M.Sc. Biotechnology–I/A

1. According to Coulomb's law, the solubility of a solute increases when :
   (A) Dielectric constant of the solvent is increased
   (B) Dielectric constant of the solvent is decreased
   (C) Charge of the ions is increased
   (D) Both (B) and (C)

2. Proton in aqueous solution mainly exists as :
   (A) Hydride ion
   (B) Proton
   (C) Hydronium ion
   (D) All of the above

3. $[OH]^-$ in aqueous Solution A is 10^{-6}M, Solution B is 10^{-7} M and Solution C is 10^{-8}M, which of the following is true :
   (A) Sol. A is basic, B is neutral and C is acidic
   (B) Sol. A is acidic, B is neutral and C is basic
   (C) Sol. A is neutral, B is acidic and C is basic
   (D) Sol. A is acidic, B is basic and C is neutral

4. Isoelectric point is a point at which :
   (A) Net charge of a protein is maximum
   (B) Net charge of a protein is zero
   (C) Net charge of a protein is positive
   (D) Net charge of a protein is negative

5. Which of the following aminoacid can establish a covalently linkage between two subunits of a protein ?
   (A) Proline
   (B) Tyrosine
   (C) Serine
   (D) Cysteine

6. Phosphodiester bond in RNA is formed between phosphoric acid and :
   (A) 2′–OH of one ribose and 5′–OH of adjacent ribose
   (B) 3′–OH of one ribose and 5′–OH of adjacent ribose
   (C) 3′–OH of one ribose and 3′–OH of adjacent ribose
   (D) 3′–OH of one ribose and 4′–OH of adjacent ribose

7. Which of the following technique is NOT used for protein separation ?

(A) Isoelectric focussing

(B) Gel-exclusion chromatography

(C) Denaturating polyacrylamide gel electrophoresis

(D) Southern blotting

8. Which of the following chemical can reduce disulphide bonds of proteins ?

(A) β-mercaptoethanol

(B) Sodium dodecayl sulphate (SDS)

(C) Urea

(D) Sodium thiocynate

9. Which of the following is inversely related with the electrophoretic mobility of ion in a medium ?

(A) Charge on ion

(B) Electric force

(C) Viscosity of medium

(D) All of the above

10. Ultracentrifugation is used for :

(A) Protein separation

(B) Nucleic acid separation

(C) Protein molecular weight determination

(D) All of the above

11. Partial double bond character of peptide bond is because of the following reason :

(A) Its carbon is bonded to electronegative atom and the nitrogen has loan pair of electrons

(B) Its carbon is bonded to carbon side chain

(C) Its nitrogen is bonded to carbon side chain

(D) Both (B) and (C)

12. Glycosidic bond is present in the following :

(A) Amino acids

(B) Nucleotides

(C) Monosaccharide

(D) Fatty acids

13. Red colour of blood is because of :

(A) Globin part of hemoglobin

(B) Heme part of hemoglobin

(C) Plasma

(D) Antibodies

14. Which of the following is NOT true about triglycerides ?

(A) They form major part of biological membranes

(B) They are non-polar in nature

(C) They act as energy reservoirs in animal cells

(D) They are esters of fatty acids and glycerol

15. The determinants of blood groups are :

(A) Glycoproteins (B) Phospholipid

(C) Nucleic acid (D) Lipoproteins

16. Which of the following statement is NOT true about enzymes ?

(A) They are mostly proteinaceous in nature

(B) Their activity is regulated

(C) They act as catalysts by increasing the activation energy

(D) They are mostly sterospecific

17. An enzyme performs catalysis by using nucleophilic attack on the substrate, which of the following amino acid is the most likely candidate for performing such attack :

(A) Valine (B) Isoleucine

(C) Serine (D) Proline

18. If thyroid stimulating hormone (TSH) is found raised above the normal value, it indicates :

(A) Hyperthyroidism

(B) Hypothyroidism

(C) Both (A) and (B)

(D) Raised TSH has no relation with thyroid function

19. Cells not responsive to insulin hormone is because of the following reason :

(A) Cell lacks insulin receptors

(B) Cell lacks the Protein channel through which insulin enters the cell

(C) Cell membrane of a cell lacks a special phospholipid which binds insulin

(D) Cell has specific proteases which destroy insulin

20. In Muscle, during vigorous activity and depleted oxygen conditions, glucose is mostly converted to :

(A) Acetyl-CoA

(B) Lactate

(C) Ethanol

(D) Both (B) and (C)

21. During action potential (depolarization) in the neurons, the movement of Na^+ ions occurs in the following direction :

(A) Na^+ moves from outside to inside of neuron

(B) Na^+ moves from nucleus to cytosol of neuron

(C) Na^+ moves from inside to outside of neuron

(D) Na^+ moves from cytosol to nucleus of neuron

22. Following conditions favour photorespiration over photosynthesis :

(A) Presence of low O_2 and raised CO_2 near the chloroplast

(B) Presence of low O_2 and low CO_2 near the chloroplast

(C) Presence of raised O_2 and low CO_2 near the chloroplast

(D) Presence of raised O_2 and raised CO_2 near the chloroplast

23. Which of the following is NOT true about bile salts ?

(A) They help in lipid aggregation

(B) They help in lipid digestion

(C) They help in lipid absorption

(D) They help in absorption of lipid soluble vitamins

24. Following combination is the best for the individuals suffering from severe salt and water depletion :

(A) Proteins, salts and water

(B) Salts and water

(C) Vitamins, salt and water

(D) Glucose, salt and water

25. Which of the following metabolic pathway leads to glucose synthesis ?

(A) Phospho pentose pathway
(B) Gluconeogenesis
(C) TCA cycle
(D) None of the above

26. Majority of the chemotherapeutic agents used in cancer treatment are :

(A) Protein translation inhibitors
(B) Transcription inhibitors
(C) DNA synthesis inhibitors
(D) Repair system inhibitors

27. Which of the following statement is NOT correct for DNA Replication ?

(A) It is semi-discontinuous
(B) It is semi-conservative
(C) DNA polymerase synthesizes DNA in 3′ to 5′ direction
(D) DNA polymerase require oligonucleotide to start DNA synthesis

28. Which of the following statement for prokaryotic transcription is NOT correct ?

(A) mRNA transcribed has same sequence as that of template strand of its gene
(B) mRNA transcribed has same sequence as the sense strand of its gene
(C) Prokaryotic mRNAs can be polycistronic
(D) Transcription and translation in prokaryotic is coupled

29. Starting from first nucleotide, how many amino acid coding codons are present in the following synthetic mRNA, 5′–AUGACCACACAGGACUAGUAACAC–3′ :

(A) 5
(B) 6
(C) 7
(D) 8

30. Which of the following is NOT correct about type-II restriction endonucleases ?

(A) They cleave phosphodiester bond between two nucleotides
(B) They cleave both strands of DNA
(C) They recognize specific DNA sequences
(D) They cleave bond between nitrogenous base and the deoxyribose

31. The unique feature of the enzyme Taq polymerase used in Polymerase chain reaction is :

(A) High fidelity
(B) High thermal stability
(C) No cofactor requirement
(D) All of the above

32. Which of the following is NOT correct about clonning vectors ?

(A) They have selectable marker gene

(B) They have multiple cloning site

(C) They do not have any restriction endonuclease site

(D) They have origin of replication

33. Telomeres perform the following function(s) :

(A) They help in end replication of linear DNA

(B) They prevent ligation of chromosomal ends

(C) They prevents exonucleases from attacking the chromosomal ends

(D) All of the above

34. Which of the following is NOT a membrane bound cell organelle ?

(A) Peroxisome (B) Nucleosomes

(C) Glyoxysomes (D) Lysosomes

35. If you have a chloroplast in an aqueous solution, which of the following conditions will make the chloroplast produce oxygen :

(A) Illuminating the chloroplast containing solution

(B) Placing the chloroplast containing solution in dark

(C) ATP addition

(D) NADPH addition

36. Which of the following is NOT present inside mitochondria ?

(A) DNA (B) RNA

(C) Ribosomes (D) None of the above

37. Phosphorylase is an enzymes that :

(A) Add inorganic phosphate to other substrates

(B) Transfer phosphate from ATP to other substrates

(C) Removes phosphate from substrates

(D) All of the above

38. If a husband has A blood group and the wife has B blood group, their offspring's may have the following blood group :

(A) A only (B) B only

(C) AB only (D) A, B, AB and O

39. If a plant, homozygous for red flowers and heterozygous for tallness is bred with a plant homozygous for yellow flowers and homozygous for dwarfness (Red colour and tallness are dominant over yellow colour and dwarfness). What will be the percentage of plants in F1 progeny having red flowers and being tall ?

(A) 25% (B) 50%
(C) 75% (D) 100%

40. Which of the following represents the interphase ?

(A) S, M, G1 (B) G1, S, G2
(C) M, G2, S (D) G1, M, G2

41. Mismatch DNA repair system is able to distinguish newly synthesized DNA strands from older strands because :

(A) New strands do not contain Cytosine bases
(B) Old strands are methylated while new strands are not
(C) New strands are methylated while old strands are not
(D) New strand has some Uracil bases incorporated

42. Which of the following is having the highest antigenicity ?

(A) Proteins (B) Carbohydrates
(C) Lipids (D) Fatty acids

43. Which of the following terms is NOT related to antibody ?

(A) Constant region (B) Fab fragment
(C) Hinge region (D) Epitope

44. Which of the following antibodies are mainly found in secretions ?

(A) IgG (B) IgM
(C) IgA (D) IgE

45. Which of the following pathways of complement system is activated by antibody ?

(A) Classical pathway (B) Alternate pathway
(C) Lectin pathway (D) All of the above

46. How many ml of one molar NaCl solution are required to prepare 10ml of 200mM NaCl solution ?

(A) 8 ml (B) 2 ml
(C) 11.7 ml (D) 0.0117 ml

47. Which of the following molecular events can lead to cancer ?

(A) Chromosomal rearrangement
(B) Altered regulatory sequences
(C) Gene amplifications
(D) All of the above

48. Cancer is often as the result of following events :

(A) Activation of oncogene to proto-oncogene
(B) Activation of Tumor suppressor gene to proto-oncogene
(C) Activation of oncogene to tumor suppressor gene
(D) Activation of proto-oncogene to oncogene

49. Homolytic cleavage of –C–H– bond results in the formation of :

(A) Carbon radical and hydrogen atom
(B) Carbanion and proton
(C) Carbocation and hydride ion
(D) Carbanion and hydride ion

50. Addition of groups to double bonds or formation of double bonds by removal of groups is performed by the following class of enzymes :

(A) Ligases (B) Mutases
(C) Lyases (D) Epimerases

51. Which of the following is the unit of K_m in the Michaelis-Menten equation ?

(A) μM (B) μM/Sec
(C) 1/second (D) Second

52. Oxidative phosphorylation is favoured when :

(A) NAD^+/NADP ratio is high
(B) NADH/NAD^+ ratio is high
(C) NAD^+/NADP ratio is low
(D) Both (B) and (C)

53. Which of the following is a plant stress hormone ?

(A) Auxin (B) Gibberlin
(C) Abscisic acid (D) Cytokinin

54. Which of the following microorganism is used as a host for Ti plasmids so as to produce transgenic plants ?

(A) Nostoc
(B) Thermus aquatics
(C) Agrobacter staphylococcus albus
(D) Agrobacterium tumefaciens

55. The resistance of 4 ohm, 8 ohm and 16 ohm are connected in parallel, the equivalent resistance is :

(A) 16/7
(B) 16/9
(C) 7/16
(D) 7/9

56. Which of the following is correct for the oxidation-reduction reaction : $Fe^{3+} + Cu^{+} \rightarrow Fe^{2+} + Cu^{2+}$:

(A) Cu^{+} acts as reductant and is oxidized
(B) Fe^{3+} acts as reductant and is oxidized
(C) Cu^{+} acts as oxidant and is reduced
(D) Both (B) and (C)

57. Boat and chair conformations are found :

(A) In pyranose sugars
(B) In furanose sugars
(C) Both (A) and (B)
(D) None of the above

58. Following virus has a single-stranded circular genome :

(A) Bacteriophage lambda
(B) ϕX174
(C) Simian virus 40
(D) Herpes simplex virus

59. Ampicillin resistance is conferred by :

(A) Streptokinase
(B) Amylase
(C) β-lactamase
(D) Primase

60. A bacterial strain is designated as High frequency recombination (Hfr) when :

(A) F factor is integrated in its chromosome
(B) F factor DNA alone exists as extra chromosomal DNA
(C) F factor and some bacterial chromosomal DNA with it and remains as extra chromosomal DNA
(D) F factor DNA is absent.

Bio-technology

1. How much current will an electric bulb draw from a 220 V source, if the resistance of a bulb filament is 1200Ω ?

   (a) 0.11 A (b) 0.2 A

   (c) 0.18 A (d) 1.0 A

2. 200 ml of 0.3 M NaCl is prepared by dissolving the following amount of NaCl :

   (a) 3.51 gms (b) 35.1 gms

   (c) 0.35 gms (d) 0.03 gms

3. How many micro litres (µl) of 1m M solution of NaCl is required to make 20 ml of 1µM NaCl solution ?

   (a) 200 (b) 20

   (c) 0.2 (d) 0.02

4. Which of the following is a programming language ?

   (a) Lotus (b) Pascal

   (c) Netscape (d) MS-Outlook

5. Ice is less dense than liquid water, because :

   (a) In ice H_2O molecules make more hydrogen bonds with each other than in liquid state

   (b) In ice H_2O molecules make less hydrogen bonds with each other than in liquid state

   (c) Hydrogen bonding has no role to play in the density of ice

   (d) Hydrogen bonds between H_2O molecules in liquid state are stronger than in ice

6. Formation of native structure of proteins from its denatured form has :

   (a) $\Delta H > 0$ and $\Delta S < 0$ (b) $\Delta H < 0$ and $\Delta S = 0$

   (c) $\Delta H = 0$ and $\Delta S > 0$ (d) $\Delta H < 0$ and $\Delta S < 0$

58. Which of the following amino acid is the most often target of protein kinases activated by growth factors receptors ?

(a) Serine
(b) Tyrosine
(c) Threonine
(d) Histidine

59. Adenylate cyclase is involved in :

(a) Conversion of cAMP to AMP
(b) Conversion of cAMP to ADP
(c) Conversion of ATP to cAMP
(d) All the above

60. Just prior to G2 phase of cell cycle, the diploid human body cell contains :

(a) 23 chromatids
(b) 46 chromatids
(c) 69 chromatids
(d) 92 chromatids

7. On titration, which of the following substances will have three different pK values ?

(a) Acetic Acid
(b) Glycine
(c) Glutamate
(d) Alanine

8. Arginine in acidic medium will have net :

(a) Positive charge
(b) Negative charge
(c) Neutral charge
(d) Zero charge

9. If you have to incorporate an amino acid in a protein where sharp turn occurs, with which of the following groups you will replace the "R" of a general amino acid (R–CH (NH_2)–COOH) :

(a) $-CH_3$
(b) $-CH_2OH$
(c) –H
(d) $-CH_2-CH_3$

10. Following is the relative percentage of single bases obtained from the double stranded DNAs isolated from different bacteria. Using this data, which DNA will have highest melting temperature ?

(a) Adenine (20%)
(b) Guanine (30%)
(c) Cytosine (25%)
(d) Thymine (15%)

11. Trans-fatty acids found in various fast foods have all the following characteristics, except :

(a) They increase the shelf life of vegetable oils
(b) They are made by partial hydrogenation of unsaturated fatty acids
(c) They prevent rancidity of fatty acids
(d) None of the above

12. In aqueous solution, D-glucose exists as a mixture of :

(a) α-D-Glucopyranose and Linear D-Glucose
(b) β-D- Glucopyranose and Linear D-Glucose
(c) Only Linear D-Glucose
(d) α-D-Glucopyranose, β-D-Glucopyranose and Linear D-Glucose

13. Eukaryotic cells are physically linked by intercellular channels made of following proteins :

(a) Chalthrins
(b) Integrins
(c) Connexins
(d) Caderins

14. Proteins with KEDL amino acid signature are destined to :

(a) Endoplasmic reticulum
(b) Golgi bodies
(c) Mitochondria
(d) Lysosomes

15. Cytoskeleton includes all the following, except :

(a) Microtubules
(b) Myosin filaments
(c) Actin filaments
(d) Intermediate filaments

16. Nucleic acids are NOT present in the following cell compartment :

(a) Nucleus
(b) Cytosol
(c) Mitochondria
(d) None of the above

17. Anaerobic degradation of glucose in muscle, *via* glycolysis leads to the formation of :

(a) Lactate
(b) Ethanol
(c) Pyruvate
(d) Acetyl CoA

18. During starvation which of the following metabolic pathways does not occur ?

(a) Gluconeogenesis
(b) Glycogen synthesis
(c) Glycogen breakdown
(d) All the above

19. SGOT enzyme, a diagnostic marker of liver damage is indicative of disturbance in :

(a) Nucleotide metabolism
(b) Carbohydrate metabolism
(c) Amino acid metabolism
(d) Fatty acid metabolism

20. Gout is caused by the deficiency of following :

(a) HGPRT
(b) Glucose-6- Phosphatase
(c) Both (a) & (b)
(d) None of the above

21. In the following oxidation-reduction reaction,
$NADH+H^+ + E\text{-}FMN \rightarrow NAD^+ + E\text{-}FMNH_2$ catalyzed by NADH dehydrogenase, which one is electron acceptor and oxidizing agent ?

(a) NAD^+
(b) $E\text{-}FMNH_2$
(c) NADH
(d) E-FMN

22. Chemiosmotic hypothesis of oxidative phosphorylation requires all the following, except :

(a) Increase in the permeability of the inner mitochondrial membrane to ions
(b) Impermeability of the inner mitochondrial membrane to ions
(c) Intact inner mitochondrial membrane
(d) Generation of proton gradient across inner mitochondrial membrane

23. Which of the following is produced more during the cyclic photophosphorylation of light reaction ?

(a) NADPH
(b) O_2
(c) ATP
(d) All the above

24. In the biological oxidation-reduction reaction, the oxidised form of nicotinamide adenine dinucleotide can accept :

(a) One electron and one proton
(b) One electron and two protons
(c) Two electrons and one proton
(d) Two electrons and two protons

25. *E.coli* was grown for two generations in a media containing ^{15} Nitrogen source. Based on semi-conservative mode of DNA replication, the ratio of $^{14}N\ ^{14}N : {}^{14}N\ {}^{15}N : {}^{15}N\ {}^{15}N$ will be respectively :

(a) 1:1:0
(b) 0:1:1
(c) 1:0:1
(d) 0:0:2

26. Operon has all the following characteristics, except :

(a) All genes in an operon are under the control of single promoter

(b) All genes in an operon are under the control of single transcription terminator

(c) The operon mRNA has single translational start and stop signals

(d) The operon mRNA has more than one Shine-Dalgarno signal

27. Following will be the approx. molecular weight (in Daltons) of the peptide coded by the longest open reading frame of eukaryotic mRNA; 5′-CAAUCCACCAUGGUUUACGAACAGACGUACUAAACAGAAAAAAAA-3′

(a) 770 (b) 880

(c) 1320 (d) 1650

28. Which of the following protein is NOT involved in DNA repair system ?

(a) Uracil-N-Glycosylase (b) RNA Polymerase II

(c) Mut S (d) None of the above

29. How many linear DNA fragments will be obtained, if E. coli genomic DNA is digested with a restriction endonuclease, whose restriction site is present once :

(a) Two

(b) One

(c) None, because all DNA will be degraded

(d) Unknown number

30. Multiple cloning site (MCS) present in a vector is a :

(a) DNA region in a vector containing many unique restriction endonuclease sites

(b) DNA region in a vector where multiple genes can be cloned simultaneously

(c) DNA region in a vector where origin of replication is present to make multiple copies of a vector

(d) DNA region in a vector where selectable marker gene is cloned

31. Which of the following vectors has highest DNA intake capacity ?

(a) Plasmid
(b) Phagemid
(c) Cosmid
(d) Bacteriophage lambda

32. During Polymerase chain reaction, following enzyme (s) is NOT required :

(a) DNA ligase
(b) DNA helicase
(c) Primase
(d) All the above

33. Serum of the person with blood group of "AB" will have antibodies against antigen :

(a) Both "A" and "B"
(b) "O" and "B"
(c) Only "O"
(d) Neither "A" nor "B"

34. Which of the following cell is NOT present in Immune system ?

(a) Cytotoxic T-cell
(b) Natural Killer Cell
(c) Dendritic Cell
(d) None of the above

35. Which of the following is NOT the accurate description of B cells ?

(a) B cells are involved in respiratory burst
(b) B cells produce antibodies
(c) B cells mediate humoral immunity
(d) None of the above

36. Which of the following statement regarding antibodies is Incorrect ?

(a) Antibodies cross placenta
(b) Antibodies are glycosylated
(c) Antibodies have disulphide bond between light chain and heavy chain
(d) None of the above

37. In non-reducing SDS-PAGE, a protein after electrophoresis showed a band of 50 Kda and under reducing conditions same protein showed a band of 25 Kda. On the basis of this observation, the protein is composed of :

(a) Homodimer covalently linked together
(b) Homodimer non-covalently linked together
(c) Heterodimer of different molecular weight subunits
(d) None of the above

38. Gel exclusion chromatography can be used for the following application :

(a) Desalting of protein solution

(b) Separation of proteins in a mixture

(c) Studying protein-protein interactions

(d) All the above

39. Protein dissolved in pure water can be quantified by using :

(a) Spectrophotometry (b) Colorimetry

(c) Both (a) and (b) (d) None of the above

40. Ribosomes are designated as 70S or 80S. The term "S" denotes :

(a) Electrophoteric property of ribosomes

(b) Light scattering property of ribosomes

(c) Gel exclusion chromatographic property of ribosomes

(d) None of the above

41. How are mitochondrial genes inherited ?

(a) Paternally (b) Maternally

(c) During foetal development (d) All the the above

42. Life of the individuals with one of these genetic disorders can be saved and improved using diet modifications :

(a) Cystic fibrosis (b) Down syndrome

(c) Phenylketonuria (d) Sickle Cell anaemia

43. Linkage of genes on same chromosome is never complete, because of :

(a) Mutations

(b) Crossing over between homologous chromosomes

(c) Re-arrangement of genes on chromosomes

(d) All the above

44. Frequency of recombination between two genes will be highest for the map units :

(a) 5 (b) 7

(c) 10 (d) 13

45. Which of the following is NOT the characteristic feature of C_4 plants ?

(a) Their Rubis CO enzyme do not have oxygenase activity

(b) Atmospheric CO_2 is taken up by mesophyll cells which lack Rubis CO enzyme

(c) Rubis CO enzyme is present in Bundle sheath cells

(d) Malate is transported from mesophyll cells to Bundle sheath cells

46. Which of the following function is NOT stimulated by insulin hormone ?

(a) Blood glucose uptake by the cells (b) Protein synthesis

(c) Fatty acid synthesis (d) Glycogen breakdown

47. Transgenic Bt Brinjal is more resistant to :

(a) Fungal infection (b) Bacterial infection

(c) Insects (d) Viral infection

48. Decarboxylation product of the following amino acid acts as inhibitory neurotransmitter in central nervous system :

(a) Glutamate (b) Tyrosine

(c) Trytophan (d) Glycine

49. E. coli is :

(a) Obligate aerobe (b) Facultative anaerobe

(c) Obligate anaerobe (d) None of above

50. Commonly used Amoxicillin drug contains antibiotic which kills bacteria by inhibiting :

(a) Cell wall formation (b) Protein Translation

(c) DNA replication (d) mRNA synthesis

51. Bacteria can acquire antibiotic resistance by :

(a) Mutation (b) Insertion of transposon

(c) Acquiring plasmid (d) All the above

52. Which of the following is NOT present in bacteria ?

(a) Gas vacoule
(b) Magnetosomes
(c) Carboxysome
(d) None of the above

53. To prevent blindness in persons who consume methanol, the patients are given intravenous infusion of ethanol. What is the enzymatic basis of this therapy ?

(a) Ethanol reacts with methanol and makes it less effective
(b) Ethanol competes with methanol for binding the substrate binding site of alcohol dehydrogenase
(c) Ethanol acts an uncompetitive inhibitor of alcohol dehydrogenase
(d) All the above

54. The typical saturation curve for an enzyme catalysed reaction is sigmoidal. This indicates that the enzyme is :

(a) Regulatory enzyme
(b) Non regulatory enzyme
(c) Both (a) & (b)
(d) None of the above

55. A competitive inhibitor of an enzyme :

(a) Increases Km without effecting Vmax
(b) Decreases Km without effecting Vmax
(c) Increases Vmax without effecting Km
(d) Decreases Vmax without effecting Km

56. Among the following which is the wrong pair ?

(a) Transferase-Kinase
(b) Lyase-decarboxylase
(c) Hydrolase-pepsin
(d) Oxidoreductase-epimerase

57. A loss of function mutation in gene was reported to be associated with tumorogenesis. What could be the most probable function of the protein ?

(a) Oncogene
(b) Proto-oncogene
(c) Tumor suppressor
(d) Both (a) & (b)

BIOTECHNOLOGY - 2010

1. 16 is represented in the binary system as :
   (a) 10001 (b) 10000
   (c) 01011 (d) 10100

2. One liter of milk will weigh :
   (a) Equal to one Kg of water
   (b) Less than one Kg of water
   (c) More than one Kg of water
   (d) There is no relation between the two

3. Which of the following nuclei will have a magnetic moment ?
   (a) $^{16}O_8$ (b) $^{2}D_1$
   (c) $^{12}C_6$ (d) $^{32}S_{16}$

4. If equal volumes of solid, liquid or vapour state of water is filled in thermos. Molecules of which state of matter will possess maximum mean kinetic energy :
   (a) Solid (b) Liquid
   (c) Vapour (d) All will have same

5. A closed system is the one which :
   (a) Exchanges energy but not matter with surroundings
   (b) Exchanges neither matter nor energy with surroundings
   (c) Exchanges both energy and matter with surroundings
   (d) Exchanges matter but not energy with surroundings

6. High specific heat of water is useful to cells because :
   (a) It increases the buffering capacity of water
   (b) It helps it to keep the cell environment warm
   (c) It increases the hydrogen bonding capacity of water
   (d) It makes it a good heat buffer

7. Overnight burning of a domestic gas heater in a poorly ventilated room resulted in a death of a person. What could be the possible reason ?
   (a) Release of poisons gaseous (b) Depletion of oxygen
   (c) Overheating (d) Dehydration

8. For spontaneous chemical reactions, which of the following is incorrect ?
   (a) Free energy change is negative (b) Change in enthalpy is negative
   (c) Change in entropy is positive (d) None of the above

9. Molecules dissolve in water because of :
   (a) The properties associated with the solute
   (b) Weak water-water interaction
   (c) The properties associated with water
   (d) Strong solute-solute interaction

10. During melting of ice into water :
   (a) Enthalpy change is negative
   (b) Entropy change is positive
   (c) Both (a) and (b)
   (d) None of above

11. Two uncharged atoms close to each other can stabilize due to :
   (a) Hydrogen bonds
   (b) Ionic bonds
   (c) Hydrophobic force
   (d) Van der Walls force

12. Dielectric constant of formamide, water, ethanol and benzene is 110.0, 78.5, 24.3 and 2.3 respectively. In which of the above solvents force between two electric charges will be highest ?
   (a) Formamide
   (b) Water
   (c) Ethanol
   (d) Benzene

13. Molarity of 1 liter of pure water at 25°C is :
   (a) 55.5 M
   (b) 18 M
   (c) 25 M
   (d) 10 M

14. If equal amount of NaCl and glucose are added to water, which of the above will affect the colligative property of water more ?
   (a) NaCl
   (b) Glucose
   (c) Both will affect equally
   (d) None of above

15. Which of the following is an incorrect statement ?
   (a) Chemical synthesis of chiral molecules produces racemic mixtures
   (b) Biosynthesis of chiral molecules produces a pure stereoisomers
   (c) All amino acids have asymmetric centers
   (d) Chiral molecules are non-superimposible mirror images

16. Sucrose doesn't exist in its anomeric form while its hydrolyzed products glucose and fructose have anomers. The reason is :
   (a) C1 of glucose and C1 of fructose are bonded in glycosidic linkage
   (b) C1 of glucose and C2 of fructose are bonded in glycosidic linkage
   (c) Sucrose is polysaccharide
   (d) Both (b) and (c)

17. Which of the following is likely to obey Charagaff's rule ?
    (a) Double stranded RNA
    (b) Single stranded RNA
    (c) Single-stranded DNA
    (d) None of above

18. Which of the following does not possess nucleic acids ?
    (a) Ribozyme
    (b) Ribosomes
    (c) Nucleosomes
    (d) None of above

19. De-methylated thymine is :
    (a) Cytosine
    (b) Uracil
    (c) Hypoxanthine
    (d) Xanthine

20. Which of the following is correct regarding type-II restriction endonucleases ?
    (a) Both endonuclease and methylase activities are present on single protein molecule
    (b) They cleave DNA at specific sites within the recognition sequence
    (c) They cleave DNA at a site located 1000 the bp away from recognition sequence
    (d) They cleave DNA at site located 24 to 26 bp away from recognition site

21. Which of the following is not a cloning vector ?
    (a) Bacteriophages
    (b) Phagemids
    (c) E.coli
    (d) Bacterial artifical chromosomes

22. Which of the following technique is NOT linked with nucleic acids ?
    (a) Western Blotting
    (b) Polymerase chain reaction
    (c) Southern blotting
    (d) Northern blotting

23. Purifying mRNA using oligo dT tagged column chromatography is an example of :
    (a) Molecular sieve chromatography
    (b) Ion-exchange chromatography
    (c) Affinity chromatography
    (d) High performance liquid chromatography

24. In gel electrophoresis, molecular separation is based on :
    (a) Gel sieving effect
    (b) Electrophoretic mobility of molecules
    (c) Both (a) and (b)
    (d) None of above

25. β-mercapto-ethanol in SDS-PAGE is used :
    (a) To reduce di-sulphide bonds (b) To denature protein
    (c) To give equal charge to proteins (d) Both (b) and (c)

26. Which of the following is NOT true regarding peptide bond ?
    (a) Peptide bond is planar in structure
    (b) Peptide bond has partial double bond characteristics
    (c) Peptide bond assumes a trans configuration
    (d) Peptide bond is a pure single bond

27. Which of the following forces significantly contribute to the structure of proteins ?
    (a) Ionic interactions (b) Van der Walls interactions
    (c) Hydrogen bonding interactions (d) None of above

28. During diarrhea, glucose is recommended to be given orally as opposed to intravenously, because :
    (a) Glucose needs to be digested
    (b) To enhance the secretion of digestive enzymes
    (c) To enhance resorption of Na^+ from intestine
    (d) All the above

29. Blood cells placed in water will have following fate :
    (a) Will become functionally more active
    (b) Will lose water and shrink
    (c) Will have no effect
    (d) Will imbibe water and will lyse

30. Clones are :
    (a) Genotypically and phenotypically similar
    (b) Phenotypically but not genotypically similar
    (c) Genotypically but not phenotypically similar
    (d) None of the above

31. Which of the following ion plays important role in the excocytosis of synaptic vesicles into synaptic cleft ?
    (a) Ca^{2+} (b) Na^+
    (c) K^+ (d) Both (b) and (c)

32. If the outflow of K^+ ions from a neuron is inhibited, it will result in :
    (a) Depolarization (b) Hyperpolarization
    (c) No effect (d) None of above

33. C_4 plants prevent photorespiration by :
    (a) Removing O_2 from their photosynthetic cells
    (b) Removing CO_2 from their photosynthetic cells
    (c) By concentrating CO_2 in their photosynthetic cells
    (d) By concentrating O_2 in their photosynthetic cells

34. Metabolic fate of pyruvate is :
    (a) Lactate
    (b) Acetyl CoA
    (c) Ethanol
    (d) All of the above

35. Expressing more LDL receptors on the cell membrane will prevent :
    (a) Hypocholesterolemia
    (b) Hypercholesterolemia
    (c) Excess of triglycerides in blood
    (d) Septicemia

36. During prolonged starvation, brain's energy requirements are mainly met by :
    (a) Glucose
    (b) Proteins
    (c) Fatty acids
    (d) Acetoacetate and β-hydroxbutyrate

37. Derivative of following amino acid is used to cure Parkinson's disease :
    (a) Glutamate
    (b) Tryptophan
    (c) Tyrosine
    (d) Histidine

38. C-value paradox suggests us about :
    (a) Colinearity between genome size and complexity of organism
    (b) No-colinearity between genome size and complexity of organism
    (c) Dosage compensation
    (d) Number of chromosomes

39. If the K_m of enzyme for substrate A is 1×10^{-6} and for substrate B is 4×10^{-8}, it means :
    (a) Enzyme has more affinity for substrate A than substrate B
    (b) Enzyme has equal affinity for substrate A and substrate B
    (c) Enzyme is non-specific
    (d) Enzyme has more affinity for substrate B than substrate A

40. Which of the following vitamins is NOT a co-enzyme precursor ?
    (a) Pyridoxine
    (b) Biotin
    (c) Pantothenate
    (d) Vitamin A

41. Most common reason for the genetic variation from one generation to next generation among humans is :
    (a) Homologous recombination
    (b) Non-homologous recombination
    (c) Mutations
    (d) Transposition

42. Exception to the concept of central dogma of genetic information flow is :
    (a) DNA viruses
    (b) RNA viruses
    (c) Both (a) and (b)
    (d) None of above

43. During DNA replication, hydroxyl group at the 3' end of primer attacks the :
    (a) Glycosidic bond of incoming nucleotide
    (b) β-phosphate of incoming nucleotide
    (c) γ-phosphate of incoming nucleotide
    (d) α-phosphate of incoming nucleotide

44. Which of the following statement regarding promoters is incorrect ?
    (a) Promoters are always present upstream of transcriptional start site
    (b) Promoters is a DNA sequence which binds RNA polymerase
    (c) Promoters are orientation dependent
    (d) None of above

45. Which of the following DNA polymerase lacks 3' to 5' exonuclease activity ?
    (a) DNA Pol I
    (b) Taq DNA Pol
    (c) DNA Pol III
    (d) Klenow fragment

46. Telomerase is NOT present in :
    (a) Somatic cells
    (b) Germ cells
    (c) Embryonic stem cells
    (d) Cancer cells

47. Among the following choose the wrong combination :
    (a) 16S rRNA, 23S rRNA, Shine-Dalgarno sequence, 50S ribosomal subunit
    (b) 5.8S rRNA, Kozak sequence, eIF4E, 40S ribosomal subunit
    (c) 5' Guanosine cap, 28S rRNA, eIF4G, 60S ribosomal subunit
    (d) Poly A tail, 18S rRNA, N-formyl methionine tRNA, Kozak sequence

48. mRNA of 500 nucleotides with open reading frame of 400 nucleotides will code for a protein having approx. molecular weight of :
    (a) 14.6 kDa
    (b) 10.33 kDa
    (c) 18.33 kDa
    (d) 22.6 kDa

49. Hypertrichosis, hairiness of the pinna of the ear, is inherited as a Y-linked recessive in humans. If a man with hypertrichosis marries a normal woman, what types of children may they have ?

(a) All of their children of both sexes have hypertrichosis
(b) All the sons have hypertrichosis, but none of their daughters
(c) Half of their sons, but none of their daughters will have hypertrichosis
(d) None of their children have hypertrichosis.

50. The most rapid method to resynthesize ATP during exercise is through :

(a) Glycolysis
(b) Phosphocreatine breakdown
(c) Glycogenolysis
(d) TCA cycle

51. Which of the following is NOT the steroid hormone ?

(a) Estrodiol
(b) Glucocorticoids
(c) Mineralocorticoids
(d) None of above

52. Which of the following is an oncogene ?

(a) *c-jun*
(b) *c-myc*
(c) *v-fos*
(d) All the above

53. Which of the following is NOT a secondary messenger ?

(a) Diacylglycerol
(b) Phospholipase C
(c) Ca^{2+}
(d) Inositol triphosphate

54. Ramachandran explained the possibility of the protein structure on the basis of :

(a) Inductive effect
(b) Endomeric effect
(c) Steric hindrance
(d) All of the above

55. Which of the following represents the nullisomic and trisomic condition ?

(a) $2n + 2, 2n + 4$
(b) $2n - 2, 2n + 1$
(c) $2n - 1, 2n + 1$
(d) $2n - 2, 2n + 2$

56. HIV- the human immunodeficiency virus belongs to which of the following viral groups ?

(a) Reoviruses
(b) Retroviruses
(c) Rhabdoviruses
(d) None of the above

57. Which of the following is multimeric antibody ?

(a) IgG
(b) IgE
(c) IgA
(d) None of above

58. CDR determines the :

(a) Antibody specificity
(b) Antibody structure
(c) Shape of the antigen
(d) It is an unrelated term

59. Cobalamin is a vitamin synthesized by :

(a) Animals only
(b) Plants only
(c) Both animals and plants
(d) Bacteria

60. How many grams of glucose are required to make 2 ml of 10% glucose solution ?

(a) 38 g
(b) 2.0 g
(c) 1.5 g
(d) 0.5 g

BIO-TEGHNOLOGY 2006

Note:-Attempt 70 questions in all.
1. Section A is compulsory for all comprising 1-30 questions.
2. Section B is for Medical Stream comprising 31-70 questions.
3. Section C i for Non-medical Stream comprising 31-70 questions.
Section A' compulsory for all candidates
However candidates shall exercise their option to attempt questions either from section B or Section C.
The relevant box as given below has essentially to be tick-marked by a candidate that the question paper is evaluated as per the option offered by him/her, otherwise the question paper shall render redundant.

Section B
(Medical Stream)

Section C
(Non-medical Stream)

Section A

1. Which of the following is *not* a computer language ?
(a) PASCAL
(b) COBOL
(c) LOTUS
(d) BASIC

2. Decimal equivalent of binary number 1010 is
(a) 2
(b) 10
(c) 13
(d) 16

3. Which of the following is *not* a storage device?
(a) Floppy
(b) Hard disk
(c) Register
(d) ROM

4. Dimensions of moment of inertia are
(a) ML2T
(b) MOLoTl
(c) M2LT
(d) MOLT2

5. Four resistors each of value. 4 ohm is connected as shown in figure. The equivalent resistance between points A and B is':

(a) 1ohm
(b) 3 ohm
(c) 4 ohm
(d) 16 ohm

6. An air bubble under water shines brightly because of the phenomenon of:
(a) dispersion
(b) interference
(c) diffraction
(d) total internal reflection

7. Balmer series in hydrogen ga~ spectrum is emitted when electro higher orbits to the:
(a) first orbit
(b) second orbit
(c) third orbit
(d) fourth orbit

8. The maximum height attained by a projectile equals its horizontal range.
The angle with the horizontal with which it was projected is :
(a) tan-1 1
(b) tan-1 2
(c) tan-1 3
(d) tan -1 4
9. In a spherical bubble of radius R, the excess pressure is :

10. Which of the g the biggest ion?
(a) Al^{3+}
(b) Ba^{2+}
(c) Mg^{2+}
(d) Na^{+}

11. Conditions that will favour the exo e ic ammonia synthesis reaction:

$N_2(g) + 3H_2(g) \equiv 2.\ aI_3(g)$
(a) high temperature and high pressure
(b) high temperature and low pressure
(c) low temperature and high pressure
(d) low temperature and low pressure

.
12. Which one of the following is blue vitriol?
(a) $CuS0_4 \cdot 7H_2O$
(b) $CuS0_4 \cdot 5H_2O$

(c) $FeS0_4 \cdot 7H2O$

(d) $ZnS0_4 \cdot 7H2O$

13. pH of 10-3 M HCI is :
(a) 2
(b) 3
(c) 4
(d) 11

14. An alcohol is formed when nitrous acid reacts with:
(a) CH3NH2
(b) (CH3)2NH
(c) CH3NHC2Hs
(d) (CH3)3N

15. The edible part of the fruit apple is :
(a) peduncle
(b) thalamus
(c) pericarp
(d) embryo

16. The F2 ratio resulting from a dihybrid cross will be :
(a) 9 : 3 : 3 : 1
(b) 1 : 1
(c) 3 : 1
(d) 1 : 1 : 1 1

17. Application of gibberellic acid induces flowering in
(a) long day plants
(b) short day plants
(c) both (a), (b)
(d) neither of the two

18. The chief nitrogenous waste in human is
(a) urea
(b) ammonia
(c) , uric acid
(d) ammonium nitrate

19. Fluid mosaic mode of biological membranes was given by
(a) Robert on
(b) Danielli and Davison
. (c) inger and icolson
(d) Gorter and Grendel

20. Phyllum Annelida includes
(a) unsegmented triploblastic coelomates

(b) unsegmented triploblastic acoelomates
(c) segmented triploblastic coelomates
(d) segmented triploblastic acoelomates

2l. Which of the following is *not* correct ?
(a) sucrose is a carbohydrate ,
(b) ribonuclease is an enzyme
(c) phosphorus is a component of DNA
(d) anticodon is present on *rRNA*

22. The correct taxonomic hierarchy is reflected in :
(a) phylum, class, order and family
(b) kingdom, family, class and order
(c) kingdom, family, order and class
(d) kingdom, class, species and genus

23. The soil type with the poor water holding capacity is
(a) silty
(b) loamy
(c) clay
(d) sandy

24. The missing term in the series 2, 3, 5, ..., 12 is :
(a) 7
(b) 8
(c) 9
(d) 11

25. In a certain language WORK is coded as 4567 and MAN as 328, then in that Language WOMAN is coded as :
(a) 43528
(b) 82354
(c) 32845
(d) 45328

26. $\sin^2 38° + \cos^2 38° = ?$
(a)1/2
(b) 3.32
(c) 1
(d)1/3

27. In a right-angled triangle, the sides perpendicular to each other are 15 cm and 8 em. Its perimeter is:
(a) 46 em
(b) 60 em
(c) 120 em
(d) 40 em

28. A alone completes a piece of work " days. If A and B work together the same work can be completed in 6 day . In how many days can B alone complete that work?
(a) 24
(b) 12
(c) 7
(d) 5

29. The critical temperarure a which an unsaturated air becomes saturated is called:
(a) dew point
(b) frost
(c) condensaation
(d) absolute humidity

30. In the SARS
(a) and
(b) acute
(c) asthma
(d) anti

Section B

31. The uncertainty in the velocity of a ball of mass 100 g when its uncertainty in position is 1 A is :
(a) 3.24 * 10-24 *mls*
(b) 5.23 * 10-24
(c) 6.14 * 10-12 *mls*
(d) 10-12

32. Which of the following favours the pontaneity of change?
(a) ~H is - ve
(b) ~S is + ve
(c) ~G is -ve
(d) All of the above

33. EOfor a cell Zn IZn2+(aq)IICu2+(aqIC) O is 1.10 V at 25°C. The equilibrium constant for the reaction Zn + Cu^{2+}(aq)= Cu + Zn^{2+}(aq) is of the order' of :
(a) 10^{-28}
(b) 10^{-37}
(c) 10^{18}
(d) 10^{17}

34. "In a given photochemical reaction, each molecule of a reaction absorbs only one quantum of radiation causing tha particular reaction." It is a statement of :
(a) Stark-Einstein law

(b) Lambert-Beer's law
(c) Grothus-Draper law
(d) None of the above

35. The decreasing order of stability of carbonium ions is given by
(a) tertiary > primary > secondary
(b) primary > secondary > tertiary
(c) tertiary> secondary> primary
(d) secondary> primary> tertiary

36. Glucose on warming with excess of phenyl hydrazine forms a yellow crystalline compound called :
(a) fructose
(b) glucosone
(c) glucosazone
(d) arabino e

37. The following reaction is an example of :
C_6H_6CHO KOH/100 degree $C_6H_6COO\text{-}K+C_6H_5CH_2OH$
(a) Perkin reaction
(b) Witting reaction
(c) Aldol condensation
(d Cannizaro reaction

38. Which of the following metal ions is green coloured ?

40. XeF_2 involve hybridization
(a) *sp3d*
(b) *dsp2*
(c) *sp3d2*
(d) *sp2*

4l. African sleeping sickness is caused by :
(a) Giardia
(b) Trypanosome
(c) Trichomonas
(d) Leishmania

42. The major immunoglobin in normal human serum IS
(a) IgG
(b) . IgM
(c) IgD
(d) IgE

43. Which of the following *does not* secrete silk ?
(a) Bombyx mori
(b) Apis indica

(c) Attacus atlas
(d) Apis indica

44. Which of the following is meant for reproduction in *Taenia solium* ?
(a) Scolex
(b) Strobila
(c) Rostellum
(d) None of the above

45. The diploid number of an organism is 12. Number of chromosomes expected to be in monosomic is
(a) 11
(b) 10
(c) 9
(d) 13

46. Modern horse is
(a) Pliohippus
(b) Equs
(c) Merychippus
(d) Mesohippus

47. Loss of water as drops of liquid from the surface of plant is called :
(a) Transpira tion •
(b) Evaporation
(c) . Guttation
(d) Condensation

48. The main body of ovule is called:
(a) nucellus
(b) integument
(c) embryo sac
(d) micropyle

49. In pinus, each sporophyll of male cone has
(a) one sporangia
(b) two sporangia
(c) four sporangia
(d) eight sporangia

50. Tropopause eparates troposphere from:
(a) Strate phere
(b) Meso phere
(c) Thermosphere
(d) Exosphere

51. "Growth is dependent on amount of food-stuff that is present in- minimum quantity" is a statement of :

(a) Shelford's law
(b) Liebig's law
(c) Vant Hoffs law
(d) None of the above

52.' Which of the following is lotic system ?
(a) lake
(b) pond-
(c) marshes
(d) stream

53. The most mono-unsaturated fatty acids have double bond between:
(a) C-8 and C-9
(b) C-9 and C-10
(c) C-1O and C-l1
(d) C-12 and C-13

54. Which of the following is sulfur containing amino acid ?
(a) Leucine
(b) Tyrosine
(c) Serine
(d) None of the above

55. The enzyme that moves along the DNA and separates the strands is
(a) prnnase
(b) helicase
(c) topoisomerase
(d) ligase

56. When the base composition of DNA from bacterium Mycobacterium tuberculosis was determined, 18% of the bases were found to be adenine. What is the [G] + [C] content ?
(a) 18%
(b) 32%
(c) 36%
(d) 64%

57. Red algae differ from the green algae and brown algae in having
(a) no chlorophylla •
(b no differentiated cells
c) no phycocyanin within their cells
d) no flagellated stages in their life cycles

58. Oxy en content reduction makes the glycolyse(glycogenesis)intensity increased due
(a) increase of ADP concentration in cell
(b) increase of ...~*AD*+concentration in cell
(c) increa e o ATP concentration in cell
(d) increase of concentration of peroxides and free radicals

59. A bacterial m-R A ith a length of 360 nucleotides in length codes for a proteirr of :
(a) roughly 360 amino acids
(b) roughly 1080 amino acids
(c) exactly 120 amino acids
(d) less than 120 amino acid

60. Nitrogen is fixed in ecosystems in ways stated below. One of the statements below is false. Which one?
(a) by cyanobacteria
(b) by electrical discharges in the atmosphere
(c) by industrially synthesized fertilizer
(d) by denitrification

61. When sunlight is on the chloroplast, pH is the lowest in the
(a) stroma
(b) cytosol
(c) space enclosed by the thylakoid membranes
(d) space enclosed by the inner and outer membranes

62. Tissues that form long, tough stands, as in the leaf stalk of celery, are
(a) epidermis
(b) collenchyma
(c) sclerenchyma
(d) parenchyma

63. Which reactions are made with the help of the system of giant axons ? slow differential reactions

64. In the blood of an adult man the total content of haemoglobin is, roughly:
(a) several hundred gram
(b) tens of gram (10-100 g)
(c) several gram
(d) several hundred milligram

65. A mollusc sample is given to a biologist. After examining the sample he says that it belongs to Bivalvia. Which of the following may be the key that makes him to reach this conclusion ?
(a) gills
(b) absence of radula
(c) body symmetry
(d) mantle

66. When a muscle cell ha a shortage of oxygen this is associated with a change in pH. What substance is responsible for this change in pH?
(a) decreased carbon dioxide
(b) decreased lactate (lactic acid)

(c) increased carbon dioxide .
(d) increased lactate (lactic acid)

67. Which one of the following pairs is *correctly* matched?
a)chloroplast-storage of enzymes •
b)peroxisomes-cellular transportation
c)nucleolus-site 'of ribosomal subunit synthesis
d)lysosomes-power house of cell

68. The belonging of a human erythrocyte to serotypes A, B, 0 is determined by chemical markers on its surface. These markers are
a. lipid molecules
b. oligosaccharides
c. polypeptides
d. antibodies

69. C4-plants can start photo ynthesis with a lower concentration of CO_2 in the atmosphere than C3-plants. This is because:
a) respiration of C4-plants is higher
b).respiration of C4-plants is lower
c) C_4 plants do not have photorespiration
d) C4-plants have photorespiration

70. the most important factor regulating seasonal migration is
a) the change in average air temperature
b) the change in day length
c) the reduced availability of food
d) the increased predator pressure

Section C

31. Current flow in semiconductor depends on the phenomenon of :
(a) drift
(b) diffusion
(c) recombination
(d) All of the above

32. A transistor connected in common base configuration has
(a) a low input resistance and high output resistance
(b) a high input resistance and low output resistance
(c) a low input resistance and low output resistance
(d) a high input resistance and high output resistance

33. The Q-point in voltage amplifier is selected in the middle of active region because:
(a) it gives distortionless output
(b) the operating point becomes very stable

(c) the current then requires less number of re i tors
(d) it then requires a small d.c. voltage

34. Tuned voltage amplifiers are *not* used
(a) in public addre s system
(b) in radio receivers
(c) where a band of frequencies is to be selected and amplified
(d) in television receivers

35. In AMtransmission with $m = 1$, suppression of carrier cuts power dissipation by a factor of :
(a) 6
(b) 2
(c) 3
(d) 4

36. One of the serious disadvan ages of FM transmission is its
(a) high static no' e
(b) limited line-of- ight range
(c) expensive equipment
(d) adjacen channel interference

37. An XOR gate produces an output only when its two inputs are
(a) high
(b) low
(c) different
(d) same

38. A half adder can be constructed from
(a) two XNOR gates only
(b) one XOR and one OR gate with their outputs connected in parallel
(c) one XOR and one OR gate with their inputs connected in parallel
(d) one XOR gate and one NOR gate

39. A blocking oscillator :
(a) IS a triggered oscillator
(b) 1 an amplifier with negative feedback
(c) generates sinusoidal waves
(d) produce sharp and narrow pulses

40. A relaxation 0 cillatcr is one which
(a) ha two able states
(b) relaxes inde .tel
(c) produce non- inu oidal output
(d) oscillates continuously

41. Binary equivalent of octal number 527 is
(a) 101010111
(b) 111011010
(c) 101010101

(d) 111000110

42. Intel 8085 is an :
(a) 4-bit microprocessor
(b) 8-bit microprocessor
(c) 16-bit microprocessor
(d) 64-bit microprocessor

43.. Which of the following languages is sui able for artificial intelligence ?
(a) ALGOL
(b) PASCAL
(c) PROLOG
(d) PILOT

44. A conventional electric current flows d e east in a high voltage power line.
What would be the direction of the resulting magnetic field directly below the power line ? -
(a) north
(b) east
(c) south
(d) west

45. An electron travels so that its total energy is twice its rest energy (0.511MeV).
What is the speed of the electron ?
(a) V=1/2c
(b) B) v=3/4c
(c) C) 3/2c
(d) D) 8/9c

46. An object is placed 60 cm from a convex converging lens. The image produced is inverted and half the size of the object. What would be focal length of the lens?
{a) 90 cm
(b) 60 cm
(c) 45 cm
(d) 20 c

47. An ide eat engine takes in heat energy at a high temperature and exhausts energy at a lower temperature. If the amount of energy exhausted at the 10 temperature is 3 times the amount of work done by the heat engine, what efficiency?
a) 0.25
b) 0.33
c) 0.67
d) 0.9

48. Consider a simple circuit containing a battery and three light bulbs. Bulb parallel with bulb B and this combination is wired in series at would happen to the brightness of the other two bulbs if bulb A were burn out ?

a) Only bulb B would get brighter
b) Both would get brighter
c) Bulb B would get brighter and bulb C would get dimmer
d) Bulb B would get dimmer and bulb C would get brighter

49. The root mean square velocity of oxygen gas (atomic mass 16) is *v* at room temperature. The root mean square velocity of Helium (atomic mass 4) at the same temperature is :
(a 4v
(b 2v
(b) v
(d) v/2

50. An object is projected straight upward from ground level with a velocity of *50 m/s*. Ignoring air resistance, it will return to ground level in approximately
(a) 2.5 s
(b) 5.0 s
(c) 7.5 s
(d) 10 s

51. The eccentricity of the ellipse $16x^2 + 7y^2 = 112$ IS
(a) 4/3
(b) 7/16
© 3/7
(e) ¾

52. If $a + b + c = 0$, then the quadratic equation $3ax^2 + 2bx + c = 0$ has
(a) At least one root in (0 1)
(b) One root in [1 2] and other in (-1, 0)
(c) Both roots are imaginary
(d) None of the above

53. The value of $\int_{-1}^{1} x|x|\,dx$ is
(a) 2/3
(b) 1
(c) 0
(d) 2

54. If A and B are an *two* non-singular matrices of the same order, then:
(a) Adj(AB) = (AdjA) (AdjB)
(b) Adj(AB) = (AdjB) (AdjA)
(c) Adj(Ad·A. = A
(d) one 0 he above

55. The func 'on f defined on R by
.r = *x* , when *x* is rational

= 1- *x* ,when *x* is irrational

r; ontinuous for all *x,* except at :

x = O

x = 1

c .r = 0 and *x* = 1

(d =

56. The - 1z - 41 < 1z - 21, represents the region given by :

O

a) ReZ >0

b) ReZ < 0

c) ReZ > 2

d) None of the above

57. If = 0 *(x, y)* = (0, *b)* then at gill :

(a) *fX)* =

(b) *fxy* ~

(c) *fxy* = 0

(d) *fyx* = 0

58. The polynomial equation $10Z^5 + 8Z^4 + 6Z^3 + 4Z^2 + 2Z + 1 = 0$ has all roots In:

(a) Iz I s 1

(b) I z I .~ 1

(c) 1 s I z I s 10

(d) None of the above

60. For negative skewed distribution :

(a) mean = median < mode

(b) median < mean < mode

(c) mean < median < mode

(d) mode < mean < media

61. The uncertainty in the velocity of a ball of mass 100 g when its uncertainty in position is 1 A is :

(a) 3.24 * 10^{-24} *mls*

(b) 5.23 * 10^{-24}

(c) 6.14 * 10^{-12} m/s

(d) 10^{-12}

62. Which of the following favours the spontaneity of change?

(a) ~H is - ve

(b) ~S is + ve

(c) , ~G is - ve

(d) All of the above

63. EOfor a cell Zn I Zn2+(aq)\lCu2+(aqI)Cu is 1.10 V at 25°C. constant for the reaction Zn + Cu2+(aq) === Cu + Zn2+(aq) is of the order of :
(a) 10^{-2}
(b) 10^{-37}
(c) 10^{18}
(d) 10^{17}

64. "In a given photochemical reaction, each molecule of a reaction absorbs only one quantum of radiation causing that particular reaction." It is a statement of :
(a) Stark-Einstein law
(b) Lambert-Beer's law
(c) Grottus-Draper law
(d) None of the above

65. The decreasing order of stability of carbonium ions is given by
(a) tertiary > primary' > secondary
(b) primary > secondary > tertiary
(c) tertiary> secondary> primary
(d) secondary > primary > tertiary

66. Glucose on warming with excess of phenylhydrazine forms a yellow crystalline compound called
(a) fructose
(b) glucosone
(c) glucosazone
(d) arabinose

67. The following reaction is an example of
C6H6CHO KOH/100 C6H5COO-K+C6H5CH2OH
(a) Perkin reaction
(b) Wittig reaction
(c) Aldol condensation
(d) Cannizaro reaction

68. Which of the following metal ions is green co cured?
(a) Cr^{3+}
(b) Cu^{2+}
(c) Zn^{2+}
(d) Ti^{4+}

69. Deficiency of which of the following cau e anemia
(a). Molybdenum
(b) Cobalt
(c) . Chromium
(d) Tin

70. XeF_2 involves hybridization
(a) sp^3d

(b) *dsp2*
(c) *sp3d,2*
(d) *sp2*
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Section A

1. Two bullets are fired horizontally with different velocities from the same height. Which will reach the ground first?
(a) Slower one
(b) Faster one
(c) Both will reach simultaneously
(d) Cannot be predicted

2. Two bodies A and B of equal mass have an elastic collision. Initially B is at rest and A moves with velocity V. After the collision:
(a) The body A traces its path back with same speed
(b) The body A comes to rest and B moves away in the direction of A's approach with the velocity V
(c) The body A comes to rest and B moves away in the direction of A's approach with the velocity 2V
(d) Both the bodies stick and are at rest

3. A cycle tyre bursts suddenly. This represents an
(a) Isothermal process
(b) Isobaric process
(c) Isochoric process
(d) Adiabetic process

4. As one penetrates a uniformly charged metallic sphere, the electric field strength E:
(a) Increases
(b) Decreases
(c) Remains the same at the surface
(d) Is zero at all points?

5. If a power of 100 W is being supplied across a potential difference of 200 V, the current flowing is
(a) 2 A
(b) 0.5 A
(c) 1 A
(d) 20 A

6. Number of unpaired electro~s in N2+ is :
(a) 2
(b) 0
(c) 1
(d) 3

7. Hybridisation in 802 is :
(a) *sp*
(b) *sp2*
(c) *sp3*
(d) *sp3d*

8. Which of the following is the weakest base ?
(a) NaOH
(b) Ca(OH)2
(c) KOH
(d) Zn(OH)2

9. Which of the following behaves both as electrophile and a nucleophile ?
(a) CH3NH2
(b) CH3Cl
(c) CH3CN
(d) CH30H

10. Aspirin is:
(a) Anti-inflammatory
(b) Analgesic.
(c) Anticoagulant
(d) All of the above

11. Life supporting zone of earth is:
(a) Ecosystem
(b) Ecosphere
(c) Hydrosphere
(d) Lithosphere

12. Insulin may be used as a therapy in
(a) Type I Diabetes
(b) Type II Diabetes
(c) Both type I and type II Diabetes
(d) Gout

13. A food product rich in fructose is:
(a) Table sugar
(b) Honey
(c) Turnip
(d) Grapes

14. Global warming is caused by:
(a) CO_2
(b) CH_4
(c) 0_3
(d) All of the above

15. CPR is:
(a) an imaging technique commonly used in clinical diagnosis
(b) a physical exercise aimed at restoring heart beat
(c) a device that records sound wave data
(d) a ratio of calcium and phosphorous in serum

16. Athlete's foot is a condition caused by:
(a) Ringworm infection
(b) Sweat gland abnormality
(c) Muscular injury
(d) All of the above

17. Bovine spongiform encephalopathy (BSE) is caused by.
(a) Severe viral infection
(b) Septicemia
(c) Tapeworm infection
(d) Abnormal protein production

18. The sound we hear during cracking of knuchles is due to
(a) Grinding of the upper and lower part of the joint
(b) Burst of muscular contraction and relaxation
(c) Release of gas from the fluid surrounding the joint
(d) None of the above

19. Decimal equivalent of binary number 1010 is
(a) 2
(b) 4
(c) 8
(d) 10

20. Which of the following is a part of computer hardware?
(a) Bus
(b) Register
(c) RAM
(d) All of the above

Section B
21. The median of scores 25, 45, 35, 35, 40, 30 is:
(a) 45
(b) 40
(c) 35

(d) 30

22. What is the probability that a value chosen at random from a particular population is larger than the median of the population:
(a) 0.25
(b) 0.5
(c) 1.0
(d) 0.67

23. The mean, mode and median are related by the relation (Approximate)
(a) Mode = 3 median - 2 mean
(b) Mean = 3 mode - 2 median
(c) Mode = 3 mean - 2 median
(d) None of the above

24. For a normal curve with ~ = 55 and σ = 10, how much area will be found under the curve to the right of the value 55
(a) 1.0
(b) 0.68
(c) 0.5
(d) 0.32

25. For a two tailed test of hypothesis at a = 0.10, the acceptance region is the entire region:
(a) To the right of the negative critical value
(b) Between the two critical values
(c) Outside the two critical values
(d) To the left of positive critical value

26. If sample 1 has 13 elements with 8_1= 17 and sample 2 has 9 elements with 8_2 = 22, then pooled 8_2 is:
(a) 19
(b) 361
(c) 367
(d) 1~.5

27. In double sampling we reject the batch if :
(a) $d_1 > C_2$
(b) $d_2 > C_2$
(c) Either (a) or (b)
(d) Neither (a) nor (b)

28. Assume that chi square test is to be performed on a contingency table with four rows and four columns. How many degrees of freedom should be used?
(a) 10
(b) 8
(c) 9
(d) 6

29. The sum of first *n* natural numbers is:

(a) $n(n + 1)/2$
(b) $n(n + 1)\ (2n + 1)/6$
(c) $n(n + 1)\ (n + 2)/2$
(d) n^2

30. The number of proper subsets of a set of order 3 is :
(a) 3
(b) 6
(c) 8
(d) 9

31. If $f(x) = \log x$, then which of the following is *true:*
(a) $f(x + y) = f(x) + f(y)$
(b) $f(x + y) = f(x).f(y)$
(c) $f(xy) = f(x)f(y)$
(d) $f(xy) = f(x) + f(y)$

32. $nC_1 + nC_2 + nC_3 + \ldots + nC_n =$
(a) $2nc_1$
(b) $n.+ tC_n$
(c) $2n$
(d) $2n\_ 1$

33. If $f(x) = x^2 - 2x + 4$, then $f\{x)$ has :
(a) Minimum at $x = 1$
(b) Maximum at $x = 1$
(c) No maximum
(d) No minimum

34. lim $\sin 2n / x$
$x \to 0$ 34.
(a) 0
(b) 1
(c) 12
(d) 2

35. The range of the function $y = lIx$ is :
(a) $x > 0$
(b) $x < 0$
(c) $-l < x < l$
(d) $x > 0, x < 0$

36. One root of the equation $5x^2 + 13x + K = 0$ is the reciprocal of the other, if:
(a) K= 0
(b) K= 5
(c) K= 6

(d) K= 1/6

37. Number of covalent bonds in P_4O_{10} is
(a) 10
(b) 12
(c) 14
(d) 16

38. The bond order of H_2, H_2^+ and He_2^+
(a) 1, 0.5 and 0.5
(b) 1, 0.5 and 1.5
(c) 1.5, 0.5 and 1
(d) 0.5, 0.5 and 1

39. When reduced with lithium aluminium hydride, amino acids form
(a) Amines
(b) Amino alcohols
(c) Salts
(d) Esters

40. The relationship between diethyl ether and methyl propyl ether is that they are:
(a) Metamers
(b) Functional isomers
(c) Position isomers
(d) Chain isomers
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41. The Van't Hoff factor for 0.1 M $Ba(NO_3)_2$ solution is 2.74. The degree of dissociation is:
(a) 91.3%
(b) 87%
(c) 100%
(d) 74%

42. An example of double salt is
(a) .Bleaching powder
(b) $K_4Fe(CN)_6$
(c) .Hypo
(d) Potash alum

43. The dry cell has an e.m.f. of 1.5 V and internal resistance of 0.5 Q. If the cell sends a current of 1A through an external resistance, the p.d. of the cell will be
(a) 1.5 V
(b) 1V
(c) 0.5 V
(d) 0 V

44. The expression of magnetic induction inside a solenoid of length L, carrying a current I and having N number of turns. is
(a) *flO/4n* x *Mlr2*
(b) *flo/4n* x *Mlr3*
(c) *flo/4n* x *2M1r2*
(d) *flo/4n* x *2M1r3*

45. The Fermi level lies midway between conduction and valence bands in
(a) Intrinsic semiconductor
(b) P-type semiconductor
(c) N-type semiconductor
(d) Extrinsic semiconductor

46. Zener breakdown occurs:
(a) Mostly in Germanium junctions
(b) Due to rupture of covalent bonds
(c) In lightly doped junctions
(d) Due to thermally generated minority carriers

47. Which of the following is unipolar device?
(a) P-N junction
(b) Zener diode
(c) Tunnel diode
(d) Schottky diode

48. The ripple factor of half wave rectifier is
(a) 1.21
(b) 1.11
(c) 0.48
(d) 0.406

49. In a transistor, the resistance of base region is of the order of:
(a) 1 Q
(b) 100 Q
(c) 1 kQ
(d) 100 kQ

50, FET can be used as
(a) Variable capacitor
(b) Variable resistor
(c) Constant voltage source
(d) Negative resistance

51. An ideal amplifier has noise factor of :
(a) 0db
(b) More than 0 db

(c) Unity
(d) None of the above

52. Turn off time of thyristor :
(a) Depends upon junction temperature and forward current
(b) Is a constant
(c) Depends on load
(d) All of the above

53. If H is Hubble's constant, the age of universe is
(a) V = Hr2
(b) V= Hr
(c) V= Hfr
(d) V = H/r^2

54. The velocity of projection of a body is increased by 2%. Other factors remaining unchanged, what will be the percentage change in the maximum height attained?
(a) 1%
(b) 2%
(c) 4%
(d) 8%

55. Maximum value of static friction is called:
(a) Limiting fraction
(b) Rolling friction
(c) Normal friction
(d) Coefficient of friction

56. The work done in moving a body up a rough inclined plane is given by
(a) mg sine x S
(b) mg cosa x S
(c) (mg sine + umg coss) x S
(d) (mg sine - mg cosfl) x S

57. A body of mass 0.5 kg executes S.H.M. of frequency 4 Hz. The amplitude of S.H.M. is 1 cm. The maximum resting force is (take $n^2 = 10$)
(a) 0.32 N
'(b) 3.2 N
(c) 32 N
(d) 320 N

58. For measuring temperature near absolute zero, the thermometer used is :
(a) Thermo-electric thermometer
(b) Radiation thermometer
(c) Magnetic thermometer
(d) Resistance thermometer

59. The maximum wavelength of radiation emitted at 200 K is 4 urn. What will be the maximum wavelength of radiation emitted at 2400 K.
(a) *3.33* urn
(b) *0.66* urn
(c) *l/lm*
(d) 1 m

60. Positive rays are
(a) Ions
(b) electrons
(c) neutrons
(d) electromagnetic waves

Section C

61: Which of the following shows correct order of decreasing inductive effect?
(a) F> Cl > Br > I
(b) I> Br> Cl> F
(c) Cl> F> I > Br
(d) Br> I > F> Cl

62. Number of chiral carbons in tartaric acid is
(a) 1
(b) 2
(c) 3
(d) 4 .

63 Which of the following methods is *not* employed in the preparation of dicarboxylic acids?
(a) Oxidation of glycols and hydroxy acids using K2Cr207
(b) Subjecting dicyanides to hydrolysis
(c) Hydrolysis of malonic esters
(d) Oxidation of cyclic alkenes

64. Which of the following is used in the determination of R.M. value of fat?
(a) 1.5 N KOH
(b) 1.0 N KOH
(c)0.1 N KOH
(d) 0.005 N KOH

65. The compound in which C* uses *spa* hybridisation for bond formation is:
(a)
(b)
(c)
(d)

66. Oxidation number of S in 803- is :
(a) '2
b)3
(c) 4
(d) 5

67. Calgon, used as water softener is :
(a) Na2[Na4(P03)6]
b) Na4[Na2(P03)6]
(c) Na2[Na4(P04)5]
(d) Na4[Na4(P04)6]

68. Mark the smallest atom:
(a) F
B)Cl
(c) Br
(d) I

69. Which of the following is standard amino acid ?
(a) Ornithine
(b)Homocysteine
(c) Citrulline
(d) None of the above

70. Proteins absorb light in:
(a) Visible range
(b) IR range
(c) UV range
(d) All of the above

71. In Lineweaver Burk plot, when 1/v is plotted against 1/[8]
(a) Straight line is obtained
(b) Sigmoidal curve is obtained
(c) , Hyperbolic curve is obtained
(d) None of the above

72. ·Concentrated acids cause dehydration of sugars to
(a) Trans-enediol
(b) Cis-enediol
(c) Furfural
(d) Furanose

73. Sphingosine is :
(a) Branched sugar
(b) Fatty acid
(c) Amino alcohol
(d) Ceramide

74. Terminator gene technology exploits the use of:
(a) Promoter sequence
(b) Operator sequence
(c) Repressor
(d) Transcription terminator

75. Glucose and fructose can be distinguished by
(a) Molish test.
(b) Acetyl Chloride
(c) Phenylhydrazine
(d) Concentrated solution of alkali

76. An example of water soluble vitamin is
(a) Vitamin- A
(b) Vitamin C
(c) Vitamin D
(d) Vitamin E

77. Supposeyou delete operator site from lac operon ofE. coli.Which of the following effects would be observed ?
(a) No expression of lac gene
(b) Constitutive expression of lac gene
(c) Regulated expression of lac gene
(d) Basal expression of lac gene

78. Which of the following binds ammo acid ?
(a) Acceptor arm
(b) D arm
(c) Anticodon arm
(d) T\jfC-arm

79. In lac and Gal operons, CAP is responsible for :
(a) De-repression
(b) Constitutive activation
(c) Regulated activation
(d) None of the above

80. Si-RNA is an important tool to study:
(a) Translation regulation
(b) Gene silencing
(c) Gene simulation
(d) Gene amplification

81 Which of the following antibiotics inhibits translation?
(a) Tetracycline
(b) Puromycin
(c) Chloramphenicol
(d) All of the above

82. DNA fragment of interest can be detected by
(a) Western blotting
(b) Northern blotting

(c) outhern blotting
(d) DNA fingerprinting

83. Which of the following could be a co-translational modification?
(a) Phosphorylation
(b) Glycosylation
(c) Methylation
(d) Acetylation

84. Immunoglobulin released in allergies IS
(a) IgA
(b) IgG
(c) IgD
(d) IgE

85. Test cross is used to test:
(a) Whether an individual is homozygous or heterozygous
(b) Whether an individual is dominant or recessive
(c) Whether parents were true breeding
(d) All of the above

86. Which' is '*not* a non-degradable pollutant?
(a) **DDT**
(b) Sewage
(c) Plastics
(d) Heavy metals

87. A direct food relation between two species of animals in which one animal kills and feeds on another is referred to as :
(a) Predation
(b) Parasitism
(c) Symbiosis
(d) Scavenging

88. Cycas differs from pteris in having
(a) Vessels and tracheids
(b) Motile sperms
(c) Pollen tube
(d) Archegonia

89. Crassulacean acid metabolism (CAM) makes it possible for plants to survive **in:**
(a)
(b)
(c)
(d)

90. The genotypic ratio of F2 progeny of dihybrid cross is
(a) 1:2:1
(b) 9:3:3:1

(c) 3:1
(d) 1:2:1:2:4:2:1:2:1

91. In areas where the incidence of malaria is high, healthier individuals should be:
(a) Heterozygous for Hb"
(b) Homozygous for Hbs
(c) Either (a) or (b)
(d) Neither (a) nor (b)
92. Rhesus monkey belongs to
(a) Even toed ungulates
(b) Odd toed ungulates
(c) Edentates
(d) Primates

93. Study of molluscs is called:
(a) Malacology
(b) Conchology
(c) Mycology
(d) Phycology

94. Heart of amphibians is:
(a) Two chambered
(b) Three chambered
(c) Four chambered
(d) Without chamber

95: Tube-within-tube plan is shown by
(a) Coelentrates
(b) Flatworms
(c) Roundworms
(d) Sponges

96. Hepatic portal vein is formed by
(a) Lineogastric vein
(b) Deodenal vein
(c) Anterior mesenteric vein
(d) All of the above

97. The optic nerve pierces through the retina, choroids and sclera at
(a) Fovea
(b) Blind spot
(c) Pupil
(d) Cornea

98. Removal of parathyroid results in
(a) Calcium deficiency
(b) Bone fracture

(c) Death of the individual
(d) Retardation of teeth formation

99. Lower aquatic animals are:.
(a) Ammonotelic
(b) Ureotelic
(c) Uricotelic
(d) Can be all the above depending upon climatic conditio-ns

100. Conversion of fibrinogen into fibrin is catalysed by:
(a) Prothrombin
(b) Thromboplastin
(c) Thrombin
(d) Thrombinase

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1. The contents of these chips are lost when the computer is switched off?
(A) RAM chips
(B) DRAM chips
(C) ROM chips
(D) None of the above

2. What would the binary number 1011 be in decimal notation?
(A) 10
(B). 11
(C) 12
(D) 13

3. Heat required to melt 1 g of ice is 80 cal. A man melts 60 g of ice by chewing in 1 min. His power is. :
(A) 4800 W
(B) 336 W
(C) 1.33 W
D) 0.75 W

5. If 5 mL of 0.15 M aCl is diluted to a [mal volume of 5 L what is the final concentration of NaCl?
(A) 0.00015 M
(B) 0.0015 M
(C) 15000 M
(D) None of the above

4. If $f(x) = xn$ then $d/dx\ f(x)$ *is :*
(A) $Xn - 1$
(B) $Xn + Iln + 1$
(C) $nXn - 1$
(D)None of the above

6. Why does the vapor pressure of a solution decrease when an ionic compound is added to it ?
(A) The mole fraction of solvent is higher, causing a lower vapor pressure.
(B) There are fewer solvent molecules at the surface, so fewer can vaporize and leave the solution.
(C) Most solutes have a positive heat of solvation, causing the temperature of the solution to decrease.
(D) none of the above

7. The molecular weight of glucose is 180. Express a blood glucose concentration of 80 mg per 100 ml in molarity.

(A) 0.44 M
(B) 0.044 M
(C) 0.0044 M
(D) 04.40 M

8. Which of the following is the closest to the pH of a solution that contains 5 millimoles per litre of H+ ions?
(A) 1.2
(B) 2.3
(C) 3.7
(D) 6.5

9. What is the pKa of triethyl-ammonium in water, if the base ionization constant Kb for triethylamine is 7.4×10^{-5} ? (Log $7.4 \times 10^{-5} = 4.13$)
(A) -4.13
(B) 2.87
(C) 4.13
(D)9.17

10. Which of the following is *not* a chaotropic agent?
(A) Lithium chloride
(B) Urea
(C) Sodium chloride
(D) Aluminium chloride

11. Solution properties of a phospholipid most appropriately match that of :
(A) Glutamic acid
(B) A purine base
(C) Starch
(D) All of the above

12. In its hydrogen bonding capacity water is followed by
(A) Methanol

(B) Urea
(C) Chloroform
(D) Glycerol

13. Phosphorolysis is a form of:
(A) Hydrolysi
(B) Pho phorylation
(C) Electrolytic breakdown of ATP
(D) Spontaneous accumulation of inorganic phosphate

14. Microsatellite sequence is:
(A) A small palindrome
(B) Extrachromosomal DNA
(C) Short repetitive DNA
(D) Looped-DNA
15. A DNA fragment is 5.7 kilo bases, if the entire fragment codes for polypeptide, the approximate number of amino acids in polypeptide would be
(A) 1900
(B) 2500
(C) 5700
(D) 170

16. In humans, right-handedness is dominant to left-handedness and the gene is autosomal. If A right-handed man, whose father was left-handed, married a left-handed woman, which of the following statements is *true?*
(A) Man was homozygous and his wife was heterozygous
(B) Man was heterozygous, his father was homozygous.
(C) Man and his father were both homozygous
(D) Man and his wife were both heterozygous

17. Small lipid soluble molecules move in and out of the cells by
(A) Simple diffusion
(B) Active transport
(C) Facilitated diffusion
(D) Pinocytosis

18. Plasmodesmata most closelyresemble which of the followingstructure in animal cells?
(A) Desmosomes
(B) Gap junctions
(C) Tight junctions
(D) Ion channels

19. During which of the following stages of the cell cycle will a diploid cell contain twice the amount of DNA found in a gamete?
(A) Prophase
(B) Entire S phase

(C) Entire G1 phase
(D) Entire G2 phase

20. All of the following amino acids are converted to succinyl -CoA, *except*
(A) Methionine
(B) Isoleucine
(C) Valine
(D) Histidine

21. Major objective of glucose breakdown by glycolysis is
(A) Energy production
(B) Production of pyruvate
(C) Production of 3 carbon intermediates
(D) Regeneration of oxidized NAD+

22. A vitamin that has an important role in the formation of collagen fibers is :
(A) Thiamine
B)Tocopherol
(C) Ascorbic acid
D) Riboflavin

23. When human immunodeficiency virus (HIV) attaches to a host cell, what material is released into the host cell cytoplasm?
(A) Viral toxins
(B) RNA
(C) DNA
(D) Proteins

24. The main determinant of blood pressure is
(A) Blood volume
(B) Elasticity of arteries
(C) Cardiac output
(D) Peripheral resistance

25. The blood flows in the body because of :
(A) Beating of the heart
(B) Establishment of a pressure gradient
(C) Contraction and relaxation of peripheral muscles
(D) Elasticity of arteries

26. All of the following are associated with inspiration in mammals *except*
(A) Increase in thoracic pressure
(B) Contraction of external intercostal muscles
(C) Lowering of diaphragm
(D) Relaxation of internal intercostal muscles

27. In an acid environment oxygen splits more, readily from haemoglobin. This is governed by :
(A) Dalton's Law
(B) Henry's Law
(C) Charles' Law
(D) Bohr Effect

28. Cardio-acceleratory centre IS located in
(A) Cerebrum
(B) Pons
(C) Medula
(D) Wall of the right atrium

29. Urine formation requires which of the following?
(A) Glomerular filtration and tubular secretion only
(B) Glomerular filtration and tubular reabsorption only
(C) Glomerular-filtration, tubular reabsorption, and tubular secretion'
(D) Tubular reabsorption and secretion only

30. Ethylene oxide finds an important use in Medical and Biological research as a
(A) Long-term preservative
(B) Respira tory aid.
(C) Sterilizing agent
(D) Anaesthetic agent

31. If an enzyme has a small value of K_M, (Michaelis Menten constant) then it achieves maximal catalytic efficiency at
(A) High substrate concentration
(B) Low substrate concentration
(C) Intermediate substrate concentration
(D) None of the above

32. Which of the following element is least likely to be found on any + strand viral genomic RNA?
(A) A cap
(B) A packing ite
(C) A binding ite for RNA Polymerase II
(D) A binding site for ribosomes

33. Guttation in plants is favoured by
(A) High humidity and dim light
(B) Low humidity and dim light
(C) Dim light only
(D) None of the above

34. Which form of phytochrome pigment predominates during the day light in plant ?
(A) **P_R** (phytochrome red)
(B) P_{FR} (ph tochromefar red)

(C) Both are predominate
(D) None of the above

35. Which of the following effects is brought about by gibberellins but not by auxins?
(A) Breaking of dormancy in leaf buds
(B) Stimulation of cambial activity
(C) Inhibition of leaf abscission
(D) Stimulation of fruit development

36. Many organisms which are morphologically complex have much lesser genome than those which looks morphologically simple, this is called:
(A) P-value paradox
(B) C-value paradox
(C) D-value paradox
(D) G-value paradox

37. When the helices of a double the linking number stranded circular DNA molecule' are opened,
(A) Decreases
(B) Increases
(C) Does not change
(D) Is always zero

38. Intrinsic torsion potential' refers to :
(A). Freedom of rotation around a C-C single bond
(B) Restriction of rotational freedom around C-N single bond in a nucleotide
(C) Accommodation of some rotation around peptide bond
(D) Reflection rotational capacity around <p and 'I' angles

39. Protein solubilization by salting in is associated with :
(A) Excessive heat loss
(B) Protein denaturation
(C) Increase in protein ionization
(D) All of the above

40. "A" form of DNA can be converted to "B" form by
(A) Denaturation
(B) Dehydra tion
(C) De-salting
(D) De-proteination

41. Which of the following *cannot* have a helical structure?
(A) *r-RNA*
(B) Protein
(C) *m-RNA*
(D) None of the above

42. The following are known to exist as a stable triple helix in nature?
(A) Few forms of DNA
(B) Some types of RNA
(C) A few proteins
(D) Specialized polysaccharides

43. In molecular sieve chromatography, separating multiple species the internal volume:
(A) Is uniformly accessible to all species
(B) Is predominantly accessible to a species with highest concentration
(C) Is predominantly accessible to a species with least molecular size
(D) Is not accessible to any of the species

44. In gel filtration chromatography, smaller molecules will be fractionated in a
(A) Larger elution volume
(B) Smaller elution volume
(C). Elution volume is not dependent on size
(D) Smaller molecules come into void volume

45. Ionic detergents can increase the solubility of a species by
(A) Increasing the dielectric constant of the solvent
(B) Binding the hydrophobic portion of the species
(C) Reducing the solute-solute interaction
(D) All of the above

46. SDS-PAGE separates proteins based on the principle of :
(A) Iso-electric focussing
(B) Passage of current through an electrolyte
(C) Gel filtration chromatography
(D) Electromotive force

47. A solution shows transmittance of 10 on spectrophotometer, what is the absorbance of the solution ?
(A) 1.0
(B) 0.1
(C). 10
(D) 0.01-.

48. If a RNA solution is heated the absorbance will
(A) Increase
(B) Decrease
(C) Will first increase and then decrease
(D) Will not change

49. Base paring in nucleic acid strands is studied using a technique
(A) X-ray diffraction
(B) Infrared spectroscopy

(C) MALDI
(D) Scanning electron microscopy

50. X (chi) is the angle of rotation between:
(A) Various bonds in phosphate group of nucleic acid backbone
(B) C5' and the' phosphate
(C) C1' and the nitrogenous base
(D) C1' and oxygen of the sugar

51. An E.coli strain lacking DNA polymerase I would be deficient in DNA
(A) Repair
(B) Methylation
(C) Transcription
(D) All of the above

52. Water of highest purity used in Molecular Biology research is indicated by the absence of :
(A) Salt ions
(B) Nucleases
(C) Bacteria
(D) Viruses

53. Isopropyl thiogalactoside is a
(A) Physiological inducer
(B) Repressor
(C) Gratuitous inducer
(D) None of the above

54. With respect to the *mRNA* start site, promoter of a gene can be located:
(A) Upstream
(B) Downstream
(C) Either upstream or downstream
(D) May not be present

55. Alkaline breakdown of nucleic acid is prevented by
(A) Double stranded nature
(B) 2'OH group
(C) Deoxyribose sugar
(D) Proteins associated with nucleic acid

56. When DNAis extracted from cells of E.coli and analyzed for base composition, it is found that 38% of the bases are cytosine. What percent of the bases are adenine ?
(A) 12%
(B) 24%
(C) 38%
(D) 62%

57. A severe winter storm kills many chicks. An investigation comparing the body size of dead birds with that of survivors reveals that the dead birds included mainly the largest and the smallest members of the population. This winter storm exemplifies:

(A) Kin selection
(B) Stabilizing selection
(C) Directional selection
(D) Balanced selection

58. Which of the following IS NOT characteristic of all VIruses with DNA genome?
(A) Replication occurs only in a living cell
(B) Replication involves translation on cellular ribosomes
(C) The viral nucleocapsid is surrounded by lipid envelope
(D) The viral genome is surrounded by protein coat

59. Incubation of Gram-negative bacteria' with lysozyme in an isotonic medium causes rod shaped bacteria to assume a spherical shape. The cause of this phenomenon is :
(A) Absorption of water
(B) Destruction of the cell wall
(C) Destruction of the cytoskeleton
(D) .Damage to the plasma membrane

60. Which of the following six-membered ring compounds, has the most planar structure?
(A) Glucose
(B) Cytosine
(C) Cyclohexane
(D) Mannose