(1) superconductor (2) metal
(3) semiconductor (4) semimetal

19. If the distance between two bodies of masses $m1$ and $m2$ is doubled, the gravitational force between them
(1) doubles. (2) halves.
(3) becomes one-fourth. (4) remains the same.

20. A cricket ball and a football are dropped simultaneously from the top of multistory building. Which of the following best describes their subsequent behaviour?
(1) They touch the ground at the same instant.
(2) They touch the ground with the same velocity.
(3) The cricket ball reaches before the football.
(4) The football reaches before the cricket ball.

21. Two pendula of lengths l_1 and l_2 (= $2l_1$) have the same period at two different locations. The accelerations due to gravity at these two locations, g_1 and g_2, are related by
(1) $g1 = g2$ (2) $g1 = 2g2$
(3) $g2 = 2g1$ (4) $g2 = 4g1$

22. Addition of two binary numbers 1101 and 1001 will be
(1) 11111 (2) 11110
(3) 11011 (4) 10111

23. The volatile RAM provides for:
(1) specific vehicle operating programs.
(2) the removal of the ROM.
(3) a memory scratch pad for diagnostic capabilities.
(4) all of the above

24. The potential difference between the cathode and target of a X-ray tube is 120 kilovolts. What is the minimum wavelength produced?
(1) 10 A (2) 5 A
(3) 0.1 A (4) 100 A

25. A charge of 3 coulombs moving in a uniform electric field experiences a force of 3000 newtons. The potential difference between the two points situated in a field at a distance of 1 cm from each other will be
(1) 100 volts (2) 5000 volts
(3) 10 volts (4) 50 volts

26. Abzyme is a
(1) zymogen granule (2) catalytic antibody
(3) antibiotic. (4) anti-cancer drug

27. Criss-cross inheritance is seen in the inheritance of which of the following?
(1) Baldness (2) Hemophilia
(3) Thalassemia (4) Down's syndrome

28. Which of the following modes of expressing concentration of solution is independent of temperature?
(1) Normality (2) Grams per litre
(3) Molarity (4) Molality

29. Bernoulli's' equation is important in the field of
(1) electrical circuits (2) magnetism
(3) flow of liquid (4) photoelectric effect

30. A loudspeaker of a music system is suspended inside a glass jar and switched on. The sound intensity is monitored outside the glass jar. The jar is then evacuated with a vacuum pump. The meausred intensity is seen to decrease because
(1) the loudspeaker fails to operate in vacuum
(2) sound waves fail to travel due to absence of a suitable medium
(3) the experiment cannot be performed
(4) detection of sound waves outside the jar is not possible at any point of time

31. The nuclear overhauser effect is the main cause for
(1) spin-spin splitting of an NMR spectrum
(2) a through-space effect on the NMR signal of an NMR-active nucleus
(3) a through-bond effect on the NMR signal of an NMR-active nucleus
(4) a result of shielding by the electrons of an NMR-active nucleus

32. If a straight line is passing through the origin, what is the value of C in equation y = mx + C?
(1) Infmite (2) Zero
(3) One (4) -1

33. How many distinct four-digit numbers may be made divisible by 5, by using the digits 1,2,3,4,5, no digit being used more than once?
(1) 4 (2) 24
(3) 100 (4) 5

34. Box A contains 9 cards numbered 1 through 9 and Box B contains 5 cards numbered 1 through 5. A box is chosen at random and. a card is drawn. If the number is even, the probability that the card came from box A is
(1) 4/45 (2) 10/37
(3) 12/31 (4) 10/19

35. Iodine is a component of
(1) thyroid hormone (2) growth hormone
(3) insulin (4) adrenaline

36. A truck is moving with a speed of 36 km/hour. It. is brought to rest by uniform declaration within a distance of 20 m. The time taken before the truck comes to rest is
(1) 10 sec. (2) 7.2 sec.
(3) 4 sec. (4) 3.6 sec.

37. On the Centigrade scale, 113°F is
(1) 51°C (2) 43°C
(3) 45°C (4) 58°C

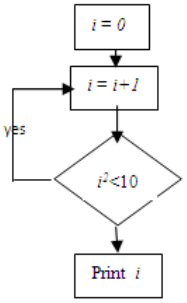
38. Which of the following is not a high level language?
(1) Assembly language
(2) Hypertext mark up language
(3) Beginners all purpose symbolic instruction code
(4) Common business oriented language

39. Consider the following truth table, if P→Q represent P implies Q, then the value of A and B will be?

P	Q	P→Q
0	0	1
0	1	A
1	0	0
1	1	B

(1) 0, 0 (2) 0, 1
(3) 1, 0 (4) 1, 1,

40. What would be the output of following program?



(1) 2 (2) 3
(3) 4 (4) 5

41. A microarray is a large collection of specific DNA oligonucleotides spotted in a defined pattern on a microscope slide. What is the most useful experiment that can be done with such a tool?
(1) Predicting the presence of specific metabolites in a cell
(2) Comparing newly synthesized nuclear RNA with cytoplasmic RNA to locate introns
(3) Comparing RNA produced under two different physiological conditions to understand patterns of gene expression
(4) Comparing proteins produced under two different physiological conditions to understand their function

42. In vertebrate genes, transcription regulatory regions that contain CpG islands are inactivated by which CpG modification?
(1) Methylation (2) Myristylation
(3) Phosphorylation (4) Acetylation

43. All of the following are proteins within the core nucleosome particle EXCEPT
(1) H1 (2) H2A
(3) H2B (4) H3

44. In a study of arginine biosynthesis in yeast, four mutant haploids requiring arginine (Arg^-) were isolated. The Arg^- haploids were fused in pairwise combinations to form diploids, whose requirement for arginine was tested. The results of the tests were that all diploid combinations yielded arginine prototrophs. How many different Arg genes are represented among the four mutants?
(1) One (2) Two
(3) Three (4) Four

45. A set of genes from *Bacillus subtilis* that encode the proteins required for sporulation have conserved DNA sequences −35 and −10 nucleotides before the site of transcript initiation, although the sequence at −35 is different from that seen in most other genes from that species. Which of the following best explains this difference?
(1) A novel sigma factor is required for transcription initiation at these genes.
(2) The −35 sequence is the binding site for a repressor of transcription.
(3) The replication of these genes requires a specifically modified DNA polymerase.
(4) Translation of the mRNAs from these genes requires specific ribosomes that recognize a modified Shine-Dalgarno sequence.

46. Acetyl CoA, the cytoplasmic substrate for fatty acid synthesis, is formed in mitochondria. The inner mitochondrial membrane is impermeable to acetyl CoA. Which of the following compounds is the form in which the carbon of acetyl CoA is transported to the cytoplasm?
(1) Malate (2) Acetate
(3) Citrate (4) Pyruvate

47. Which of the following is not correctly matched?

Phylum	Sps in India	Threatened sps	Total Sps
(1) Pisces	2546	4	11723
(2) Reptiles	456	16	5817
(3) Aves	32	73	9026
(4) Mammals	390	75	4629

48. Which of the following groups of enzymes are unique to the Calvin cycle?
(1) Ribulose bisphosphate carboxylase, phosphoribulokinase, and sedoheptulose 1,7-bisphosphatase
(2) Ribose 5-phosphate isomerase, epimerase, and aldolase
(3) Glyceraldehyde 3-phosphate dehydrogenase, phosphofructokinase, and phosphoenolpyruvate carboxylase
(4) Phosphoglycolate phosphatase, glycerol kinase, and serine synthetase

49. Which of the following best describes the hyperchromicity of DNA?
(1) The shift in UV absorbance to longer wavelengths upon denaturation
(2) The shift in UV absorbance to shorter wavelengths upon hydrolysis
(3) The increase in absorbance at 260 nm upon annealing
(4) The increase in absorbance at 260 nm upon denaturation

50. Isopentenyl pyrophosphate is a precursor of which of the following?
I. Cholesterol II. Farnesyl groups on proteins
III. Steroid hormones
(1) I only (2) I and II only
(3) I and III only (4) I, II, and III

51. Cytokinesis in animal cells is caused by
(1) the sliding movements of a band of microtubules around the circumference of the cell
(2) the contraction of a band of actin filaments around the circumference of the cell
(3) the movement of the mitotic spindle fibers
(4) endocytosis of the plasma membrane around the equator of the cell

52. The synthesis of mRNA's that encode the proteins of eukaryotic ribosomes occurs in the
(1) cytoplasm (2) nucleolus
(3) euchromatin (4) heterochromatin

53. Which of the following is NOT a consequence of increased cellular levels of cAMP?
(1) Activation of a kinase cascade
(2) Activation of the transducin G-protein
(3) Increased phosphorylation of glycogen phosphorylase
(4) Inhibition of glycogen synthesis

54. The KDEL sequence, found on luminal proteins of the ER, is responsible for
(1) translocation of proteins into the ER lumen
(2) insertion of proteins into the membrane of the ER
(3) recognition by signal peptidase of the signal sequence
(4) retrieval of ER luminal proteins from the Golgi

55. Cyclins are proteins involved in regulation of
(1) cell-cycle protein kinases
(2) circadian rhythms
(3) synthesis of cAMP
(4) membrane circulation via exocytosis and endocytosis

56. The uppermost figure above shows the locations of four genes on the genetic map of an organism; the lower figure shows the locations of the same four genes on a physical map derived from the nucleotide sequence of the DNA of that organism. The maps are not identical because
(1) there is no relationship between the position of genes in a genetic map and their positions on the DNA
(2) recombination frequencies per kb of DNA are not uniform throughout a chromosome
(3) the farther apart two genes are, the more likely they are to recombine
(4) the closer two genes are, the more likely they are to recombine

57. The karyotype of a triploid plant contains 72 chromosomes. How many chromosomes would the karyotype of a diploid plant of the same species contain?
(1) 24 (2) 48
(3) 49 (4) 96

58. The DNA from the bacteriophage φ X 174 has a base composition of 25% A, 33% T, 24% G, and 18% C. Which of the following best explains this observation?
(1) In viral genomes, the base pairing does not follow the standard Watson-Crick rules, and allows G-A and C-T base pairs.
(2) In viral genomes, the base pairing does not follow the standard Watson-Crick rules, and allows G-T and C-A base pairs.
(3) Viral genomes are linear and tolerate basepair mismatches.
(4) The genome of bacteriophage φ X174 is single-stranded.

59. The GAL4 protein activates transcription from the *GAL*1 promoter in yeast. To bind to DNA, the protein utilizes a
(1) heme group
(2) transcriptional-activating domain
(3) zinc-finger domain
(4) transmembrane segment

60. Active transposable elements have which of the following features?
I. Repeated sequences at the ends of the transposable element
II. Different numbers and chromosomal positions in different species of a single genus
III. The ability to alter the phenotype of an organism

(1) I only (2) II only
(3) I and III only (4) I, II, and III

61. Which of the following is NOT an anabolic product of nitrogen assimilation?
(1) Glutamate (2) Glutamine
(3) Asparagine (4) Urea

62. Consider the average *in vivo* turnover rates for proteins, DNA, and mRNA. Which of the following orders best describes the turnover rate from fastest (shortest average lifetime) to slowest (longest average lifetime)?
(1) mRNA > DNA > proteins
(2) mRNA > proteins > DNA
(3) Proteins > mRNA > DNA
(4) Proteins > DNA > mRNA

63. India has 47 000 species of flowering and non-flowering plants. Out of 47 000 species of plants, 5150 are endemic and 2532 species are found in the Himalayas and adjoining regions and 1782 in the peninsular India. What proportion of fauna is represented by India of the recorded world's flora?
(1) 0.5 % (2) 5 %
(3) 12 % (4) 24 %

64. Which of the following biosphere reserve is not correctly matched with its location?
(1) Nilgiri (01.08.86): Tamilnadu
(2) Nokrek (01.09.88): Meghalaya
(3) Similpal (21.06.94): Orissa
(4) Kanchanjanga (07.02.2000): Kashmir

65. Which is correct decreasing order of biogeographical regions of India according to landmass covered?
(1) Semi arid>Gangatic plain>Himalaya>Desert
(2) Western ghat>Trans himalayan>North East India>Deccan Penninsula
(3) Deccan Penninsula>Islands>Coastal areas>Semi arid
(4) Coastal areas>Semi arid>Gangatic plain>Himalaya

66. Rhodopsin, β-adrenergic receptors, and muscarinic acetylcholine receptors share which of the following features?
(1) Each causes an inhibitory intracellular response.
(2) Each activates a tyrosine kinase cascade.
(3) Each is composed of an dimer.
(4) Each functions through a heterotrimeric G-protein.

67. Retroviral oncogenes are probably aberrant forms of normal cellular genes that regulate cell proliferation. Which of the following gene products are LEAST likely to be encoded by an oncogene?
(1) GTP-binding proteins
(2) DNA-binding proteins
(3) Transmembrane proteins
(4) Capsid proteins

68. Which of the following best supports the endosymbiotic theory of the evolutionary origin of mitochondria?
(1) Mitochondria, chloroplasts, and prokaryotes contain electron carriers.
(2) Genes for mitochondrial pyruvate dehydrogenase subunits are found in the nuclear DNA.
(3) Mitochondrial and bacterial ribosomal functions are inhibited by the same antibiotics.
(4) The outer mitochondrial membrane contains the protein porin.

69. When the nucleus of a frog red blood cell, which does not replicate DNA, is transplanted into an enucleated frog egg, the egg goes through several cell divisions. Which of the following is the best interpretation for this phenomenon?
(1) Isolated red-blood-cell nuclei synthesize DNA.
(2) The nucleus plays no role in cell division.
(3) An enucleated frog egg can divide.
(4) The cytoplasm controls nuclear DNA synthesis.

70. The nuclear-synthesized poly-A sequence at the 3' end of eukaryotic messenger RNA is
(1) attached at random sequences within the 3' non-translated region of a pre-mRNA
(2) found also as a common feature in rRNA and tRNA
(3) transcribed from poly-T sequences in template DNA
(4) added after 3' end cleavage of the pre-mRNA transcript

71. A silent mutation in a gene results in
(1) no change in the nucleotide sequence of the mRNA encoded by the gene
(2) no change in the amino acid sequence of the protein encoded by the gene
(3) no expression of the protein encoded by the gene
(4) an amino acid substitution that has a significant effect on the functional activity of the protein encoded by the gene

72. Which of the following most accurately explains the cause for the abnormal numbers of chromosomes during human reproduction that can result in Down syndrome, Turner's syndrome, or Klinefelter's syndrome?
(1) The occurrence of nondisjunction of homologous chromosomes during meiosis
(2) The duplicative production of extra chromosomes during DNA replication
(3) The abnormal pairing of nonhomologous chromosomes during prophase of meiosis I
(4) The selective loss of particular chromosomes from the sex cells after formation of the mature gamete

73. If in a population of 10,000 in any village 1900 are suffering from Hutington disease, a dominant autosomal disorder. The frequency of diseased allele is
(1) 0.19 (2) 0.81
(2) 0.38 (4) 0.1

74. The enzyme reverse transcriptase is useful in the generation of cDNA libraries for which of the following reasons?
(1) It is sensitive to high temperatures and so can be readily "killed" by heat treatment when the reaction is completed.
(2) It does not require a primer to initiate polymerization as do most DNA polymerases.
(3) It is insensitive to high temperatures and so can survive the many cycles of heating required to perform the polymerase chain reaction.
(4) It is an RNA-dependent DNA polymerase. DNA polymerases and so is able to utilize mRNA from mutated genes as a template.

75. Gene rearrangements play a role in which of the following processes?
(1) Adaptation to carbon source by bacteria
(2) Surface antigen changes in trypanosomes
(3) Sex determination in nematodes
(4) Host range modification in bacteriophage T4

76. A mutant of *E. coli* with a heat-sensitive DNA ligase (25°C permissive, 37°C nonpermissive) has been used to show that DNA synthesis is discontinuous. Examination of DNA replication in the presence of [^{3}H]-thymidine in the mutant would demonstrate which of following?
(1) The accumulation of short segments of unlabeled DNA at 25°C and at 37°C
(2) The accumulation of short segments of unlabeled DNA at 25°C but not at 37°C
(3) The accumulation of short segments of radioactive DNA at 37°C but not at 25°C
(4) The accumulation of short segments of radioactive DNA at 25°C but not at 37°C

77. All of the following statements are true about damage by ultraviolet light to DNA in living cells EXCEPT:
(1) The damage blocks normal DNA replication.
(2) The most damaging wavelength is about 260 nm.
(3) Covalent bonds are formed that join neighboring pyrimidines.
(4) Neighboring phosphodiester bonds are cleaved.

78. Which of the following is correct order of distribution of forest types in India?
(1) Tropical dry deciduous>Tropical moist deciduous>Tropical thorn>Tropical wet evergreen
(2) Subtropical pine>Sub alpine>Tropical dry deciduous>Tropical thorn
(3) Tropical thorn>Tropical wet evergreen> Tropical dry deciduous>Sub alpine
(4)Tropical dry deciduous>Sub alpine>Tropical thorn>Tropical wet evergreen

79. Which of the following statement is incorrect?
(1) The Western and Central flock of Siberian crane, one of the most endangered cranes in the world, uses Sambhar lake as its winter site.
(2) The brown antlered deer (*Cervus eldi eldi*) or 'sangai' is found only in phumadis (floating landmasses) of Lok Tak Lake.
(3) Gahirmatha beach is a major breeding site of olive ridley turtles.
(4) Chilka is the habitat of many threatened species such as green sea turtle, Hawksbill turtle, dugong, and blackbuck.

80. Which of the following is not a collection of mangrove vegetation in India?
(1) *Avicennia officinalis, Excoecaria agallocha, Heritiera fomes*
(2) *Bruguiera parviflora, Ceriops decandra*
(3) *Rhizophora mucronata, Xylocarpus granatump*
(4) *Acacia tortalis, Prosopis sinereria, Tecomella undulate*

81. A coenzyme required by some enzymes that transfer one-carbon groups is
(1) pyridoxal phosphate (2) tetrahydrofolate
(3) thiamine PP (4) FAD

82. Which of the following represents the sequence of electron flow in the light reactions of photosynthesis in higher plants?
(1) H_2O → photosystem I → photosystem II → NADP
(2) H_2O → PSII → photosystem I → NADP
(3) H_2O → photosystem II → photosystem I → ATP
(4) NADPH → PSI → photosystem II → O_2

83. Allosteric inhibition of an enzyme involves which of the following?
(1) Binding of an inhibitor to a site other than the substrate binding site
(2) Binding of an inhibitor competitively to the substrate binding site
(3) Binding of an inhibitor noncompetitively to the substrate binding site
(4) Cooperative binding of substrate to an enzyme that does not deviate from normal Michaelis- Menten kinetics

84. The ability of a cell to migrate on a substrate involves all of the following EXCEPT
(1) formation and breakage of focal adhesions
(2) assembly of an actin meshwork at the leading edge
(3) WASp proteins
(4) connexin proteins

85. Correct statements concerning different members of the myosin family include which of the following?
I. Some are actin plus (barbed)-end motors
II. Some are actin minus (pointed)-end motors
III. Some are actin-depolymerizing proteins
(1) I only (2) III only
(3) I and II only (4) I, II, and III

86. Which of the following cell junctions is responsible for metabolic coupling?
(1) Tight junction (2) Gap junction
(3) Adherens junction (4) Desmosome

87. A dicentric chromosome is unstable because
(1) it cannot resynthesize its telomeres during replication
(2) it pairs with nonhomologous chromosomes in meiosis
(3) it pairs with nonhomologous chromosomes in mitosis
(4) it is often simultaneously drawn to opposing spindle poles in mitosis

88. Which of the following statements about repetitive DNA is NOT true?
(1) Repetitive DNA is associated with the centromeres and telomeres in higher eukaryotes.
(2) Repetitive DNA is restricted to nontranscribed regions of the genome.
(3) Repetitive DNA sequences are often found in tandem clusters throughout the genome.
(4) Repetitive DNA was first detected because of its rapid reassociation kinetics.

89. Which of the following is NOT characteristic of a eukaryotic enhancer element?
(1) Its activity is independent of its orientation (i.e., the sequence can be inverted without effect).
(2) Its activity is dependent on its distance from the start site of transcription.
(3) It may be found as far as 1 to 2 kilobases from the promoter.
(4) It may be positioned at the 5' end or the 3' end of the gene.

90. Under what conditions Guass Exclusion Principle will not operate even if two species are occupying same niche?
(1) Resources are abundant
(2) There is pressure of predators
(3) Environment is not constant
(4) All of the above

91. The glyoxylate cycle is found in plants and bacteria but not in animals. The lack of this cycle in animals
results in the inability to
(1) synthesize oxaloacetate from isocitrate
(2) synthesize glutamate from malate
(3) perform gluconeogenesis from amino acids
(4) perform gluconeogenesis from fatty acids

92. Lack of independent assortment of two genes A and B in fruit fly Drosophila is due to
(1) Repulsion (2) Recombination
(3) Linkage (4) Crossing over

93. Which of the following is expected to have the highest value ($gm/m^2/yr$) in a grassland ecosystem?
(1) Secondary Production (2) Tertiary Production
(3) Gross Production (GP) (4) Net Production (NP)

94. If by radiation all nitrogenase enzymes are inactivated, then there will be no
(1) fixation of nitrogen in legumes
(2) fixation of atmospheric nitrogen
(3) conversion from nitrate to nitrite in legumes
(4) conversion from ammonium to nitrate in soil

95. Age of fossils in the past was generally determined by radio-carbon method and other methods involving radioactive elements found in the rocks. More precise methods, which were used recently and led to the revision of the evolutionary periods for different groups of organisms, includes
(1) study of carbohydrates/proteins in fossils
(2) study of the conditions of fossilization
(3) electron spin resonance (ESR) and fossil DNA
(4) study of carbohydrates/proteins in rock

96. What kind of evidence suggested that man is more closely related with chimpanzee than with other hominoid apes?
(1) Evidence from DNA from sex chromosomes only
(2) Comparison of chromosomes morphology only
(3) Evidence from fossil remains, and the fossil mitochondrial DNA alone
(4) Evidence from DNA extracted from sex chromosomes, autosomes and mitochondria

97. An ecosystem which can be easily damaged but can recover after some time if damaging effect stops will be having
(1) Low stability and high resilience
(2) High stability and low resilience
(3) Low stability and low resilience
(4) High stability and high resilience

98. During transcription, if the nucleotide sequence of the DNA strand that is being coded is ATACG then the nucleotide sequence in the mRNA would be
(1) TATGC (2) TCTGG
(3) UAUGC (4) UATGC

99. Extranuclear inheritance is a consequence of presence of genes in
(1) Mitochondria and chloroplasts
(2) Endoplasmic reticulum and mitochondria
(3) Ribosomes and chloroplast
(4) Lysosomes and ribosomes

100. Viruses that infect bacteria, multiply and cause their lysis, are called
(1) Lysozymes (2) Lipolytic
(3) Lytic (4) Lysogenic

101. The recessive genes located on X-chromosome in humans are always
(1) Lethal (2) Sub-lethal
(3) Expressed in males (4) Expressed in females

102. In C_3 plants, the first stable product of photosynthesis during the dark reaction is
(1) Malic acid
(2) Oxaloacetic acid
(3) 3-phosphoglyceric acid
(4) Phosphoglyceraldehyde

103. Crossing over that results in genetic recombination in higher organisms occurs between
(1) sister chromatids of a bivalent
(2) non-sister chromatids of a bivalent
(3) two daughter nuclei
(4) two different bivalents

104. Which of the following statements is not true for retroviruses?
(1) DNA is not present at any stage in the life cycle of retroviruses
(2) Retroviruses carry gene for RNA-dependent DNA polymerase
(3) The genetic material in mature retroviruses is RNA
(4) Retroviruses are causative agents for certain kinds of cancer in man

105. Restriction endonucleases?
(1) are present in mammalian cells for degradation of DNA when the cell dies
(2) are used in genetic engineering for ligating two DNA molecules
(3) are used for in vitro DNA synthesis
(4) are synthesized by bacteria as part of their defense mechanism

106. In glycolysis, during oxidation electrons are removed by
(1) ATP
(2) glyceraldehyde-3-phosphate
(3) NAD+
(4) molecular oxygen

107. Phenetic classification of organisms is based on
(1) Observable characteristics of existing organisms
(2) The ancestral lineage of existing organisms
(3) Dendrogram based on DNA characteristics
(4) Sexual characteristics

108. The Ti plasmid, is often used for making transgenic plants. This plasmid is found in
(1) Azotobacter
(2) Agrobacterium
(2) Rhizobium
(4) Yeast as a 2 μm plasmid

109. In a plant, red fruit (R) is dominant over yellow fruit (r) and tallness (T) is dominant over shortness (t). If a plant with RrTt genotype is crossed with a plant that is rrtt,
(1) 25% will be tall with red fruit
(2) 50% will be tall with red fruit
(3) 75% will be tall with red fruit
(4) all the offspring will be tall with red fruit

110. Which one of the following precedes re-formation of the nuclear envelope during M phase of the cell cycle?
(1) Decondensation from chromosomes, and reassembly of the nuclear lamina
(2) Transcription from chromosomes, and reassembly of the nuclear lamina
(3) Formation of the contractile ring, and formation of the phragmoplast
(4) Formation of the contractile ring, and transcription from chromosomes

111. A normal woman, whose father was colour-blind is married to a normal man. The sons would be
(1) 75% colour-blind (2) 50% colour-blind
(3) all normal (4) all colour-blind

112. Which of the following statement is incorrect for Eastern Himalayas?
(1) In the whole of Eastern Himalayas, there are an estimated 9000 plant species, with 3500 (i.e. 39%) of them being endemic.
(2) At least 55 flowering plants endemic to this area are recognized as rare, for example, the pitcher plant (*Nepenthes khasiana*).
(3) The area has long been recognized as a rich centre of primitive flowering plants and the area is recognized as 'Cradle of Speciation'.
(4) About 1 500 endemic species of dicotyledonous plants are reported from this region. 245 species of orchids belonging to 75 genera are found here, of which 112 species in 10 genera are endemic to the region

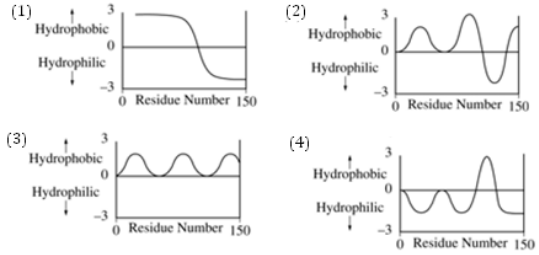
113. Which of the following is not a rare fauna of the Western Ghat?
(1) Lion Tailed Macaque, Nilgiri Langur
(2) Nilgiri Tahr, Flying Squirrel
(3) Malabar Gray Hornbill, Malabar Tree Nymph (*Idea malabarica*)
(4) Golden Langur, Namdapha flying squirrel

114. If the side R groups of alternate aminoacids along a polypeptide strand points in opposite direction then the secondary structure of polypeptide stretch should be-
(1) α-helix (2) 3^{10} –helix
(3) β-strand (4) random coil

115. The peptide ITVNGKTY can take up the following three structures-
A. all 8 amino acids are in α-helix conformation
B. all 8 amino acids are in β-helix conformation
C. all 8 amino acids are in 3^{10}-helix conformation

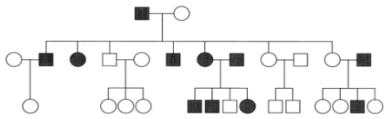
Arrange the structure in decreasing order of their N to terminal distances-
(1) ABC (2) BCA
(3) CAB (4) BAC

116. Glycophorin, an integral membrane protein, has a single transmembrane alpha helix. Which of the following idealized hydropathy plots most likely represents the transmembrane nature of glycophorin?



117. The phospholipids which form a membrane bilayer are-
(1) Completely non-polar molecules
(2) Completely polar groups
(3) Ampipathic molecules with polar head group and hydrophobic tail
(4) None of the above

118. The rate at which a DNA fragment moves in an electrophoretic gel is primarily a function of the fragment's
(1) length (2) double helical structure
(3) Degree of methylation (4) Adenine content



119. In the pedigree above, circles denotes females, squares denote males, and shaded figures denote individual expressing a specific trait. Which of the following is most probable mode of inheritance of this trait?
(1) Simple Mendelian dominant
(2) Simple Mendelian recessive
(3) Codominant relationship of a single pair of alleles
(4) X-linked dominant transmission

120. Catabolite repression in *E. coli* bacteria, involving the catabolite activator protein (CAP), is actually a type of positive regulation, because
(1) cAMP-CAP helps RNA polymerase to initiate transcription
(2) cAMP-CAP prevents RNA polymerase from initiating transcription
(3) glucose stimulates the production of cAMP
(4) glucose binds CAP and inactivates it

121. Mitochondria and chloroplast carry out oxidative phosphorylation and photo phosphorylation, respectively, by means of
(1) Conformational coupling
(2) Chemiosmotic coupling
(3) high energy intermediate coupling
(4) Sliding filaments

122. Which of the following adaptation appeared for first time in the common ancestor of the mammals, birds, and modern reptiles?
(1) Membranous lungs (2) Internal nostrils
(3) Tetrapod limbs (4) Amniotic eggs

123. C_4 plants, by decreasing photorespiration and efficiency carrying out photosynthesis, can
(1) decrease stomatal openings and thereby reduce the water loss.
(2) decrease stomatal opening and thereby reduce the leaf temperature
(3) increase stomatal opening and thereby increase water loss
(4) increase stomatal opening and thereby increase transpiration rates

124. Intron-free genes can be obtained through:
(1) Inverse-transcription
(2) Direct transcription
(3) Reverse transcription
(4) Sequence transcription

125. According to inducible operon concept, an operator gene combines with:
(1) inducer gene to switch on transcription
(2) regulator protein to switch off transcription
(3) regulator gene to switch off transcription
(4) regulator protein to switch on transcription

126. The peptide, Gly - lie - Met - Lys -Glu - Phe, upon treatment with Trysin produces:
(1) Gly-Ile-Met+ Lys-Glu-Phe
(2) Gly-Ile-Met-Lys+Glu-Phe
(3) Gly- lie + Met-Lys-Glu-Phe
(4) All of the above

127. Ouabain inhibits the Na+/K+ pump by:
(1) binding toNa+- binding site
(2) binding to K+- binding site
(3) binding to ATP binding site
(4) None

128. When [S] = K_M, the velocity of an enzyme catalyzed reaction is about:
(1) 0.1 V_{max} (2) 0.2 V_{max}
(3) 0.3 V_{max} (4) 0.5 V_{max}

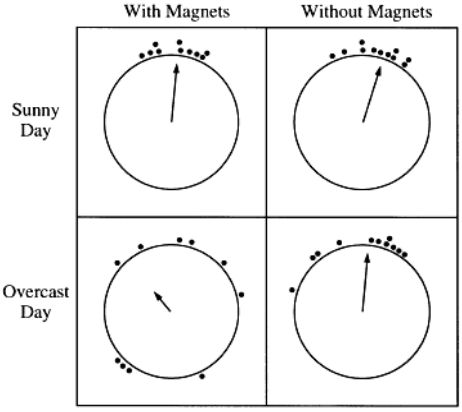
129. Many enzymes require cofactors to function. Many of these cofactors are vitamins. Which of the following statements is NOT true?
(1) Fe, Zn, Cu, Mg, Mn, K, Ni, and Mo are classified as vitamins
(2) Humans have lost the ability to synthesize vitamins
(3) Vitamins are modified by the body to form coenzymes
(4) There are 2 classes of vitamins: water-soluble and fat-soluble

130. The first antibody synthesized by the fetus:
(1) IgG (2) IgA
(3) IgM (4) IgE

131. Multimeric forms may contain a secretary component:
(1) IgA&IgD (2) IgD&IgG
(3) IgG & IgE (4) IgA & IgM

133. Two populations of land snails have been effectively isolated from each other for a long period. According to the biological species concept, which of the following would demonstrate that the two populations have become separate species?
(1) The two populations behave differently when subjected to same dose of pesticides
(2) Sterile hybrids are produced when member of the two populations are experimentally mated
(3) DNA nucleotide sequence are different between two populations
(4) The two populations have different electrophoretic pattern of proteins

132. In the diagram below, the centre of each circle represents the location at which homing pigeons were released.



The top of each circle is the homeward direction, each dot represents the direction taken by the one bird, and the arrows represents the statistical average if the chosen directions. The bird in left-hand circle were equipped with the magnets that prevented them from detecting the Earth's magnetic field. This experiment demonstrated that homing pigeons
(1) can navigate only on sunny days
(2) can use either the sun or earth's magnetic field as navigational aids
(3) use only the sun as a compass for navigation
(4) lose navigational ability when magnet are attached to them

134. Behavior by an individual that confers evolutionary benefits to a recipient at no evolutionary cost to donor because the recipient delivers benefits to the donor at some later time and behavior by an individual that increases the fitness of recipients but lowers the fitness of donor are termed as
(1) Reciprocity and Altruism
(2) Cooperation and Spite
(3) Nepotism and Kin selection
(4) Symbiosis & Predation

135. Na^+- K^+ pump is found in membranes of many cells. It work against electrochemical gradient and involves an integral protein ATPase. For each molecule of ATP used
(1) 3 ions of Na^+ are pumped out and two K^+ ions are taken in
(2) 3 ions of Na^+ are taken in and two K^+ ions are pumped out
(3) 2 ions of Na^+ are thrown out and 3 K^+ ions are absorbed
(4) 3 ions of Na^+ are absorbed and 3 K^+ ions are pumped but,

136 . First organism evolved on earth were-
(1) aerobic heterotrophs
(2) anaerobic heterotrophs
(3) aerobic autotrophs
(4) anaerobic autrotrophs

137. The isoelectric point of a protein is 7.0 At pH4, four aspartyl carboxylic groups which were completely ionized at pH 7.0, remain protonated. What would be the net charge on the protein at pH 4.0?
(1) +3 (2) +4
(3) -4 (4) -3

138. Molecular chaperones are used in vivo by organisms to help in the correct folding proteins. One of the following statements is correct about their mode of action
(1) they prevent the aggregation of polypeptide chains
(2) z-DNA
(3) they Prevent the formation of wrong disulphide bonds
(4) all of the above

139. The oxidation of one mole of glucose by anaerobic glycolysis yields a net of
(1) 2 moles of lactate and 2 moles of ATP
(2) 2 moles of pyruvate and 6 moles of ATP
(3) 2 moles of lactate and 6 moles of ATP
(4) 2 moles of pyruvate and 8 moles of ATP

140. Which therapeutic antibiotics blocks the peptidyl transferase reaction of protein synthesis?
(1) Chloramphenicol (2) Erythromycin
(3) Tetracycline (4) puromycin