Sr. No. .....

ENTRANCE TEST-2023

SCHOOL OF BIOLOGICAL SCIENCES

BIO-CHEMISTRY

Question Booklet Series **A**

Total Questions : 60

Time Allowed : 70 Minutes

Roll No. : | | | | | | |

Instructions for Candidates :

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2. OMR Answer Sheet has an Original Copy and a Candidate's Copy glued beneath it at the top. While making entries in the Original Copy, candidate should ensure that the two copies are aligned properly so that the entries made in the Original Copy against each item are exactly copied in the Candidate's Copy.
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4. Choose the correct / most appropriate response for each question among the options A, B, C and D and darken the circle of the appropriate response completely. The incomplete darkened circle is not correctly read by the OMR Scanner and no complaint to this effect shall be entertained.
5. Use only blue/black ball point pen to darken the circle of correct/most appropriate response. In no case gel/ink pen or pencil should be used.
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1. Which of the following is a chiral molecule ?
   (A) Adenine
   (B) Glyceraldehyde 3-phosphate (GD3P)
   (C) Linolenic acid
   (D) Glycine
2. The following molecules are enantiomers of each other:
   (A) D-Glucose and L-Glucose
   (B) D-Glucose and D-Galactose
   (C) Lactose and Maltose
   (D) Pyruvate and Lactic acid
3. Which of the following is the weakest bond ?
   (A) Ionic bond
   (B) Covalent bond
   (C) Hydrogen bond
   (D) van der Waals interaction
4. Water has the property of being a *"universal solvent"* because:
   (A) It can dissolve salts, fats and oils
   (B) It has very high density
   (C) It is polar in nature
   (D) It can exist in solid, liquid and gaseous forms
5. Which of the following formulas correctly represents the change in Gibbs free energy:
   (A) ✤G=✤H-T✤S
   (B) ✤H=✤G-T✤S
   (C) ✤G=✤H-✤S
   (D) ✤G+✤H=T✤S
6. Non-polar substances like oils are insoluble in water because they:
   (A) Increase the entropy of surrounding water molecules
   (B) Decrease the entropy of surrounding water molecules
   (C) Increase both entropy and enthalpy of the surrounding water molecules
   (D) Have no effect on the entropy of water molecules
7. A buffer consists of:
   (A) A strong acid and its conjugate base
   (B) A weak acid and its conjugate base
   (C) A strong acid and a strong base
   (D) Two weak acids
8. Following is an example of biological buffer that helps maintain pH in our body at physiological conditions:
   (A) CH_3COOH and CH_3COONa
   (B) Citric acid and sodium citrate
   (C) NH_4OH and NH_4Cl
   (D) Na_2HPO_4 and NaH_2PO_4
9. The common mechanism between photophosphorylation in chloroplasts and oxidative phosphorylation in mitochondria is that:
   (A) PSI-PSII complex is involved in the synthesis of ATP in both the organelles
   (B) F_0-F_1 ATPase complex is involved for the synthesis of ATP in both mechanisms
   (C) A proton gradient is generated across the membranes of these organelles that is used for the synthesis of ATP
   (D) Complexes I-IV are involved in the synthesis of ATP in both the organelles
10. In cyclic photophosphorylation:
   (A) Only Photosystem I (PSI) is involved and only ATP molecules are synthesized
   (B) Only Photosystem II (PS-II) is involved and only NADPH molecules are synthesized
   (C) Both Photosystems I and II (PS-I and II) are involved and both ATP and NADPH are produced
   (D) Electrons are transferred in a cyclic manner between Photosystems I and II and no ATP is generated

11. In photorespiration, also known as C_2 cycle:
    (A) CO_2 is added to ribulose 1,5 bisphosphate (RuBP) to form two molecules of 3-phosphoglycerate
    (B) O_2 is added to ribulose 1,5 bisphosphate (RuBP) to form one molecule of 2-phosphoglycolate and one molecule of 3-phosphoglycerate
    (C) CO_2 is added to oxaloacetate to form citrate
    (D) CO_2 is added to pyruvate to form ribulose 1,5 bisphosphate

12. C_4 plants can carry out photosynthesis under:
    (A) Very low amounts of CO_2 and under hot and dry conditions
    (B) Very high amounts of CO_2 and abundant moisture
    (C) Very high amounts of oxygen and high moisture
    (D) In dark conditions

13. Which of the following nutrient cycles is an example of a sedimentary cycle ?
    (A) Carbon cycle
    (B) Nitrogen cycle
    (C) Sulfur cycle
    (D) Water cycle

14. In January 2023, Bill Gates announced to support research to design and manufacture dietary supplements that would help reduce the emission of the following gas which is produced by the grazing cattle and substantially contributes to global warming:
    (A) CO_2
    (B) Oxygen
    (C) NO_3
    (D) Methane

15. Which of the following strategies will help reduce the greenhouse effect and hence the global warming ?
    (A) Increasing industrialization
    (B) Switching to renewable sources of energy like solar and wind energy
    (C) Increasing the use of chemical fertilizers
    (D) By cooling our houses with air conditioners and storing food in refrigerators

16. Following is a modern scientific method of conservation of biodiversity:
    (A) By preserving natural habitats for living organisms like national parks
    (B) By creating special habitats like botanical gardens and zoological parks
    (C) Using methods like recombinant DNA technology, gene/seed banks, tissue culture and cryopreservation
    (D) By designing novel proteins that cannot be degraded by proteasomes

17. Bacteria uptake foreign genetic material naturally by the following method(s):
    (A) Electroporation
    (B) Operon regulation
    (C) Lipofection
    (D) Transformation, conjugation or transduction

18. The structure of viruses can be best described as:
    (A) Nucleocapsids
    (B) Proteoglycans
    (C) Lipoproteins
    (D) Phospholipids

19. During the stationary phase, bacterial growth and division are slowed down because:
    (A) The nucleo-cytoplasmic shuttling of materials is inhibited
    (B) The essential nutrients in the culture medium are exhausted
    (C) Bacteria predominantly use the operon model for their metabolism
    (D) Bacteria are killed by the expression of antibiotics

20. Probiotic bacteria have the following properties:
    (A) They promote the infection of hosts by viruses
    (B) They are very harmful bacteria that often cause sickness of hosts
    (C) They are dead bacteria that are used for making vaccines and hence strengthen the immune system of the hosts
    (D) They are live bacteria that are mostly beneficial and help in the digestion and absorption of food materials in the gut of hosts and also fight the harmful bacteria

21. The most common source of energy that is stored in animals and is readily available for energy production is:
    (A) Starch
    (B) Glucose
    (C) Glycogen
    (D) Fats

22. Fats are rich sources of energy because they have the following properties:
    (A) Anhydrous and reduced
    (B) Unsaturated and in cis-configuration
    (C) Oxidized and hydrated
    (D) Linear and phosphorylated

23. The secondary structure of proteins arises because of the following:
    (A) Peptide bonds
    (B) Hydrogen bonds
    (C) Disulfide bonds
    (D) Hydrophobic interactions

24. In the B-form of DNA, the distance between two adjacent base pairs is:
    (A) 3.4A°
    (B) 3.4nm
    (C) 10nm
    (D) 20nm

25. During the purification process, as we move towards more purity, the specific activity of an enzyme undergoes the following change:
    (A) Decreases
    (B) Remains unchanged
    (C) Can both increase or decrease
    (D) Increases

26. In non-competitive type of enzyme inhibition:
    (A) K_m remains unchanged but V_{max} decreases
    (B) K_m increases but V_{max} remains the same
    (C) Both K_m and V_{max} increase
    (D) K_m and V_{max} remain unchanged

27. Enzymes that are also regulated by sites other than the catalytic site are called:
    (A) Isozymes
    (B) Proteasomes
    (C) Catalases
    (D) Allosteric enzymes

28. Which of the following plots is best to determine V_{max} and K_m values, especially in the presence of various types of inhibitors ?
    (A) Michaelis Menten plot
    (B) Briggs Haldane plot
    (C) Lineweaver-Burk plot
    (D) Sigmoid curve

29. The most common pathway for energy production in all living organisms is:

(A) Gluconeogenesis

(B) TCA cycle

(C) ß-oxidation

(D) Glycolysis

30. During glycolysis, conversion of 1,3-bisphosphoglycerate to 3-phosphoglycerate is an example of:

(A) Oxidative phosphorylation

(B) Anaplerotic reaction

(C) Substrate level phosphorylation

(D) Allosteric regulation

31. The major source of energy currency that is produced in ß-oxidation is:

(A) a-Ketoglutarate

(B) ATP

(C) NADH

(D) Pyruvate

32. In starvation, gluconeogenesis is most important metabolic pathway and hence major source of energy for which organ of the body ?

(A) Brain

(B) Liver

(C) Pancreas

(D) Kidneys

33. The most prominent feature that distinguishes a prokaryotic and eukaryotic cell is:

(A) Plasma membrane

(B) Nucleus

(C) Semi-conservative replication

(D) Glycolysis

34. The phospholipid bilayer of plasma membrane contains:

(A) Intrinsic proteins

(B) Nucleoporins

(C) F_0-F_1 proteins

(D) Sodium dodecyl sulfate

35. Which of the following proteins is present in the mitochondria ?

(A) snRNPs

(B) Succinate dehydrogenase

(C) Hexokinase

(D) Microtubules

36. Chromatin is present in its most compact conformation in which of following stage of cell cycle in eukaryotic cells ?

(A) S-phase

(B) Metaphase

(C) Cytokinesis

(D) G_0/G_1 phase

37. Which group of scientists carried out the most authentic and conclusive set of experiments to prove that DNA is the genetic material of living organisms ?

(A) Temin and Baltimore

(B) Watson and Crick

(C) Avery, Macleod and McCarty

(D) Hershey and Chase

38. Solenoid can be defined as:

(A) Group of 6 nucleosomes in a loop forming a fibre of 30nm

(B) Two rounds of DNA wound around 4 pairs of histones forming a fibre of 10nm

(C) DNA at the centromeres of the chromosomes that link the two chromatids

(D) Multisubunit complexes of proteins at the replication fork

39. The sequence on the DNA where RNA polymerase binds during transcription is called:
(A) UTR
(B) Okazaki fragment
(C) Enhancer
(D) Promoter

40. Mutations that essentially result in the change in primary sequence of a polypeptide are called:
(A) Point mutations
(B) Frame shift mutations
(C) Palindromes
(D) Codons

41. Absorption spectrophotometry is fundamentally based on:
(A) Kepler's laws
(B) Beer Lambert's law
(C) Avagadro's law
(D) Laws of Thermodynamics

42. In gel exclusion chromatography, molecules are separated on the basis of:
(A) Ionic interactions
(B) Hydrophobic interactions
(C) Sizes of the molecules
(D) Chemical reactivity

43. In native PAGE, proteins are separated based on:
(A) Shape and size
(B) Charge
(C) Hydrophobic interactions
(D) DNA-protein interaction

44. A particular protein can be efficiently and specifically detected in minute quantities in plasma using the following technique:
(A) Western blotting
(B) ELISA
(C) RT-PCR
(D) Spectrophotometry

45. Which of the following is a disease related to the circulatory system ?
(A) Tuberculosis
(B) Diabetes
(C) Stroke
(D) Muscular dystrophy

46. In which part of the respiratory system, the gaseous exchange of O_2 and CO_2 takes place ?
(A) Bronchi
(B) Bronchioles
(C) Alveoli
(D) Trachea

47. Peptic ulcers are most commonly caused by:
(A) Infection by *Helicobacter pylori*
(B) Viral infection
(C) Spicy foods and coffee
(D) Acidic fruits

48. Which gland of the endocrine system controls the sleep cycle by regulating the secretion of the sleeping hormone melatonin ?
(A) Thyroid
(B) Pituitary
(C) Hypothalamus
(D) Pineal

49. Which of the following vitamins can be stored in excess in the body and cause hyper-vitaminosis ?
(A) Vitamin D
(B) Vitamin C
(C) Vitamin B7
(D) All of the above

50. The normal range of body mass index (BMI) of an adult person is:
(A) 15-20
(B) 18-25
(C) 25-30
(D) >40

51. Higher levels of acid phosphatase (PAP) are used as a diagnostic marker for the following disease:
    (A) Cystic fibrosis
    (B) Type I diabetes
    (C) Chronic Obstructive Pulmonary Disease (COPD)
    (D) Prostate cancer with metastasis

52. Lactate Dehydrogenase 1 (LDH1) is commonly used as a diagnostic marker for:
    (A) Myocardial Infarction (MI)
    (B) Urinary tract infection (UTI)
    (C) Diabetes
    (D) Kidney malfunction

53. Antibodies are secreted by the following cells of the immune system:
    (A) Helper T cells
    (B) Cytotoxic T cells
    (C) B Cells
    (D) Dendritic cells

54. Monoclonal antibodies are the antibodies that:
    (A) Recognize a single epitope of an antigen
    (B) Recognize a single protein in a multisubunit complex
    (C) Are produced only once in the life time of an organism
    (D) Have a single heavy and a light chain

55. Antibody diversity in higher organisms is primarily generated by:
    (A) Fusion of the B and T cells of an organism
    (B) Recombination of different V, D and J gene segments of Ig genes
    (C) Mixing of the IgM and IgE antibodies during viral infection
    (D) Chiasmata formation during meiosis

56. T cells of the immune system are named so because they are:
    (A) Produced in the thymus
    (B) Generated in response to toxins
    (C) Produced in response to the tumors in the body
    (D) They have abundance of tyrosine receptors

57. The scientist who engineered the first recombinant DNA molecule was:
    (A) Susumu Tonegawa
    (B) Kary Mullis
    (C) Paul Berg
    (D) Werner Arbor

58. Restriction endonucleases type II are the enzymes that:
    (A) Cut specific sequences on double stranded DNA by breaking the phosphodiester bonds
    (B) Join two double stranded DNA molecules
    (C) Cut dsDNA molecules randomly
    (D) Repair DNA cuts and nicks during DNA replication

59. *Cell lines* are the cells that can:
    (A) Divide a few times and die
    (B) Are immortalized and hence divide indefinitely
    (C) Produce antibiotics for commercial use
    (D) Have the properties of cancer cells and make tumors when injected in mice

60. Cosmids are vectors that contain:
    (A) Components from both animal and plant origin
    (B) Regions from Corona virus and Herpes virus
    (C) Components from both phages and plasmids
    (D) Sequences from two different plasmids

ROUGH WORK

Sr. No. 037

ENTRANCE TEST-2022

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BIOCHEMISTRY

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Question Booklet Series A

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SEAL

1. Which of the following is incorrect ?
   (A) A pi bond is formed after sigma bond formation takes place
   (B) Rotation of orbitals is ceased after the pi bond is formed
   (C) A pi bond is more stable than a sigma bond due to multiple contacts of the orbitals
   (D) All alkanes, alkenes, and alkynes exhibit sigma bond formation

2. Following elements are arranged in increasing order of their electronegativity. Pick up the correct order of elements arranged by their electronegativity :
   (A) F < S < P < N < O
   (B) P < S < N < O < F
   (C) N < O < F < P < S
   (D) N < P < S < F < O

3. A pair of molecules that are mirror images of each other but cannot be superimposed one upon the other are called :
   (A) Enantiomers
   (B) Conformers
   (C) Diastereomers
   (D) Positional isomers

4. Pick up the weakest and the strongest bonds :
   i. Ionic bonds
   ii. Metallic bonds
   iii. Covalent bonds
   iv. van der Waals forces
   v. Hydrogen bond
   (A) v and i
   (B) ii and v
   (C) iv and i
   (D) iv and iii

5. The first step in photosynthesis is :
   (A) Formation of reduced carbon compounds
   (B) The excitement of an electron of chlorophy by a photon of light
   (C) Formation of ATP
   (D) Splitting of a water molecule

6. The dark reaction is also called :
   (A) Biosynthetic phase
   (B) Blackman's reaction
   (C) Calvin cycle
   (D) All of the above

7. SI unit of entropy is :
   (A) J/K
   (B) J/S
   (C) J
   (D) J/C

8. The most abundant enzyme on earth – Rubis stands for :
   (A) Ribose-1,5-bisphosphate carboxyla oxygenase
   (B) Ribulose-1,5-bissulplate carboxyla oxygenase
   (C) Ribulose-1,5-bisphosphate carboxyl oxygenase
   (D) Rubisco-1,5-bisphosphate reducta oxygenase

SEAL

9. Provide the correct match of the statements in Column A from Column B below :

Column A	Column B
i. The most common way for nitrogen fixation is by	a. Denitrification
ii. Organic nitrogen is converted back to inorganic nitrogen like ammonium, through the process of	b. Nitrogen oxides
iii. Eutrophication can cause an increase in	c. Decay
iv. Which process releases dinitrogen gas (N_2) back into the atmosphere	d. Fixed nitrogen (Ammonium)
v. Synthetic fertilizers add	e. Nitrogen-fixing bacteria
vi. Which of the following is a component of acid rain	f. Harmful algal blooms

(A) i-e, ii-c, iii-f, iv-a, v-d, vi-b

(B) i-c, ii-e, iii-f, iv-a, v-d, vi-b

(C) i-e, ii-c, iii-a, iv-f, v-d, vi-b

(D) i-e, ii-c, iii-f, iv-a, v-b, vi-d

10. Which of the metals (Hg, Pb, Cr, Cd and As) cause gastrointestinal toxicity ?

(A) Hg and Cr

(B) Hg, Pb and Cr

(C) Hg, Pb, Cr, Cd and As

(D) Hg, Pb, Cr and Cd

11. Which of the following contributes to global warming ?

(A) Methane

(B) Carbon dioxide

(C) Nitrous oxide

(D) All of the above

12. Among the following four copper-dependents enzymes, three are placed against the enzyme class they belong to, pick up the one which is assigned to the wrong class of enzymes ?

(A) Oxidoreductase – ascorbate oxidase

(B) Monooxygenase – multicopper ferroxidase

(C) Electron transferring – cytochrome c oxidase

(D) Oxidase – Laccase

13. The pathogen of COVID-19 disease is :

(A) Severe acute respiratory syndrome coronavirus 1

(B) South Asian respiratory syndrome coronavirus 1

(C) Severe acute respiratory syndrome coronavirus 2

(D) South Asian respiratory syndrome coronavirus 2

14. Which of the following types of vaccines are being tested or used against Covid-19 disease ?

(A) Messenger RNA vaccine

(B) Vector vaccines

(C) Protein component vaccine

(D) All of the above

15. D type amino acids are found in :

(A) Nervous system and endocrine system

(B) The nervous system, endocrine system and bacterial cell wall

(C) Bacterial cell wall

(D) Nervous system

16. When NADH reduces pyruvate, the product is :

(A) Lactic acid

(B) Alcohol

(C) Dihydroxyacetone

(D) Both d- and l-glyceraldehyde

17. Which class of carbohydrates is considered non-sugar ?

(A) Monosaccharides

(B) Disaccharides

(C) Polysaccharides

(D) Oligosaccharides

18. The net charge on a protein will be zero, positive and negative when the pH of a solution is :

(A) Above its pl, below its pl, and at its pl respectively

(B) At its pl, below its pl and above its pl respectively

(C) At its pl, above its pl and below its pl respectively

(D) All the above statements are incorrect

19. Which of the following is the Chylomicron component ?

(A) Cholesterol

(B) Triglyceride

(C) Apolipoprotein B48

(D) All of the above

20. The enzyme responsible for the removal of supercoiling in replicating DNA ahead of the replication fork is :

(A) Primase

(B) DNA polymerase

(C) Helicase

(D) None of the above

21. Compare the enzyme class with the reaction they catalyze :

a.	Oxidoreductases	i.	Group transfer reactions
b.	Transferases	ii.	Hydrolysis reactions
c.	Hydrolases	iii.	Transfer of electrons
d.	Lyases	iv.	Formation of bods by condensation reactions coupled to ATP cleavage
e.	Isomerases	v.	Addition of groups to double bonds
f.	Ligases	vi.	Transfer of groups with in molecules

(A) a-i, b-ii, c-iii, d-iv, e-v, f-vi

(B) a-iii, b-i, c-ii, d-v, e-vi, f-iv

(C) a-iv, b-i, c-ii, d-v, e-vi, f-iii

(D) a-iii, b-i, c-v, d-ii, e-vi, f-iv

22. Reversile inhibition can be :

(A) Competitive and uncompetitive

(B) Competitive only

(C) Uncompetitive only

(D) Competitive, uncompetitive and mixed

23. High levels of acids phosphate are indicators of :
(A) Stomach cancer
(B) Prostate cancer
(C) Brain tumour
(D) None of the above

24. Which of the following can bind to haem ?
(A) Oxygen
(B) CO
(C) NO
(D) All of the above

25. Which of the following enzyme catalyze the rate-limiting step in the pentose phosphate pathway ?
(A) Transketolase
(B) Glucose-6-P dehydrogenase
(C) Transaldolase
(D) Phosphogluconate dehydrogenase

26. The urea cycle is linked to :
(A) Citric acid cycle
(B) Glycolysis
(C) Pentose Phosphate Pathway
(D) Beta oxidation

27. How many ATP molecules are produced in a citric acid cycle for every glucose molecule ?
(A) 30
(B) 15
(C) 4
(D) 2

28. Which citric acid cycle enzyme uses FAD+ ?
(A) Malate dehydrogenase
(B) Succinate dehydrogenase
(C) Citrate synthase
(D) Alpha-Ketoglutarate dehydrogenase

29. Ribosomes are present on :
(A) Endoplasmic reticulum
(B) Nuclear membrane
(C) Both of the above
(D) Both (A) and (B) are incorrect

30. Which of the following do not share similarities or are not linked to one another ?
(A) Prokaryotic cell-chloroplast-mitochondria
(B) Beta oxidation-Nucleus-Lysosome
(C) Endoplasmic reticulum-Golgi complex-Transporting vesicle
(D) Glycolysis-Urea cycle-Citric acid cycle

31. Which of the following does not contain any membrane ?
(A) Ribosome
(B) Plant vacuole
(C) Endosome
(D) Vesicle

32. Which of the histones binds to the linker DNA (DNA that links two adjacent histones) ?
(A) H4
(B) H3
(C) H2A
(D) H1

33. Beads-on-string (nucleosome) structure has an average diameter of :

(A) 10 nm

(B) 15 nm

(C) 20 nm

(D) 25 nm

34. Which of the following proteins recognize the origin of replication and is called the E-coli licencing factor ?

(A) DnaA

(B) DnaB

(C) DNA Polymerase III

(D) Topoisomerase I

35. What was the main limitation of Marshall Nirenberg's findings on genetic code ?

(A) Triplet concept of a codon was missing

(B) Compositions of codons were not known

(C) The sequence of codons for different amino acids was not known

(D) None of the above

36. Which of the post-translational modifications can happen to chromatin histones ?

(A) Methylation and acetylation

(B) ADP-ribosylation and phosphorylation

(C) Glycosylation, SUMOylation and ubiquitination

(D) All of the above

37. Two different proteins with the same molecular weight traverse different distances when run together in a native PAGE in a cold room. The possible reason is/are :

(A) The two proteins experience the different magnitude of resistance in their movement as possess different shapes

(B) The two proteins possess different amino acid sequences

(C) They have no different interactions with polyacrylamide gel

(D) All of the above

38. For gel filtration chromatography of proteins, which of the following is true ?

(A) Large or elongated proteins enter the pores in the beads

(B) Small proteins enter the pores in the beads

(C) Large or elongated proteins elute from the bottom of the column later

(D) Small proteins elute from the bottom of the column first

39. The movement of proteins in SDS-PAGE and gel filtrations can be described as :

(A) Larger proteins follow the smaller proteins in both the resolving techniques

(B) Smaller proteins follow the larger proteins in both the resolving techniques

(C) Smaller protein will move first in SDS-PAGE and later in gel filtration

(D) Smaller protein will move later in SDS-PAGE and first in gel filtration

40. Which technique is used to assay drug concentration in plasma ?

(A) IR spectroscopy

(B) UV spectroscopy

(C) Non-aqueous titration

(D) RIA

41. Which statement/s holds good for ELISA ?

(A) Can be used to detect both antigen and antibody

(B) It is very sensitive and can detect less than a nanogram of a protein

(C) Enzyme-linked to an antibody can be monoclonal or polyclonal

(D) All of the above are correct

42. Fe in the hemoglobin is in a ferrous state and the oxygen molecule binds at :

(A) 6^{th} coordination site

(B) Its 1^{st} coordination site

(C) 3^{rd} coordination site

(D) 4^{th} coordination site

43. Which of the following is correct ?

(A) Only 50% of the oxygen carried by hemoglobin can be released in absence of a change in pH

(B) When pH changes to 7.2 only 40% of its oxygen is released

(C) Hydrogen ions and carbon dioxide increases oxygen affinity of Haemoglobin

(D) None of the above

44. The test for checking mean plasma glucose concentration over the previous 8-10 weeks is :

(A) Fasting plasma glucose concentration for two days

(B) Haemoglobin A1c

(C) Oral glucose tolerance test

(D) 2-hour postprandial glucose concentration

45. Which diseases cause elevated SGOT and SGPT in the blood ?

(A) Hepatitis A or B or C or chronic viral hepatitis

(B) Cirrhosis of the liver or liver damage from alcohol

(C) Hemochromatosis

(D) All of the above

46. In which of the following clinical conditions, the activity of creatine kinase is not seen ?

(A) Muscular dystrophy

(B) Muscle disease

(C) Pancreatitis

(D) Myocardial infarction

47. Which of the following enzymes hydrolyses alpha-1,4 linkages in starch and glycogen to yield maltose ?

(A) Alpha-amylase

(B) Sucrase

(C) Lactase

(D) All of the above

48. What is a xenobiotic ?

(A) A nutrient

(B) Metabolizable chemical substances but not a nutrient

(C) Non-Metabolisable and but can be used as a nutrient

(D) Metabolisable nutrient

49. Innate immunity does not include :

(A) Anatomic and physiologic barriers

(B) Endocytic and phagocytic barriers

(C) Inflammatory barriers

(D) None of the above

50. Adaptive immune responses are characterized by :

i. Specificity

ii. Diversity

iii. Memory

iv. Self/non-self recognition

(A) i and ii

(B) i, ii and iii

(C) i, ii, iii and iv

(D) ii, iii and iv

51. The major effector function/s that enable antibodies to remove antigens and kill pathogens is/are :

(A) Opsonization

(B) Complement activation and antibody-dependent cell-mediated cytotoxicity

(C) Both (A) and (B)

(D) Neither (A) nor (B)

52. Match the two columns correctly :

i.	Type I Hypersensitivity	a.	Transfusion reaction and hemolytic disease of a newborn are its examples
ii.	Type II Hypersensitivity	b.	Involve T_H1 cells
iii.	Type III Hypersensitivity	c.	Result in Arthus reaction
iv.	Type IV Hypersensitivity	d.	Mediated by IgE antibodies

(A) i-a, ii-b, iii-c and iv-d

(B) i-a, ii-d, iii-b and iv-c

(C) i-d, ii-c, iii-a and iv-b

(D) i-d, ii-a, iii-c and iv-b

53. A large quantity of a genome or a piece of DNA is needed for laboratory purposes. It can be obtained by :

(A) The growing large number of cells in a cell culture

(B) By cloning

(C) By polymerase chain reaction

(D) All of the above

54. The type of restriction enzyme used in rDNA technology is :

(A) Type I

(B) Type II

(C) Type III

(D) All of the above

55. Which of the following is the most important discovery that led to the discovery of recombinant DNA technology ?

(A) Discovery that DNA is the genetic material

(B) Discovery of DNA structure

(C) Deciphering of genetic code

(D) Discovery of restriction enzymes

56. Choose the incorrect statement for YAC vectors :

(A) The YAC molecule is approximately 10 kb in size

(B) It contains both yeast origin of replication and prokaryotic origin of replication

(C) It doesn't contain the ampicillin-resistant gene

(D) It contains TEL sequence

57. The heat given to an ideal gas in isothermal conditions is used to :

(A) Increase temperature

(B) Do external work

(C) Increase temperature and in doing external work

(D) Increase internal energy

58. Calculate the Gibbs free energy for the reaction of conversion of ATP into ADP, at 293 Kelvin, the change in enthalpy is 19.07 Kcal and the change in entropy is 90 cal per Kelvin :

(A) 7.3 cal

(B) –5.3 Kcal

(C) 7.3 Kcal

(D) –7.3 Kcal

59. The melting of ice into liquid water is an example of tube _____ reaction.

(A) endergonic

(B) exergonic

(C) exothermic

(D) endothermic

60. What is the reverse process of Neutralization ?

(A) Formation

(B) Hydrolysis

(C) Reaction

(D) Splitting

Sr. No. .....

ENTRANCE TEST-2021

SCHOOL OF BIOLOGICAL SCIENCES

BIOCHEMISTRY

Question Booklet Series **A**

Total Questions : 60

Time Allowed : 70 Minutes

Roll No. : | | | | | | |

Instructions for Candidates :

1. Write your Entrance Test Roll Number in the space provided at the top of this page of Question Booklet and fill up the necessary information in the spaces provided on the OMR Answer Sheet.
2. OMR Answer Sheet has an Original Copy and a Candidate's Copy glued beneath it at the top. While making entries in the Original Copy, candidate should ensure that the two copies are aligned properly so that the entries made in the Original Copy against each item are exactly copied in the Candidate's Copy.
3. All entries in the OMR Answer Sheet, including answers to questions, are to be recorded in the Original Copy only.
4. Choose the correct / most appropriate response for each question among the options A, B, C and D and darken the circle of the appropriate response completely. The incomplete darkened circle is not correctly read by the OMR Scanner and no complaint to this effect shall be entertained.
5. Use only blue/black ball point pen to darken the circle of correct/most appropriate response. In no case gel/ink pen or pencil should be used.
6. Do not darken more than one circle of options for any question. A question with more than one darkened response shall be considered wrong.
7. There will be **'Negative Marking'** for wrong answers. Each wrong answer will lead to the deduction of 0.25 marks from the total score of the candidate.
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10. Calculators and mobiles shall not be permitted inside the examination hall.
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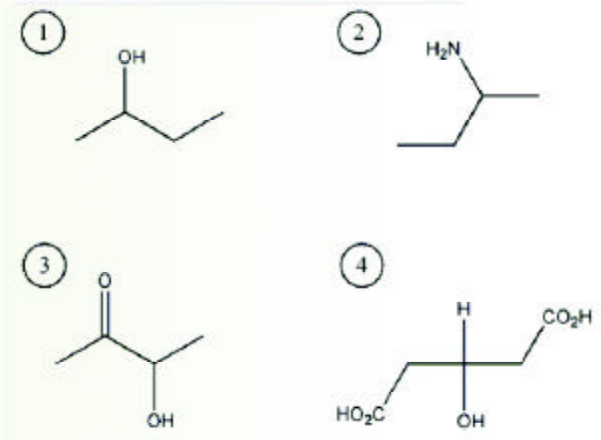
14. At the end of the examination, hand over the OMR Answer Sheet to the invigilator who will first tear off the original OMR sheet in presence of the Candidate and hand over the Candidate's Copy to the candidate.

1. N-glycosidic bond is between:
   (A) Nitrogenous base and ribose sugar of RNA
   (B) Nitrogenous base and de-oxy ribose sugar of DNA
   (C) Both (A) and (B) are correct
   (D) Neither (A) nor (B) is correct

2. Among the following pairs, the identical bond order is in:
   (A) N_2, O_2^{+2}
   (B) N_2, O^{-2}
   (C) N^{-2}, O_2
   (D) O^{2+}, N_2

3. AB and CD are two diatomic molecules with dipole moments 10.41D and 10.27 D, and their bond distances are 2.82 and 2.67A°, respectively, indicating that:
   (A) AB has lesser ionic bond character than CD
   (B) AB has more ionic bond character than CD
   (C) 100% ionic in both the molecules
   (D) Bonding is nearly covalent in both the molecules

4. Taking a close view of the following structures of compounds, indicate which is not chiral:



   (A) 1
   (B) 2
   (C) 3
   (D) 4

5. The largest unit of energy is:
   (A) electron volt
   (B) Joule
   (C) calorie
   (D) erg

6. Nernst formulated one among the following laws:
   (A) First law of thermodynamics
   (B) Second law of thermodynamics
   (C) Third law of thermodynamics
   (D) None of the above

7. At pH = 10, the potential of a hydrogen electrode is:
   (A) 0.59 V
   (B) -0.59 V
   (C) 0.059V
   (D) -0.059V

8. Buffering capacity of a buffer depends upon:
   (A) Concentration of the buffer constituents
   (B) pK of a buffer
   (C) Both (A) & (B)
   (D) Neither (A) nor (B)

9. The interior compartment of the thylakoid membrane becomes _____, during photosynthetic electron transport.
   (A) Basic as compared to reaction centre
   (B) More acidic than stroma
   (C) Enriched in ATP
   (D) The site for glucose formation

10. Glycolate substrate is associated with:
   (A) Photorespiration
   (B) Krebs cycle
   (C) C_3 cycle substrate
   (D) Glycolysis

11. The site for conversion of pyruvate to PEP by use of ATP in C_4 plants lies in:
    (A) Mesophyll cells of chloroplasts
    (B) Mesophyll cells of cytoplasm
    (C) Bundle sheath cells of cytoplasm
    (D) Bundle sheath cells of chloroplasts
12. Tick odd one out with regard to transpiration:
    (A) Water comes out as water vapors
    (B) It occurs in all plants
    (C) Involvement of Root pressure
    (D) It occurs by stomata, lenticels, and cuticle
13. As per the International Union of Conservation of Nature and Natural Resources (IUCN), endangered species are defined as:
    (A) The species which are out of the list of conservation measure
    (B) The species which no longer exists today
    (C) The species which are in danger of extinction and whose survival is unlikely if the causal factors continue to be operating
    (D) All of the above
14. In India Biodiversity Act came into existence in:
    (A) 2000 AD
    (B) 2001 AD
    (C) 2002 AD
    (D) 2003 AD
15. The incorrect one from the below mentioned statements is:
    (A) BOD value of clean water is less than 5 ppm
    (B) Drinking water pH should be between 5.5- 9.5
    (C) Carbon, sulphur and nitrogen oxides are the most widespread air pollutants
    (D) Dissolved oxygen concentration below 5 ppm is ideal for the growth of fish
16. The secondary pollutant among the following is:
    (A) PAN
    (B) N_2O
    (C) SO_2
    (D) CO_2
17. The outcome of most host-parasite relationships depends on:
    (A) The host's defenses or degree of resistance
    (B) The number of microorganisms infecting the host
    (C) The virulence of the organism
    (D) All of the above
18. Considering that the doubling time of a bacterium is 20 min, starting with one bacterium initially, the number of bacteria produced in 2 hours will be:
    (A) 16
    (B) 32
    (C) 64
    (D) 128
19. SARS-CoV-2 belongs to the β- CoVs category. It has round or elliptic and often pleomorphic form and a diameter of approximately:
    (A) 60-140 nm
    (B) 90-250 nm
    (C) 30-50 nm
    (D) 50-100 nm
20. Which one among following bacteria associated with the mitigation of oil spills, is called as the super-bug?
    (A) *E.coli*
    (B) *Pseudomonas putida*
    (C) *Salmonella sp.*
    (D) *Agrobacterium tumefaciens*

21. Cellulose, the structural polysaccharide of plant is a polymer of:

(A) α-D -Glucose

(B) β-D -Glucose

(C) α-D -Galactose

(D) α-D -Galacturonic acid

22. Helix disrupting amino acid is:

(A) Lysine

(B) Cysteine

(C) Proline

(D) Arginine

23. The lipid exclusively present in mitochondrial membrane is:

(A) Lecithin

(B) Ceramide

(C) Cephalin

(D) Cardiolipin

24. If the percentage of adenine in a DNA sample is 20%. What would be the percentage of other bases?

(A) T=30%, G=20%, C=30%

(B) T=40%, G=20%, C=20%

(C) T=20%, G=30%, C=30%

(D) T=20%, G=20%, C=40%

25. The E.C code word for alcohol dehydrogenase is:

(A) EC:1.1.1.1

(B) EC:1.2.3.4

(C) EC:1.1.1.27

(D) EC:2.1.1.1

26. Enzyme activity is a measure:

(A) Catalytic ability

(B) Enzyme specificity

(C) Enzyme sensitivity

(D) Potential energy of enzyme

27. In which type of inhibition both K_M and V_{max} decreases?

(A) Competitive

(B) Non-competitive

(C) Un competitive

(D) Irreversible

28. Important amino acid/s at the active site of hexokinase is/are:

(A) Asp^{205}

(B) Thr^{168}

(C) Lys^{169}

(D) All of the above

29. Which one among the following, is not synthesized from tyrosine?

(A) Nor epinephrine

(B) Dopamine

(C) Melatonin

(D) Thyroxine

30. One molecule of urea is formed at the expense of:

(A) 1 ATP

(B) 2 ATP

(C) 3 ATP

(D) 4 ATP

31. Which of the following contributes nitrogen atoms to both purine and pyrimidine rings?

(A) Aspartate

(B) Carbamoyl phosphate

(C) CO_2

(D) Glutamine

32. For the formation of Glycogen _____ acts a precursor.

(A) UDP-glucose

(B) Malate

(C) Glycerol 3-phosphate

(D) Glyceraldehyde- 3-phosphate

33. Some bacteria have a slimy layer outside cell wall responsible for its virulence called as:

(A) Outer layer

(B) Capsule

(C) Plasmid

(D) Fimbriae

34. Consider two statements:

Statement 1 : Sclerenchyma cells do not have plasmodesmata

Statement 2 : The cell walls of some permanent tissues are heavily lignified.

Select the correct one from the following options

(A) Both(1) and (2) are correct

(B) Both(1) and (2) are incorrect

(C) Statement(1) is correct and (2) is wrong

(D) Statement(1) is wrong and (2) is correct

35. All are the functions of Golgi bodies except:

(A) Cell plate formation

(B) Secretory protein synthesis

(C) Post translational modifications

(D) Sorting centre of the cell

36. _____ tends to vanish always during meiosis and mitosis.

(A) Plastids

(B) Plasma membrane

(C) Nucleolus and nuclear membrane

(D) All of the above

37. The genetic code operates *via* :

(A) The protein moiety of DNA

(B) The base sequences of DNA

(C) The nucleotide sequence of mRNA

(D) The base sequence of tRNA

38. A level of regulation, demonstrated by the termination of transcription if tryptophan is abundant, by the tryptophan operon in E.coli is called as:

(A) Attenuation

(B) Co-repression

(C) Activation

(D) Catabolite repression

39. The characteristic feature/s of homologous chromosomes is/are:

(A) They regularly exchange parts by crossing over at meiosis

(B) They physically pair at meiosis

(C) They carry alleles for the same gene in the same relative position

(D) All of the above

40. The causes of frame shift mutation can be:

(A) Formation of thymine dimmers

(B) Deamination of cytosine to uracil

(C) Both (A) and (B)

(D) Neither (A) nor (B)

41. One among the following chromatographic techniques used for determination of molecular weight of Enzymes/proteins is:

(A) Ion exchange chromatography

(B) Molecular exclusion chromatography

(C) Affinity Chromatography

(D) Paper chromatography

42. Which among the following is not the requirement for the formation of polyacrylamide gel for native PAGE?

(A) Acrylamide and Bis-acryalmide

(B) TEMED

(C) SDS

(D) Ammonium persulphate

43. Who is considered to be the pioneer of Centrifugation?

(A) Davis

(B) Michael Tswett

(C) Theodore Svedberg

(D) Lamellae

44. A DNA solution showing absorbance of 0.2 at 260 nm, has a concentration of:

(A) 10 µg/ml

(B) 20 µg/ml

(C) 30 µg/ml

(D) 50 µg/ml

45. Gastrin stops its secretions when the stomach pH reaches up to:

(A) 1.5

(B) 4.5

(C) 6.8

(D) 7.2

46. Which hormone is responsible for conversion of glycogen into glucose?

(A) Insulin

(B) Glucagon

(C) FSH

(D) None of the above

47. Pulmonary fibrosis has most commonly been associated with:

(A) Asthma

(B) Cigarette smoking

(C) Prolonged shallow breathing

(D) Immobility

48. The most muscular, powerful heart chamber is the:

(A) Left atrium

(B) Right atrium

(C) Left ventricle

(D) Right ventricle

49. The normal range of values for AST (SGOT) is about _____ per liter of serum.

(A) 5 to 40 units

(B) 7 to 56 units

(C) 20 to 200 units

(D) 0.1 to 10 units

50. Which of the following diseases does obesity increase the risk of developing?

(A) Type 2 diabetes

(B) Cardiovascular diseases

(C) Cancers

(D) All of the above

51. When a patient tests positive for 6-monoacetyl morphine, it indicates:

(A) Ingestion of Heroin

(B) Ingestion of Methamphetamine

(C) Ingestion of Cocaine

(D) Ingestion of Marijuana

52. Which of the following is /are associated with kidney function tests:

(A) Creatinine clearance tests

(B) Inulin clearance tests

(C) Urea clearance tests

(D) All of the above

53. A hapten refers to:

(A) An epitope

(B) A paratope

(C) A small chemical grouping which reacts with preformed antibodies

(D) An immunogen

54. Which one of the following mast cell products is not preformed and therefore has to be newly synthesized?

(A) Histamine

(B) Prostaglandin D_2

(C) Heparin

(D) Eosinophil chemotactic factor

55. Protection of body surfaces is not done by:

(A) Gastric acid

(B) Mucus

(C) Salivary amylase

(D) Skin

56. An antibody having high carbohydrate content is:

(A) IgE

(B) IgM

(C) IgD

(D) IgG

57. Recombinant plasmids are added to a bacterial culture that has been pretreated with _____ ions.

(A) Iodine

(B) Magnesium

(C) Calcium

(D) Ferric

58. Which of the following pair of hormones is required for a callus to differentiate?

(A) Ethylene and Auxin

(B) Auxin and cytokinin

(C) Auxin and Abscisic acid

(D) Cytokinin and gibberellins

59. Arber, Nathans, Smith were awarded noble prize in recognition of discovery of restriction enzymes and their application to the problems of molecular genetics:

(A) 1973

(B) 1978

(C) 1975

(D) 1983

60. A cell line refers to:

(A) Multilayer culture

(B) Transformed cells

(C) Multiple growth of cells

(D) Sub culturing of primary culture

ROUGH WORK

Sr. No. 084

ENTRANCE TEST-2020

SCHOOL OF BIOLOGICAL SCIENCES

BIO-CHEMISTRY

Question Booklet Series **D**

Total Questions : 60
Time Allowed : 70 Minutes

Roll No. :

Instructions for Candidates :

1. Write your Entrance Test Roll Number in the space provided at the top of this page of Question Booklet and fill up the necessary information in the spaces provided on the OMR Answer Sheet.
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SEAL

****

1. The technique for purification of proteins that can be made specific for a given protein is :
   (A) Gel filtration chromatography
   (B) Ion exchange chromatography
   (C) Electrophoresis
   (D) Affinity chromatography

2. The movement of charged particles towards one of the electrodes under the influence of electrical current is :
   (A) Gel filtration
   (B) Molecular sieving
   (C) Gas liquid chromatography
   (D) Electrophoresis

3. Beer's Law is followed only if following conditions are met except :
   (A) Incident radiation on the substance of interest is monochromatic
   (B) The solute absorption is insignificant, compared with the solvent absorbance
   (C) The solute concentration is within given limits
   (D) An optical interference is not present

4. Genetic engineering requires enzyme :
   (A) DNAase
   (B) Amylase
   (C) Lipase
   (D) Restriction endonuclease

5. All the following processes occur rapidly in the membrane lipid bilayer except :
   (A) Flexing of fatty acyl chains
   (B) Lateral diffusion of phospholipids
   (C) Trans bilayer diffusion of phospholipids
   (D) Rotation of phospholipids around their long axes

6. The Golgi complex :
   (A) Synthesizes proteins
   (B) Produces ATP
   (C) Provides a pathway for transporting chemicals
   (D) Forms glycoproteins

7. The minimum number of polypeptide chains in an immunoglobulin is :
   (A) Two
   (B) Four
   (C) Five
   (D) Six

8. In mammalian cell cycle, synthesis of DNA occurs during :
   (A) S phase
   (B) G1 phase
   (C) Mitotic phase
   (D) G2 phase

9. The carbon dioxide carrying power of the blood residing within the red cells is :
   (A) 23 %
   (B) 60 %
   (C) 85 %
   (D) 100 %

10. Which organ of the body generally consumes the most glucose at rest ?
   (A) Heart
   (B) Liver
   (C) Brain
   (D) Kidney

11. The C1– content of venous erythrocytes is usually greater than that of arterial erythrocytes because :
    (A) Venous erythrocytes contain less water than arterial erythrocytes
    (B) Of erythrocytic $HCO^{3-}/C1^{-}$ antiport in systemic capillaries
    (C) Chloride gas is actively removed from erythrocytes by the lungs, and then expired in air
    (D) Carbonic anhydrase converts CO_2 to H^+ and $C1^-$ in venous erythrocytes
12. Melatonin is synthesised in :
    (A) Hypothalamus
    (B) Posterior pituitary gland
    (C) Pineal gland
    (D) Melanocytes
13. The steps of Glycolysis between glyceraldehyde-3-phosphate and 3-phosphoglycerate involves the following except :
    (A) ATP Synthesis
    (B) Utilization of Pi
    (C) Oxidation of NADH to NAD^+
    (D) Formation of 1, 3, Bisphosphoglycerate
14. Which of the following compounds is not product of Pentose Phosphate pathway ?
    (A) NADPH
    (B) Glycerate-3-Phosphate
    (C) CO_2
    (D) Ribulose-5-Phosphate
15. Acylsphingosine is also known as :
    (A) Sphingomyelin
    (B) Ceramide
    (C) Cerebroside
    (D) Sulphatide
16. The rate limiting step in the biosynthesis of catecholamines is :
    (A) Decarboxylation of dihydroxyphenylalanine
    (B) Hydroxylation of phenylalanine
    (C) Hydroxylation of tyrosine
    (D) Oxidation of dopamine
17. Conversion of inosine monophosphate (IMP) to xanthine monophosphate is catalysed by :
    (A) IMP dehydrogenase
    (B) Formyl transferase
    (C) Xanthine-guanine phosphoribosyl transferase
    (D) Adenine phosphoribosyl transferase
18. Marasmus is due to malnutrition of :
    (A) Proteins
    (B) Proteins and calories
    (C) Proteins and vitamins
    (D) Proteins and minerals
19. In early stages of myocardial ischemia the most sensitive indicator is the measurement of the activity of :
    (A) CPK
    (B) SGPT
    (C) SGOT
    (D) LDH
20. The standard enthalpies of CO_2 (g), H_2O (*l*) and Glucose (s) at 25°C are –400kJ/mol, –300kJ/mol and –1300kJ/mol respectively. The standard enthalpy of combustion per gram of glucose at 25° C is :
    (A) +2900 kJ
    (B) –2900 kJ
    (C) –16.11 kJ
    (D) +16.11 kJ

21. Given that the standard free energy change ($\Delta G°$) for the hydrolysis of ATP is –7.3 K cal/mol and that for the hydrolysis of Glucose 6-phosphate is –3.3 Kcal/mol, the $\Delta G°$ for the phosphorylation of glucose is Glucose + ATP → Glucose 6– Phosphate + ADP :

(A) – 10.6 Kcal/mol

(B) – 7.3 Kcal/mol

(C) – 4.0 Kcal/mol

(D) + 4.0 Kcal/mol

22. The disorder of a system is measured by its :

(A) Activation energy

(B) Heat of reaction

(C) Entropy

(D) Energy

23. Plasma bicarbonate is decreased in :

(A) Respiratory alkalosis

(B) Respiratory acidosis

(C) Metabolic alkalosis

(D) Metabolic acidosis

24. Zinc is a cofactor for :

(A) Acid phosphatase

(B) Alkaline phosphatase

(C) Amylase

(D) Lipase

25. Molecular iron (Fe) is :

(A) Stored primarily in spleen

(B) Absorbed in the intestine

(C) Absorbed in the ferric, Fe+++ form

(D) Stored in the body in combination with ferritin

26. In a solution containing phosphate buffer, the pH will be 7.4, if the ratio of monohydrogen phosphate : dihydrogen phosphate is :

(A) 4 : 1

(B) 5 : 1

(C) 10 : 1

(D) 20 : 1

27. Maximum possible number of hydrogen bonds in which a water molecule can participate is :

(A) 4

(B) 3

(C) 2

(D) 1

28. Glucose in Lactose are joined to each other by following bond :

(A) $\alpha(1 \rightarrow 4)$

(B) $\beta(1 \rightarrow 4)$

(C) $\alpha, \beta(1 \rightarrow 2)$

(D) $\alpha(1 \rightarrow 2)$

29. Polypeptide chains of Insulin are joined togeth by :

(A) Van der Walls interaction

(B) Hydrophobic bonds

(C) Disulphide bonds

(D) Coordinate bonds

30. Which among the following groups of peptide bo take part in hydrogen bonding ?

(A) C=O

(B) N-H

(C) Both of the above

(D) None of the above options is correct

31. The end products of saponification :
(A) Glycerol
(B) Acid
(C) Soap
(D) Both (A) and (C)

32. The hydrogen bonds in the secondary and tertiary structure of proteins are directly attacked by :
(A) Salts
(B) Alkalies
(C) Detergents
(D) All of these

33. α-D-glucose + 112° → + 52.5° ← + 19° β-D-glucose for glucose above represents :
(A) Optical isomerism
(B) Mutarotation
(C) Epimerisation
(D) D and L isomerism

34. Wavelength of UV (nm) used for quantitative estimation of proteins by spectroscopy method :
(A) 267
(B) 270
(C) 280
(D) 260

35. The optimum temperature for photosynthesis is :
(A) 25-35°C
(B) 10-15°C
(C) 35-40°C
(D) 20-25°C

36. Kranz anatomy is found in the leaves of :
(A) C_3 plants
(B) C_4 plants
(C) Both C_3 & C_4 plants
(D) None of the above

37. Photorespiration occurs in :
(A) Four cell organelles
(B) Two cell organelles
(C) One cell organelle
(D) Three cell organelles

38. In Calvin cycle, 1 molecule of glucose is formed from :
(A) $6CO_2 + 30ATP + 12NADPH$
(B) $6CO_2 + 12ATP$
(C) $6CO_2 + 18ATP + 12NADPH$
(D) $6CO_2 + 18ATP + 30NADPH$

39. Wilson's disease is a condition of toxicosis of :
(A) Iron
(B) Copper
(C) Chromium
(D) Molybdenum

40. An important cause of water intoxication is :
(A) Nephrogenic Diabetes insipidus
(B) Renal failure
(C) Gastroenteritis
(D) Fanconi syndrome

41. Pernicious anaemia is diagnosed by the radioactive substance :
(A) Cl^{36}
(B) P^{32}
(C) CO^{60}
(D) Fe^{59}

42. A radioactive isotope labeled cDNA probe is used in :
(A) Southern blotting
(B) Northern blotting
(C) Both (A) and (B)
(D) None of these

****

43. The only correct statement about oncoviruses is :

(A) All the oncoviruses are RNA viruses

(B) Reverse transcriptase is present in all oncoviruses

(C) Viral oncogenes are identical to human protooncogens

(D) Both DNA and RNA viruses can be oncoviruses

44. Sulpha drugs block the bacterial growth by interfering with bacterial synthesis of :

(A) Lipoate

(B) Vitamin E

(C) Tetrahydrofolate

(D) Ascorbic acid

45. Host which provides a medium for larval or asexual phase of life cycle of an infectious agent :

(A) Intermediate host

(B) Final host

(C) Obligatory host

(D) None of the above

46. The first protein synthesized by recombinant DNA technology was :

(A) Streptokinase

(B) Human growth hormone

(C) Tissue plasminogen activator

(D) Human insulin

47. The most important epimer of glucose is :

(A) Galactose

(B) Fructose

(C) Arabinose

(D) Xylose

48. Compounds having the same structural formula but differing in spatial configuration are known as :

(A) Stereoisomers

(B) Anomers

(C) Optical isomers

(D) Epimers

49. At neutral pH, a mixture of amino acids in solution would be predominantly :

(A) Dipolar ions

(B) Nonpolar molecules

(C) Positive and monovalent

(D) Hydrophobic

50. The number of double bonds in arachidonic acid is :

(A) 1

(B) 2

(C) 4

(D) 6

51. Enzyme-driven metabolic pathways can be made more efficient by :

(A) Concentrating enzymes within specific cellular compartments

(B) Grouping enzymes into free-floating, multi enzyme complexes

(C) Fixing enzymes into membranes so that they are adjacent to each other

(D) All of the above

52. Which of the following statements about enzymes or their function is true ?
(A) Enzymes do not alter the overall change in free energy for a reaction
(B) Enzymes are proteins whose three-dimensional form is key to their function
(C) Enzymes speed up reactions by lowering activation energy
(D) All of the above

53. The kinetic effect of purely competitive inhibitor of an enzyme :
(A) Increases K_m without affecting V_{max}
(B) Decreases K_m without affecting V_{max}
(C) Increases V_{max} without affecting K_m
(D) Decreases V_{max} without affecting K_m

54. A sigmoidal plot of substrate concentration ([S]) verses reaction velocity (V) may indicate :
(A) Michaelis-Menten kinetics
(B) Co-operative binding
(C) Competitive inhibition
(D) Non-competitive inhibition

55. In enzyme kinetics Km implies :
(A) The substrate concentration that gives one half V_{max}
(B) The dissociation constant for the enzyme substrate complex
(C) Concentration of enzyme
(D) Half of the substrate concentration required to achieve V_{max}

56. All of the following statements about eukaryotic promoters are true except :
(A) They may be located upstream or downstream from the structural gene
(B) They have two consensus sequences
(C) One consensus sequence binds RNA polymerase
(D) Mutations in promoter region can decrease the efficiency of transcription of the structural gene

57. If the codon UAC on mRNA changes into UAG as a result of a base substitution in DNA, it will result in :
(A) Silent mutation
(B) Acceptable mis-sense mutation
(C) Nonsense mutation
(D) Frameshift mutation

58. If a cell has one chromosome in excess of the normal number of chromosomes present in the nucleus, it is referred to as :
(A) Aneuploidy
(B) Polyploidy
(C) Tetraploid
(D) Allotetraploid

59. In meiosis, an inversion in one member of a pair of homologous chromosomes will most likely lead to which of the following ?
(A) Nondisjunction of the affected chromosomes
(B) Chromosomes with duplications and deficiencies
(C) Increased recombination frequencies in the inverted region
(D) Mispairing of the affected chromosome with a non-homologous chromosome Cellular arrest in meiotic prophase

60. Sigma and Rho factors are required for :
(A) Replication
(B) Transcription
(C) Translation
(D) Polymerization

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1. Which of the following are usually present in Acid rain ?
   (A) Chromic acid and Acute acetic acid
   (B) Acetic acid and Hydrochloric acid
   (C) Citric acid and Phosphoric acid
   (D) Nitric acid and sulphuric acid
2. Which of the following isotopes is not a radioisotope ?
   A) Carbon-13
   (B) Carbon-14
   (C) Tritium
   (D) Sulphur-35
3. Fugitive emissions are _____ emissions of vapours or gases from pressurised apparatus, either due to faulty equipment, leakage or other unforeseen mishaps.
   (A) deliberate
   (B) accidental
   (C) incidental
   (D) appropriate
4. Virus diseases :
   (A) Can spread from animals to humans
   (B) Are mostly transmitted by insects
   (C) Are confined to the tropics
   (D) Are only spread by skin contact
5. Mycobacterium tuberculosis bacteria avoid innate immunity by :
   (A) Interference with phagosome-lysosome fusion
   (B) Presence of a polysaccharide capsule
   (C) Destruction of complement components
   (D) Living in an immuno-privileged tissue site
6. Bacterial diseases :
   (A) Are mainly restricted to the tropics
   (B) Are rare in children
   (C) Can be caught from animals
   (D) Are generally preventable by vaccination
7. Löwentein-Jensen medium is used for culturing :
   (A) Enterobacteria
   (B) Tuberculosis
   (C) Salmonella
   (D) G+ bacteria
8. Which of the following statements about fatty acid synthesis is correct ?
   (A) Fatty acids can be used to synthesise glucose
   (B) Fatty acids can be synthesised from glucose
   (C) Fatty acids can be used to synthesise amino acids
   (D) Fatty acids are important in protein synthesis
9. Which of the following carbohydrates is a triose ?
   (A) Glucose
   (B) Ribose
   (C) Ribulose
   (D) Glyceraldehyde
10. In an experiment, bacteria were grown for many generations in a medium containing ^{15}N as the sole source of nitrogen, so that all the DNA made by cells will carry the heavy isotope of Nitrogen. The cells were then transferred to a medium containing only ^{14}N and were allowed to divide for one generation. DNAs were extracted and centrifuged in a CsCl density gradient. Two bands were observed, one heavy band corresponding to ^{15}N, and a light band corresponding to ^{14}N DNA bands. Based on the above observation, which one of the following is a likely inference ?
    (A) Replication of DNA is conservative
    (B) Replication of DNA is semi-conservative
    (C) Replication of DNA is dispersive
    (D) Replication is discontinuous
11. Another name for reverse transcriptase is
    (A) DNA dependent DNA polymerase
    (B) DNA dependent RNA polymerase
    (C) RNA dependent DNA polymerase
    (D) RNA dependent RNA polymerase
12. What is added to the 3' end of newly transcribed eukaryotic mRNA ?
    (A) a poly G tail
    (B) a poly A tail
    (C) 7' methyl guanine
    (D) a STOP codon

SEAL

13. Which of the following is an incorrect statement about mutations ?
(A) a mutation can reverse a mutant phenotype
(B) mutations only occur in exons
(C) transitions are more frequent than transversion mutations
(D) free radicals protect cells from mutation

14. How many amino acids are likely to be encoded by the following mRNA sequence ?
CUUGAAGCGAUAUGA
(A) 4
(B) 5
(C) 9
(D) 13

15. To which sequence or molecule does a repressor bind ?
(A) The Promoter
(B) RNA polymerase
(C) The Operator
(D) The Enhancer

16. Which of the following is the correct nomenclature of a restriction enzyme obtained from the first activity of strain R of Escherichia coli ?
(A) EcoRl
(B) EscRI
(C) Ecorl
(D) EcoRI

17. Which of the following methods for introducing DNA into cells is used only for plants ?
(A) Electroporation
(B) A gene 'gun'
(C) Microinjection
(D) Transformation of competent cells

18. Tissue culture involves the use of small pieces of plant tissue, known as _____, which are cultured in a nutrient medium under sterile conditions.
(A) inplants
(B) implants
(C) explants
(D) none of the above

19. When the phage transduces only those bacterial genes adjacent to the prophage in the bacterial chromosome then it is known as :
(A) generalized transduction
(B) specialized transduction
(C) restricted transduction
(D) conjugation

20. What should be the complementary strand of 3'...ATGGCTTGA....5' ?
(A) 3'....TACCGAACT....5'
(B) 5'....TACCGAACT....3'
(C) 3'....TAGGCAAGT....5'
(D) 5'....TAGGCAAGT....3'

21. Which of the following is an essential feature for being a perfect vector ?
(A) Origin of replication
(B) Selectable marker
(C) Restriction site
(D) Virulent gene

22. Which of the following is the primary use of an expression vector ?
(A) DNA library
(B) DNA purification
(C) Protein production
(D) DNA cloning

23. Which of the following regarding the basic mechanism of gene expression is correct ?
(A) DNA → tRNA → protein
(B) RNA → cDNA → mRNA → protein
(C) RNA → DNA → mRNA → protein
(D) DNA → protein

24. Which of the following applies to membrane lipids ?
(A) Membrane lipids are composed of hydrophobic molecules
(B) Scramblases and flippases are able to catalyze the transfer of lipid molecules between the outer and inner leaflets
(C) Membrane lipids are able to spontaneously move between the outer and inner leaflets
(D) Same lipid compositions are found in the two leaflets of a membrane

25. Which one is correct as far as Mycoplasmas are concerned ?
(A) Gram positive cell walls
(B) The Kingdom, Archaea
(C) Cells with a eukaryotic organization
(D) A susceptibility to cell lysis in hypotonic solutions

26. During cell cycle, cells go through different phases. Which of the following is not a part of the M Phase of cell cycle ?
(A) Prophase
(B) S Phase
(C) Anaphase
(D) Telophase

27. Which one of the following is associated with bacterial cells ?
(A) Ribosomes
(B) Nucleus
(C) Chloroplasts
(D) Lysosomes

28. The correct sequence of cytochrome carriers in respiratory chain is
(A) Cyt b—cyt c—cyt c l —cyt aa3
(B) Cyt aa3— cyt b—cyt c—cyt c l
(C) Cyt b—cyt c l —cyt c—cyt aa3
(D) Cyt b—cyt aa3—cyt c l — cyt c

29. T_3 is :
(A) Thyroxine
(B) Triodothyronine
(C) Triodotyrosine
(D) Triiodothyroxine

30. During the normal resting state of humans, most of the blood glucose burnt as "fuel" is consumed by :
(A) Liver
(B) Brain
(C) Kidneys
(D) Adipose tissue

31. During glycolysis, Fructose 1,6 bishosphate is cleaved into two 3 carbon intermediates by the enzyme :
(A) Enolase a
(B) Fructokinase
(C) Aldolase
(D) Diphosphofructophosphatose

32. Citrulline is an intermediate of :
(A) TCA cycle
(B) Urea cycle
(C) Pentose cycle
(D) Calvin cycle

33. The eukaryotes enzymes of beta-oxidation are found in :
(A) Mitochondria
(B) Cytosol
(C) Golgi apparatus
(D) Nucleus

34. Which one of the following is a rate limiting enzyme of gluconeogenesis ?
(A) Hexokinase
(B) Phosphofructokinase
(C) Pyruvate carboxylase
(D) Pyruvate kinase

35. In early stages of myocardial ischemia the most sensitive indicator is the measurement of the activity of :
(A) CPK
(B) SGPT
(C) SGOT
(D) LDH

36. In acute pancreatitis, the enzyme raised in first five days is :
(A) Serum amylase
(B) Serum lactic dehydrogenase
(C) Urinary lipase
(D) Urinary amylase

37. Which of the following is not a feature of a secondary immune response to an antigen, when compared to the first response to the same antigen ?
(A) The antibody is generated faster
(B) More antibody is produced
(C) The antibody produced has greater affinity for the antigen
(D) Antibody is generated without T-cell help

38. Which of the following statements about food storage in the body is correct ?
(A) More glycogen is stored per unit mass in the muscles than in the liver.
(B) Glycogen storage in the liver is unlimited.
(C) Fat is a more efficient form of fuel storage than glycogen.
(D) Proteins in muscle cells are a normal storage form of fuel.

39. Which of the following is the odd one out ?
(A) Elastins
(B) Collagens
(C) Spectrins
(D) Proteoglycans

40. Which of the following statements is correct ?
(A) Animal and fungal cells contain chloroplasts
(B) Animal and plant cells do not contain mitochondria
(C) Plant, animal and fungal cells possess mitochondria
(D) All plant cells contain chloroplasts

41. In the following precipitation reaction, which ions are spectator ions ?

$$AgNO_3(aq) + KI(aq) \rightarrow AgI(s) + KNO_3(aq)$$

(A) K^+ and NO_3^-
(B) K^+ and I^-
(C) Ag^+ and I^-
(D) Ag^+ and NO_3^-

42. Which one of the following thermodynamic quantities is not a state function ?
(A) Gibbs free energy
(B) Enthalpy
(C) Entropy
(D) Work

43. Which of the following terms is defined as the amount of heat released by the complete burning of 1 mole of a substance ?
(A) Specific heat
(B) Heat of combustion
(C) Heat capacity
(D) Heat of fusion

44. A pH meter is an example of :
(A) An electrolytic cell
(B) A reference electrode
(C) An ion-selective electrode
(D) A fuel cell

45. Like all equilibrium constants, the auto ionisation constant of water :
(A) remains same as temperature changes
(B) changes with temperature
(C) is independent of temperature increase
(D) is independent of temperature decrease

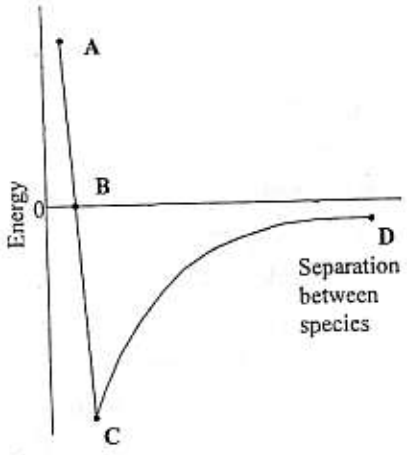
46. Which of the following gives an exact value for the ratio of V_0 and V_{max} for a single substrate single enzyme catalysed reaction following Michaelis Menten Kinetics, at a concentration of the substrate which is one third (1/3) of its Km value ?
(A) 0.25
(B) 0.50
(C) 0.75
(D) 1.25

47. All the following are essential trace elements except :
(A) Iron
(B) Iodine
(C) Zinc
(D) Cadmium

48. The tendency of an atom to attract a shared pair of electrons towards itself is referred as its :
(A) Electro negativity
(B) Electro positivity
(C) Electron density
(D) Electron hopping

49. Which of the following statements regarding a conjugated system is false ?
(A) Electrons are shared between more than two atoms, rather than being localized within bond joining two specific atoms
(B) The molecule must be cyclic (ring-structured)
(C) The molecule must feature alternating single and double bonds
(D) The system arises from the overlap of neighbouring p orbitals

50. At which of the points A-D on the following graph will two interacting species experience the greatest force of attraction ?



(A) A
(B) B
(C) C
(D) D

51. Which one of the following terms describes a positive and negative charge, which are separated in space within a molecule ?
(A) Salt bridge
(B) Polar bond
(C) Dipole
(D) Van der Waals interaction

52. Which of the following sugars are non-reducing sugars ?
(A) Glucose and lactose
(B) Fructose and galactose
(C) Sucrose and trehalose
(D) Glucose and fructose

53. The end products of saponification is :
(A) glycerol
(B) acid
(C) soap
(D) Both (A) and (C)

54. α-D-glucose and β-D-glucose are :
(A) Stereoisomers
(B) Epimers
(C) Anomers
(D) Keto-aldo pairs

55. A solution of X of concentration 0.010 mol dm^{-3} gives an absorbance of 0.5. What concentration is a solution of X which gives an absorbance reading of 0.25 ? Assume that the same optical cell is used for both readings :
(A) 0.0050 mol dm^{-3}
(B) 0.020 mol dm^{-3}
(C) 0.010 mol dm^{-3}
(D) 0.050 mol dm^{-3}

56. Transpiration is least in :
(A) good soil moisture
(B) high wind velocity
(C) dry environment
(D) high atmospheric humidity

57. Respiration is considered as _____ process.
(A) endergonic
(B) exothermic
(C) endothermic
(D) anabolic

58. Which of the following statements about thylakoids is not correct ?
(A) The thylakoid membranes contain chlorophyll pigments
(B) The thylakoid membranes contain the photosystems
(C) The thylakoid membranes contain the Calvin cycle enzymes
(D) The thylakoid membranes contain the electron transport machinery

59. The form in which carbohydrate is transported from photosynthetic tissues (e.g. leaves) to non-photosynthetic tissues (e.g. roots) via the phloem is :
(A) glucose
(B) fructose
(C) malate
(D) sucrose

60. Individuals confined to a realized niche are likely to experience :
(A) less competition from other species
(B) more intense selective pressures
(C) fewer resources
(D) fewer predators

1. The phosphorus cycle is a biogeochemical cycle and describes the movement of phosphorus through :

(A) The lithosphere and hydrosphere but not biosphere

(B) The hydrosphere only

(C) The biosphere and hydrosphere

(D) The lithosphere, biosphere and hydrosphere

2. The carbon cycle is the movement of carbon on Earth by the processes of ____ and ____ .

(A) Oxidation and hydrolysis

(B) Digestion and transport

(C) Transpiration and excretion

(D) Respiration and photosynthesis

3. The theory of origin of species has been proposed by :

(A) Charles Darwin

(B) Jean Baptist Lamarck

(C) Hugo Deveries

(D) James Watson and Francis Crick

4. Acid rain refers to rain or any other form of precipitation that is unusually acidic and may cause harmful effects on plants and animals. It usually contains :

(A) Sulphuric acid and Hydrochloric acid

(B) Nitric acid and Hydrochloric acid

(C) Citric acid and Sulphuric acid

(D) Nitric acid and Sulphuric acid

5. Bacterial growth is the asexual reproduction, or cell division, of a bacterium into two daughter cells. When bacteria adapt to growth conditions and prepare but don't actually divide, the phase is called as :

(A) Log phase

(B) Lag phase

(C) Stationary phase

(D) Death phase

6. When a bacteriophage is integrated into a cellular genome it is called a :

(A) Lytic virus

(B) Prophage

(C) Stable phage

(D) Microphage

7. The influenza viral subtypes differ in their :

(A) Cell walls

(B) Protein spikes

(C) Capsid composition

(D) Nucleic acids

8. Which of the following organisms is used to transport genes into plant cells ?

(A) Agro bacterium

(B) Mycobacterium

(C) Aerobacter

(D) Mycoplasma

9. Which of the following bonds is not present in the backbone of a polypeptide chain ?

(A) Phi bond

(B) Psi bond

(C) Peptide bond

(D) Hydrogen bond

10. The protein alpha helical structure is right handed, with each amino acid residue placed at a distance of 1.5 A°. Each turn of the helix contains 3.6 amino acid residues. The pitch of the helix is :

(A) 1.5 A°

(B) 3.6 A°

(C) 5.4 A°

(D) 4.5 A°

11. Cellulose is a linear homopolymer consisting of D Glucose units with :

(A) β 1 $\rightarrow$ 4 glycosidic linkages

(B) α 1 $\rightarrow$ 4 glycosidic linkages

(C) β 1 $\rightarrow$ 6 glycosidic linkages

(D) α 2 $\rightarrow$ 4 glycosidic linkages

12. An unsaturated fatty acid containing twenty carbon atoms and four double bonds is :

(A) Oleic acid

(B) Palmitic acid

(C) α– Linolenic acid

(D) Arachidonic acid

13. A mutation that affects the phenotype only under certain conditions is known as :

(A) Spontaneous mutation

(B) Somatic mutation

(C) Lethal mutation

(D) Conditional mutation

14. Individuals with the autosomal birth defects called as Down syndrome have multiple copies of chromosome 21. The number of copies present in such individuals is :

(A) One

(B) Two

(C) Three

(D) Four

15. During cell division, which of the following strategies of replicating the DNA is followed by the unicellular bacterium Escherichia *coli* ?

(A) Semiconservative and unidirectional

(B) Conservative but bidirectional

(C) Semiconservative and bidirectional

(D) Dispersive and random

16. Which of the following is not characteristic of genetic code ?

(A) It is non overlapping

(B) It is degenerate

(C) It is comma less

(D) It consists of doublets

17. The mechanism by which naked DNA fragments are taken up from the surrounding medium by a cell is called :

(A) Transformation

(B) Transduction

(C) Transfection

(D) Conjugation

18. Which of the following describes the process wherein bacteriophages can carry portions of bacterial DNA from one cell to another ?

(A) Transformation

(B) Transduction

(C) Conjugation

(D) Replication

19. In which of the following systems, the restriction and modification activities act independently ?

(A) Type I

(B) Type II

(C) Type III

(D) Type IV

20. Polyethylene glycol can be used in :

(A) Protoplast fusion

(B) Protoplast separation

(C) Cell lysis

(D) Cell separation

21. Which of the following cannot be used as a vector ?

(A) Phage

(B) Plasmid

(C) Bacteria

(D) Cosmid

22. The process of introduction of foreign DNA into an animal cell is called :

(A) Transversion

(B) Conversion

(C) Inversion

(D) Transfection

23. Which of the following is essentially used in mass culturing of cells ?

(A) Test tube

(B) Bioreactor

(C) Refrigerator

(D) French press

24. Agar agar is added to tissue culture media as a :

(A) Carbon source

(B) Growth regulator

(C) Nitrogen source

(D) Solidifying agent

25. Who amongst the following is credited with proposing the term "Cell" ?

(A) Hugo Deveries

(B) Lamark Ceil

(C) David Brown

(D) Robert Hooke

26. When misfolded proteins accumulate inside the Endoplasmic reticulum, it leads to ER stress. The ER stress is counteracted to restore cellular homeostasis by a signalling pathway commonly referred to as :

(A) Unfolded Protein Response

(B) Lysosomal degradation

(C) Ubiquitination

(D) mTOR signalling

27. Prophase, metaphase, anaphase and telophase represent different stages of one of the cell cycle phases. Identify the cell cycle stage to which they belong :

(A) G1 Phase

(B) S Phase

(C) G2 Phase

(D) M Phase

28. The neurons, red blood cells, and many other cells in the body divide very rarely. In which of the following cell cycle phases, such cells are likely to be present ?

(A) G1 Phase

(B) S Phase

(C) M Phase

(D) G0 Phase

29. The first part of large intestine is called :

(A) Duodenum

(B) Ileum

(C) Caecum

(D) Colon

30. Which of the following parts of human brain is involved in regulation of body temperature ?

(A) Cerebrum

(B) Cerebellum

(C) Medulla oblongata

(D) Hypothalamus

31. Which of the following carry blood from heart to various parts of the body ?

(A) Veins

(B) Capillaries

(C) Arteries

(D) Neurons

32. Which of the following hormones is **not** produced by the thyroid gland ?

(A) Calcitonin

(B) Triiodothyronine

(C) Thyroxine

(D) Thyroid stimulating hormone

33. In glycolysis, the total number of ATP molecules synthesised from ADP utilising one molecule of glucose is :

(A) Two

(B) Four

(C) Thirty six

(D) Thirty eight

34. The oxidation of long chain fatty acids occurs in a step wise manner utilising single carbon units. The process is initiated :

(A) From the carboxyl end

(B) From the aliphatic end

(C) Randomly

(D) In the middle of the chain

35. One cycle of beta oxidation of fatty acids produces :

(A) 1 $FADH_2$, 1 NAD + and 1 Acetyl CoA

(B) 1 $FADH_2$, 1 NADH and 1 Acetyl CoA

(C) 1 $FADH_2$, 1 NADH and 1 CO_2

(D) 1 FADH, 1 NADH and 2 Acetyl CoA

36. Urea cycle is responsible for the conversion of toxic ammonia to urea for excretion and involves several enzyme catalysed steps. Which of the following enzymes catalysed the rate limiting step in the cycle ?

(A) Carbamyl phosphate synthetase

(B) Ornithine transcarbamylase

(C) Argininosuccinate synthase

(D) Argininosuccinate lyase

(E) Arginase

37. Which type of cells is known to be involved in the initial presentation of antigen to T lymphocytes ?

(A) Dendritic cells

(B) Red blood cells

(C) Epithelial cells

(D) Platelets

38. Which of the following analytes are commonly determined in assessment of kidney function ?

(A) Urea and creatinine

(B) Bilirubin and albumin

(C) Sugar and Iron

(D) Sodium and Calcium

39. Which of the following diseases is related to dietary Protein deficiency ?

(A) Kwashiorkor disease

(B) Albuminism

(C) Down syndrome

(D) Sickle cell anaemia

40. Which of the following enzymes catalysed the rate limiting step in pyrimidine synthesis ?

(A) Aspartate transcarbamylase

(B) Thymidylate synthase

(C) Xanthine oxidase

(D) PRPP synthetase

41. If two systems are in thermal equilibrium with a third system, they are in equilibrium with each other. This statement represents :

(A) Zeroth Law of thermodynamics

(B) First Law of thermodynamics

(C) Second Law of thermodynamics

(D) Third Law of thermodynamics

42. A system in which neither energy nor matter is exchanged with its surroundings is known as :

(A) Open system

(B) Closed system

(C) Isolated system

(D) Rigid system

43. Intensive properties are those that are independent of the size of a system. These properties are not additive and include all of the following except :

(A) Temperature

(B) Pressure

(C) Density

(D) Mass

44. Which of the following equations gives the free energy change (ΔG) of a reaction while maintaining a constant temperature ?

(A) $\Delta G = H - T\Delta S$

(B) $\Delta G = \Delta H - T\Delta S$

(C) $\Delta G = \Delta H - TS$

(D) $\Delta G = H - S\Delta T$

45. The tendency of an atom to attract a shared pair of electrons towards itself is referred as its :

(A) Electronegativity

(B) Electropositivity

(C) Electron density

(D) Electron hopping

46. Which of the following structures represents the conjugate acid of HPO_4^{2-} ?

(A) $H_2PO_4^-$

(B) $H_3PO_4^-$

(C) $H_4PO_4^+$

(D) PO_4^{3-}

47. Which of the following relationships is true for an acidic solution at 25° C ?

(A) $[H^+] > [OH^-]$

(B) $pH > 7.00$

(C) $Kw > 1 \times 10^{-14}$

(D) $[OH^-] > [H^+]$

48. A trace element is a dietary element that is needed in very minute quantities for proper growth, development, and physiology of an organism. Which of the following does not represent a trace element ?

(A) Copper

(B) Iron

(C) Zinc

(D) Calcium

49. What type of chemical bond holds the atoms together within a water molecule ?

(A) Hydrogen bond

(B) Polar covalent bonds

(C) Non polar covalent bond

(D) Ionic bond

50. The inductive effect leads to dipolar character in a molecule, it produces dipole moment which :

(A) Increases with the increase in the inductive effect

(B) Increases with the decrease in the inductive effect

(C) Decreases with the increase in the inductive effect

(D) Is not related to inductive effect

51. Water has a high boiling point of 100°C. The higher boiling point of water is due to :

(A) Ionic interactions

(B) Hydrophobic interactions

(C) Intra molecular hydrogen bonds

(D) Inter molecular hydrogen bonds

52. The van der Waal's forces are distance-dependent interactions between atoms or molecules and include attraction and repulsion between atoms, molecules, and surfaces, as well as other intermolecular forces. Which of the following is not true for these interactions ?

(A) They are weaker than normal covalent and ionic bonds

(B) They are additive and cannot be saturated

(C) They have no directional characteristic

(D) They are long-range interactions involving atoms and molecules far away from each other

53. Which of the following compounds will exhibit cis-trans isomerism ?

(A) 2-butyne

(B) 2-butanol

(C) butanal

(D) 2-butene

54. The isomers which can be inter converted through rotation around a single bond are :

(A) Conformers

(B) Diastereomers

(C) Enantiomers

(D) Positional isomers

55. Which of the following molecular formulas corresponds to that of an unsaturated fatty acid ?

(A) $C_{18}H_{35}COOH$

(B) $C_{19}H_{39}COOH$

(C) $C_{16}H_{33}COOH$

(D) $C_{17}H_{35}COOH$

56. The Beer-Lambert Law is :

(A) An inverse relationship between absorbance and solubility of an analyte

(B) A relationship between molecules absorption and molecular weight of a compound

(C) Used to derive a molecular formula from the mass-to-charge ratio

(D) Linear relationship between intensity of absorbance and concentration of the analyte

57. Water is oxidised during the light phase of photosynthesis. Which of the following compounds is reduced ?

(A) CO_2

(B) H_2O

(C) NADP

(D) $NADPH_2$ and CO_2

58. In C4 plants, which of the following compounds is used as a source of CO_2 during Calvin cycle ?

(A) Oxaloacetic acid

(B) Ketoglutarate

(C) Malic acid

(D) Rubilose di phosphate

59. Photosynthesis takes place in the membranes of small sacs called :

(A) Thylakoids

(B) Grana

(C) Photosystems

(D) Photons

60. Macronutrients are the chemical substances that are required for human consumption in large quantities. Which of the following is a macronutrient ?

(A) Calcium

(B) Iron

(C) Cobalt

(D) Ascorbic acid

Sr. No. 332

ENTRANCE TEST-2017

SCHOOL OF BIOLOGICAL SCIENCES

BIOCHEMISTRY

Question Booklet Series **B**

Total Questions : 60
Time Allowed : 70 Minutes

Roll No. : | | | | | | |

Instructions for Candidates :

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SEAL

1. Who created the first rDNA molecule?
   (A) Nathan, Arber and Smith
   (B) Watson, Crick and Wilkins
   (C) Boyer and Cohen
   (D) Paul Berg

2. Below given statements about Agarose gel electrophoresis are true except:
   (A) Bigger fragments of DNA move faster than smaller ones
   (B) DNA/DNA fragments will move towards anode (Positive electrode)
   (C) Ethidium bromide can be used for visualization of DNA
   (D) Super coiled DNA moves faster than nicked DNA

3. The first vaccine developed through animal cell culture was:
   (A) Hepatitis B vaccine
   (B) Influenza vaccine
   (C) Small pox vaccine
   (D) Polio vaccine

4. Cybrids are produced by:
   (A) Fusion of two different nuclei from two different species
   (B) Fusion of two same nuclei from same species
   (C) Fusion of nucleus from one species but cytoplasm from both parent species
   (D) None of the above

5. During the development of the embryo, which of the following occurs first?
   (A) Differentiation of organ
   (B) Differentiation of tissue
   (C) Differentiation of organ system
   (D) Differentiation of cells.

6. Select the correct statement about G1 Phase:
   (A) Cell is metabolically inactive
   (B) DNA in the cell does not replicate
   (C) It is not a phase of synthesis of macromolecules
   (D) Cell stops growing.

7. The transmembrane region of a protein is likely to have:
   (A) A stretch of hydrophilic amino acids
   (B) A stretch of hydrophobic amino acids
   (C) A disulphide loop
   (D) Alternating hydrophilic and hydrophobic amino acids

8. Read the given statements and select the correct option :

Statement 1. In prokaryotes mitochondria are absent.

Statement 2. In prokaryotes mesosomes are present which help in respiration.

   (A) Both the statements 1 & 2 are correct and statement 2 is the correct explanation of statement 1
   (B) Both the statements 1 & 2 are correct and statement 2 is not the correct explanation of statement 1
   (C) Statement 1 is correct but statement 2 is incorrect
   (D) Both statements 1 & 2 are incorrect

9. The ratio of WBC to RBCs is:
   (A) 1 : 60
   (B) 1 : 600
   (C) 1 : 6000
   (D) 1 : 60000

10. Branches of lymph capillaries inside villi of intestine are termed as:
   (A) Lymph nodes
   (B) Thoracic duct
   (C) Thoracic lymph duct
   (D) Lacteals

11. Which one of the following does not constitute a part of single uniferous tubule?
   (A) Distal convoluted tubule
   (B) Collecting duct
   (C) Bowman's capsule
   (D) Loop of Henle

12. The specific region of hypothalamus responsible for physiological sweat secretion is:
    (A) Para- ventricular nucleus
    (B) Supra-Optic nucleus
    (C) Median Eminence
    (D) Pars Distalis

13. Inner mitochondrial membrane contains a transporter of:
    (A) NADH (B) Acetyl -CoA
    (C) ATP (D) NADPH

14. In case of TCA cycle, at which of the following enzyme catalyzed steps occurs the incorporation of water in the intermediate of the TCA cycle?
    (A) Aconitase
    (B) Citrate synthase
    (C) Malate dehydrogenase
    (D) Succinyl- CoA synthase

15. LDL receptors in liver can be detected by :
    (A) Apo B-100 and Apo E
    (B) Apo B-100 and Apo A
    (C) Apo E
    (D) Apo E and Apo A

16. Which of the following is not synthesized from tyrosine?
    (A) Norepinephrine (B) Melatonin
    (C) Thyroxine (D) Dopamine

17. Which of the following statements is true regarding RDA?
    (A) RDA is statistically defined as the 2 standard deviations above the estimated average requirement (EAR)
    (B) RDA is statistically defined as equal to estimated average requirement (EAR)
    (C) RDA is statistically defined as equal to the adequate intake
    (D) RDA is defined as the recommended minimum requirement

18. A child presented with aggressive behavior, joint pain, decreased urine output and self mutilating behavior, Enzyme deficient may be:
    (A) Adenosine deaminase
    (B) HGPR Tase
    (C) APR Tase
    (D) Acid maltase

19. Blood of AB group can not be given to B group patient because:
    (A) Patient has antibodies a
    (B) Patient lacks antibodies b
    (C) Patient lacks antibodies a
    (D) Patient has antibodies b

20. Kidney function tests are being carried out by:
    (A) Urea clearance tests
    (B) Creatinine clearance tests
    (C) Inulin clearance tests
    (D) All of the above

21. At equilibrium,
    (A) No enzymes are functioning
    (B) $\Delta G=0$
    (C) The forward and backward reactions have stopped
    (D) The products and reactants have equal value of H

22. The ratio of two specific heats of air is equal to:
    (A) 0.17
    (B) 0.24
    (C) 1.0
    (D) 1.41

23. Entropy change depends on:
    (A) Heat transfer
    (B) Mass transfer
    (C) Change of temperature
    (D) Thermodynamic state

24. In lead accumulator the electrolyte H_2SO_4 solution is:
(A) 30%
(B) 60%
(C) 80%
(D) 90%

25. Which among the following is the strongest acid ?
(A) $HClO_4$
(B) $HClO_3$
(C) $HClO_2$
(D) $HOCl$

26. If for ammonium formate, $pK_a = 3.78$ and $pK_b = 4.78$, then pH will be equal to:
(A) 6.9
(B) 6.5
(C) 7.3
(D) 6.2

27. One of the best solvent for ionic compounds in accordance of their dielectric constants (D) at 25°C is :
(A) Solvent with, D= 78.5
(B) Solvent with, D= 32.6
(C) Solvent with, D= 24.3
(D) Solvent with, D= 20.7

28. Which metal ion is essential for the action of *Taq Polymerase*?
(A) Zn^{+2}
(B) Mg^{+2}
(C) Both (A) and (B)
(D) Neither (A) nor (B)

29. Which one of the following molecule possesses zero dipole moment?
(A) Para-dichlorobenzene
(B) Chlorobenzene
(C) H_2O
(D) OCl_2

30. Secondary structure of proteins is mainly stabilized by:
(A) Hydrogen bonding
(B) Hydrophobic interactions
(C) Ionic bonding
(D) Covalent bonding

31. The observed dipole moment of nitromethane is higher than the dipole moment calculated from its structural descriptions. It is because of:
(A) Hyperconjugation
(B) Resonance
(C) Inductive effect
(D) None of the above

32. In case of DNA structure, base is connected to deoxy ribose sugar through:
(A) Two hydrogen bonds
(B) A covalent bond
(C) Three hydrogen bonds
(D) None of the above

33. Which among the following alkanes is optically active ?
(A) Propane
(B) 2- methyl butane
(C) 3- methyl hexane
(D) 2,3,4 tri methyl pentane

34. One of the detergents usually used for isolation of DNA from plants is:
(A) SDS
(B) Triton -XI00
(C) CTAB
(D) Sodium stearate

35. At 260 nm, 40 µg/ml of RNA corresponds to absorption unit equaling to:
(A) 1.5
(B) 1.0
(C) 0.5
(D) 0.25

36. Beer-Lambert's law is applicable to:
(A) UV spectroscopy only
(B) Colorimetric analysis only
(C) Visible spectroscopy only
(D) All the above

37. During photosynthesis, the assimilatory powers produced are:
(A) RuBP & RUBISCO
(B) H_2O & O_2
(C) ATP&NADPH
(D) $C_6H_{12}O_6$ & PGAL

38. The function of F_o subunit of ATP synthase is to act as:
(A) Cl^- carrier
(B) Electron carrier
(C) ATPase.
(D) H^+ channel

39. Biological nitrogen fixation occurs when atmospheric nitrogen is converted into ammonia by an enzyme called:
(A) Ammonia synthase
(B) Nitrogenase
(C) ATPase
(D) Glutamate synthase

40. The part of root involved in water absorption is zone of:
(A) Cell division
(B) Root hairs
(C) Elongation
(D) Root caps

41. Which of the following is a primary consumer?
(A) Cow
(B) Euglena
(C) Frog
(D) Wolf

42. Mercury is considered hazardous to human health. It damages brain, kidneys and lungs and also results in various diseases. Mercury pollution is a serious issue because:
(A) Mercury is a pure metal and hard to digest
(B) Mercury accumulates and concentration increases high up the food chain
(C) Mercury is light and easily dispersed by wind
(D) Mercury is very soluble in water and easily absorbed by human body

43. Half life period of a radio isotope depends upon;
(A) Concentration of the radio isotope
(B) Nuclear disintegration constant directly
(C) Nuclear disintegration constant inversely
(D) All of the above

44. Evidence from fossils records are obtained by calculating age of fossil found in:
(A) Metamorphic rocks
(B) Sedimentary rocks
(C) Igneous rocks
(D) Earth crust

45. Which of the following is not the biofertilizer producing bacterium ?
(A) Nostoc
(B) Anabaena
(C) Both (A) and (B)
(D) Clostridium

46. If the doubling time of a bacterium is 30 min, starting with two bacteria initially, the number of bacteria produced in 2 hours will be:
(A) 16
(B) 32
(C) 64
(D) 128

47. Diseases contracted via the gastrointestinal tract are:
(A) Salmonellosis
(B) Shigellosis
(C) Cholera
(D) All of the above

48. Which of the following is capable of oxidizing sulphur to sulphates?
(A) *Thiobacillus thiooxidans*
(B) *Desulfot maculum*
(C) *Rhodospirillum*
(D) *Rhodomicrobium*

49. Which among the following is not a competitive inhibitor?
(A) Iodoacetate
(B) Lovastatin
(C) Azaserine
(D) Allopurinol

50. Which enzyme is having code language as EC : 4.2.1.2 ?
(A) Lactate dehydrogenase
(B) Succinate dehydrogenase
(C) Fumarase
(D) Acetyl choline esterase

51. The lowest level of chromosome organization is:
(A) Solenoid
(B) Nucleosome
(C) 30 nm fiber
(D) None of the above

52. A sex linked trait/disease is:
(A) Color blindness/ hemophilia
(B) Night blindness/ albinism
(C) Myxoedema/beri-beri
(D) Deafness/Tylosis

53. During DNA replication, thymine dimmers formation can be due to:
(A) Gamma radiations
(B) UV radiations
(C) X-Rays
(D) IR radiations

54. A method to detect whether two mutations are located on the same gene or different genes is:
(A) Generalized transduction
(B) Complementation analysis
(C) Hfr mapping
(D) Karyotyping

55. Positively super coiled DNA can be converted into negatively super coiled DNA by:
(A) DNA gyrase
(B) DNA helicase
(C) Single strand DNA binding protein
(D) DNA polymerase

56. The function of sigma subunit of RNA polymerase is to:
(A) Specify the site for transcription
(B) Initiate replication
(C) Provide contact between ribonuclease and DNA template
(D) Terminate transcription

57. Transduction was discovered by:
(A) Griffiths
(B) Zinder and Lederberg
(C) Lederberg, Hayes and Woolman
(D) Iwanowsky

58. DNA of a bacterium is not cleaved by its own restriction enzymes because the recognition DNA sequences are:
(A) Methylated
(B) Deleted
(C) Bound by inhibitory proteins
(D) Not accessible to restriction enzymes

59. The method widely used for transforming *in vitro* animal cell cultures that uses lipid vesicles or liposome is:
(A) Lipotransformation
(B) Liposome mediated transformation
(C) Lipofection
(D) Lipid mediated DNA transfer

60. The term somaclonal variation is associated with:
(A) Plant tissue culture technique
(B) Genetic Engineering
(C) Hybridoma technology
(D) None of the above

Sr. No. 641

ENTRANCE TEST-2016

FACULTY OF BIOLOGICAL SCIENCES

M.Sc. BIOCHEMISTRY

Total Questions : 60
Time Allowed : 70 Minutes

Question Booklet Series **A**

Roll No. : | | | | | | |

Instructions for Candidates :

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SEAL

1. The process of water movement through a plant and its evaporation from the aerial parts like leaves, stems and flowers is called :

   (A) Distillation
   (B) Photosynthesis
   (C) Transpiration
   (D) Respiration

2. Which of the following equations defines the enthalpy (ΔH) for a reaction occurring at constant temperature and pressure ?

   (A) $\Delta H = \Delta U$
   (B) $\Delta H = \Delta G - T\Delta S$
   (C) $\Delta H = q + w$
   (D) $\Delta H = \Delta U + p\Delta V$

3. The effectiveness of soaps is reduced in hard water, as they form insoluble precipitates with mineral salts called soap film or scum . The mineral salts present in hard water that usually contribute to this phenomenon are :

   (A) Sodium and Lithium
   (B) Sodium and Potassium
   (C) Potassium and Cadmium
   (D) Calcium and Magnesium

4. Type II restriction endonucleases are used in recombinant DNA technology and cause :

   (A) Cleavage of DNA at specific sites
   (B) Cleavage of DNA at randomly selected sites
   (C) Cleavage of ends of DNA
   (D) Joining of restricted DNA sequences

5. The emission of which of the following gases in atmosphere leads to acid rains ?

   (A) Sulphur Nitrate and Oxygen
   (B) Sulphur Dioxide and Nitrogen Oxide
   (C) Chloroform and Methane
   (D) Carbon Dioxide and Carbon Tetrachloride

6. Which of the following molecules has no net dipole moment ?

   (A) CH_3Cl
   (B) HCl
   (C) CCl_4
   (D) H_2O

7. A large amount of water is taken up by plants from soil through roots, but only a small fraction of it is utilized in growth and metabolism. The remaining is lost by transpiration. The amount of water lost through transpiration is :

(A) 20 – 50 %
(B) > 95%
(C) < 10%
(D) 55-75%

8. Dipole moment of H_2O is :

(A) 1.87
(B) 1.85
(C) 1.58
(D) 1.82

9. Which of the following compounds will exhibit cis-trans isomerism ?

(A) 2-butene
(B) 2-butyne
(C) 2-butanol
(D) butanal

10. The dietary deficiency of which of the following nutrients can lead to Kwashiorkor disease ?

(A) Vitamins
(B) Proteins
(C) Carbohydrates
(D) Lipids

11. While being grown in a rich medium, the doubling time for most of the Escherichia *coli* strains is :

(A) 020 – 200 seconds
(B) 200 – 300 minutes
(C) 020 – 030 minutes
(D) 002 – 020 hours

12. Water can act as an acid or a base. Identify the reaction below wherein water behaves as a Brönstead Lowry acid :

(A) $NH_4^+ + H_2O \longrightarrow H_3O^+ + NH_3$
(B) $NH_3 + H_2O \longrightarrow NH_4^+ + OH^-$
(C) $2H_2O \longrightarrow 2H_2 + O_2$
(D) $HC1 + H_2O \longrightarrow 2H_3O^+ + Cl^-$

13. Which of the following is required for the fusion of two protoplasts ?

(A) Polyacrylamide
(B) Polyethylene glycol
(C) Agar agar
(D) Pectinase

14. Which of the following is the most plausible site for protein synthesis in the cell ?

(A) Lysosome
(B) Endoplasmic reticulum
(C) Cytoplasm
(D) Nucleus

15. Most of the reactions of the Citric acid cycle occur in :

(A) Inner mitochondrial membrane
(B) Plasma membrane
(C) Mitochondrial matrix
(D) Cytoplasm

16. Which of the following fatty acids is not synthesized in the body and has to be supplied in the diet?

(A) Palmitic acid
(B) Palmitoleic acid
(C) Lauric acid
(D) Linolenic acid

17. In which of the following restriction modification systems, the restriction and modification activities are present separately and not in the form of a complex ?

(A) Type II
(B) Type III
(C) Type IV
(D) Type I

18. Which of the following has the highest electronegativity ?

(A) Sodium
(B) Berellium
(C) Chlorine
(D) Fluorine

19. In animal cells, which of the following enzymes in the TCA cycle catalyzes the reaction in which one molecule of GTP is synthesized ?

(A) Fumarase
(B) Aconitase
(C) Citrate synthase
(D) Succinyl CoA synthetase

20. Which of the following is added to the 3′ end of eukaryotic mRNAs after the transcription ?

(A) Polyphosphate
(B) Modified Guanosine cap
(C) CCA
(D) Poly A tail

21. Which of the following amino acids will have the highest contribution in the absorption spectrum of a protein in the ultra violet region, when present in equal concentrations ?

(A) Tryptophan
(B) Serine
(C) Phenylalanine
(D) Tyrosine

22. Golden rice is the recombinant transgenic rice plant recommended for people with Vitamin A deficiency. Which of the following is produced in lager quantities in this recombinant rice variety ?

(A) Niacin
(B) Vitamin K
(C) Biotin
(D) β-Carotene

23. The native three dimensional structure of a protein consisting of a single polypeptide chain is refered to as its :

(A) Primary structure
(B) Tertiary structure
(C) Quaternary structure
(D) Secondary structure

24. The globular proteins in general have an inner hydrophobic core and an outer hydrophilic surface. Which of the following amino acid residues will more often be present in the inner core than along the surface of their native structures ?

(A) Isolecucine
(B) Threonine
(C) Asparagine
(D) Serine

25. Which of the following is classified as a macronutrient ?

(A) Water
(B) Calcium
(C) Iodine
(D) Vitamin C

26. Immunological unresponsiveness to self antigens is called :

(A) Hypersensitivity
(B) Acquired immunity
(C) Allergy
(D) Tolerance

27. The process of introduction of foreign DNA into an animal cell is called :

(A) Transversion
(B) Transfection
(C) Conversion
(D) Inversion

28. The principal natural phenomena that contributes acid-producing gases to the atmosphere are emissions from :

(A) Lightning
(B) Volcanic eruptions
(C) Motor vehicles
(D) Fossil fuel

29. Which of the following keto products is formed during the transamination of alanine ?

(A) Oxaloacetate
(B) α-keto-glutarate
(C) Acetone
(D) Pyruvate

30. Which of the following nucleic acids has a left handed helical structure ?

(A) Z DNA
(B) B DNA
(C) A DNA
(D) C DNA

31. The isomers which can be inter converted through rotation around a single bond are called :

(A) Enantiomers
(B) Positional isomers
(C) Diastereomers
(D) Conformers

32. In which of the following phases of the cell cycle does the replication of DNA occur ?

(A) S phase
(B) M phase
(C) G1 phase
(D) G 2 phase

33. On moving across the period from left to right the electronegativity of atoms :

(A) Increases
(B) Decreases
(C) Remains constant
(D) Fluctuates

34. Which of the following analytes are routinely determined for assessment of the Kidney function ?

(A) Bilirubin and sugar
(B) Albumin and lipase
(C) Urea and creatinine
(D) Plasma total protein

35. Which of the following is responsible for motility of bacteria ?

(A) Flagella
(B) Capsule
(C) Sheath
(D) Pilli

36. Which of the following types of proteins are most often stabilized by disulfide bonds ?

(A) Multisubunit proteins
(B) Transmembrane proteins
(C) Intracellular proteins
(D) Extracellular proteins

37. Which of the following molecules adds stability to the bilayer plasma membrane ?

(A) Receptor proteins
(B) Glycoprotein
(C) Glycolipid
(D) Cholesterol

38. Which of the following sites normally lacks a commensal flora ?

(A) Female genital tract
(B) Intestine
(C) Trachea
(D) Appendix

39. The thyroid gland is located at the base of the neck and produces several hormones. Which of the following hormones is **NOT PRODUCED** by the thyroid gland ?

(A) Thyroid stimulating hormone (TSH)
(B) Triiodothyronine (T3)
(C) Calcitonin
(D) Thyroxine (T4)

40. Which of the following parts of human brain is involved in regulation of body temperature ?

(A) Hypothalamus
(B) Medulla oblongata
(C) Cerebrum
(D) Cerebellum

41. Which of the following molecules is unlikely to form hydrogen bonds ?

(A) NH_3
(B) CH_3OCH_3
(C) CH_3COOH
(D) CH_3OH

42. Which of the following phenomena occurs across the trophic levels ?

(A) Bioconcentration
(B) Biodegradation
(C) Biomagnification
(D) Bioaccumulation

43. Which one of the following interactions is **not** associated with van der Waal's forces ?

(A) Dipole - dipole interactions
(B) Dipole - induced dipole interactions
(C) Induced Dipole - induced dipole interactions
(D) Hydrophobic interactions

44. Lymphocytes are formed and mature in primary lymphatic organs. Which one of the following is a primary lymphatic organ ?

(A) Lymph nodes
(B) Bone marrow
(C) Tonsils
(D) Spleen

45. During protein synthesis and targeting, most probable site where a signal peptide is likely to be cleaved from a pre-protein is :

(A) Mitochondria
(B) Endoplasmic reticulum
(C) Nucleus
(D) Ribosome

46. A point mutation in which a thymine residue is replaced by an Adenine is called as :

(A) Frame shift
(B) Transversion
(C) Transition
(D) Translocation

47. For a spontaneous change in a system at constant temperature and pressure, which of the following will hold true about the free energy change ?

(A) $\Delta G = \Delta H$
(B) $\Delta G = 0$
(C) $\Delta G > 0$
(D) $\Delta G < 0$

48. Which of the following describes the process wherein bacteriophages mediate transfer of bacterial DNA from one cell to another ?

(A) Transduction
(B) Replication
(C) Transformation
(D) Conjugation

49. "When an isolated system undergoes a spontaneous change, the entropy of the system will increase." This statement defines :

(A) Second Law of Thermodynamics
(B) First Law of Thermodynamics
(C) Zeroth Law of Thermodynamics
(D) Third Law of Thermodynamics

50. Which of the following subunits of DNA polymerase III is required during initiation of replication in prokaryotes but not during the elongation phase ?

(A) Gamma (γ)
(B) Alpha (α)
(C) Beta (β)
(D) Sigma (σ)

51. In animal cells, uric acid is the metabolic degradation product of :

(A) Guanine
(B) Creatinine
(C) Cytosine
(D) Thymine

52. Which of the following soil components is classified as a micronutrient ?

(A) Potassium
(B) Phosphorous
(C) Nitrogen
(D) Iron

53. The tendency of an atom to attract a shared pair of electrons towards itself in a molecule is called its :

(A) Electron cooperativity
(B) Electrolysis
(C) Inductive effect
(D) Electronegativity

54. Which of the following has the probability of causing a frame shift mutation ?

(A) Transversion
(B) Deletion
(C) Transition
(D) All of the above

55. Which of the following phenomenon is mainly responsible for the entry of water from soil into the root hair ?

(A) Transpiration
(B) Osmosis
(C) Guttation
(D) Evaporation

56. In thermodynamic terms, which of the following conditions holds true for an isolated system ?

(A) The system allows exchange of heat but not material
(B) The system has reached thermal equilibrium with its surroundings
(C) The system is open to the exchange of energy and matter
(D) Neither matter nor heat can pass into or out of the system

57. Which of the following is a non reducing disaccharide ?

(A) Maltose
(B) Sucrose
(C) Lactose
(D) Trehalose

58. Photosynthesis takes place in the membranes of small sacs called :

(A) Thylakoids
(B) Photosystems
(C) Grana
(D) Lysosomes

59. The end products of glycolytic pathway include all of the following **EXCEPT** :

(A) ATP
(B) Pyruvate
(C) NADH
(D) Inorganic phosphate

60. Energy flow in an ecosystem is :

(A) Multidirectional
(B) Random
(C) Bidirectional
(D) Unidirectional

M.Sc. Biochemistry/E

1. The type of delocalization involving sigma bond orbitals is called :
   (A) Resonance
   (B) Inductive effect
   (C) Hyper conjugation
   (D) None of the above

2. In case of hypophoshorus acid, the number of hydrogen atom(s) attached to phosphorus is :
   (A) One
   (B) Two
   (C) Three
   (D) Zero

3. Which among the following molecules show geometrical isomerism ?
   (A) Isopropylene
   (B) Propene
   (C) 1, 2-dibromobutene
   (D) 1-butene

4. Tick odd one out on the basis of their chemical nature :
   (A) SDS
   (B) Triton – X 100
   (C) CTAB
   (D) Sodium stearate

5. Proteins absorb in UV region at 220 nm and 280 nm. At 220 nm the absorption could be mainly due to the presence of :
   (A) Peptide bonds
   (B) Aromatic amino acids
   (C) Aliphatic amino acids
   (D) None of the above

6. CD-spectrum is observed only when molecule is :
   (A) Optically active
   (B) In helix form
   (C) In sheet form
   (D) Planar

7. During photosynthesis, photolysis of water is one very important step and requires :
   (A) Mn^{+2}
   (B) Cl
   (C) Mg^{+2}
   (D) Both (A) and (B)

8. F_o subunit of ATPase acts as :
   (A) H^+ channel
   (B) Cl carrier
   (C) Electron carrier
   (D) ATPase

SEAL

9. During biological nitrogen fixation, the number of ATPs required to convert one N_2 to $2NH_4^+$ is :

(A) 8 ATP (B) 12 ATP

(C) 14 ATP (D) 16 ATP

10. Transpiration pull depends on :

(A) The very negative water potential of the atmosphere

(B) Cohesion of water molecules to each other

(C) Capillarity

(D) Adhesion of water molecules to the walls of phloem cells

11. The term "Ecology" (ockologie) was coined by :

(A) Linnaeus (B) A.G. Tansely

(C) Haeckel (D) None of the above

12. Most dangerous metal pollutant of automobile exhausts is :

(A) Hg (B) Cu

(C) Cd (D) Pb

13. Rate of disintegration of a radio isotope depends upon :

(A) Concentration of the radio isotope

(B) Nuclear disintegration constant

(C) Both (A) and (B)

(D) Neither (A) nor (B)

14. Evidences of evolutionary relationship is found in :

(A) Rocks (B) Fossils

(C) Ocean beds (D) Atmosphere

15. Polio virus is one of the smallest viruses with diameter of :

(A) 0.1 mμ (B) 1 mμ

(C) 30 mμ (D) 100 mμ

16. If the doubling time of a bacterium is 30 min, starting with two bacteria initially, the number of bacteria produced in 3 hours will be :

(A) 16 (B) 32

(C) 64 (D) 128

17. Which of the following statements is true ?

(A) The primary goal of a pathogen is to kill its host

(B) A successful pathogen does not kill its host before it is transmitted

(C) A successful pathogen never kills its host

(D) Evolution selects for the most virulent pathogen

18. *Coliforms* are used as indicator organisms of sewage pollution because :

(A) They are pathogens

(B) They ferment lactose

(C) They are abundant in human intestines

(D) They grow in 48 hours

19. Inulin is a :

(A) Polysaccharide (B) Trisaccharide

(C) Hormone (D) None of the above

SEAL

20. In case of un-competitive inhibition of enzymes :

(A) K_M increases (B) V_{max} increases

(C) Both K_M and V_{max} decrease (D) No change in K_M

21. Which among the following contains thymine ?

(A) DNA (B) m-RNA

(C) t-RNA (D) r-RNA

22. Which among the following is wrong statement about histones ?

(A) Histones are very similar between species

(B) Histones have many basic amino acids

(C) Histones are rich in lysine and arginine

(D) Each histone has one single gene that codes for it

23. When all or a piece of a chromosome becomes attached to another chromosome, then the aberration is called a/an :

(A) Inversion (B) Translocation

(C) Deletion (D) Duplication

24. E.coli, DNA ligase requires :
    (A) FAD as an electron acceptor
    (B) $NADP^+$ as a phosphate donor
    (C) NAD^+ to form an active adenyl enzyme
    (D) NAD^+ as an electron acceptor

25. One of the bacterial enzymes which converts positively super coiled DNA in to negatively super coiled DNA is :
    (A) DNA gyrase
    (B) DNA helicase
    (C) Single strand DNA binding protein
    (D) DNA polymerase

26. The sex determination symbol is XXY in the human beings with _____ syndrome.
    (A) Turner's (B) Down's
    (C) Male Klinefelter's (D) Female Klinefelter's

27. Transduction in bacteria is mediated by :
    (A) Plasmids vectors (B) Cosmids vectors
    (C) F-factors (D) Phage vectors

28. Bacteria prevent themselves from viruses by fragmenting viral DNA upon entry with :
    (A) Methylases (B) Restriction endonuclases
    (C) Ligases (D) Exonucleases

29. Which among the following is not the requirement for PCR ?
    (A) *Taq* polymerase (B) dNTPs
    (C) $MgCl_2$ (D) Lactose

30. Haberlandt is associated with :
    (A) Plant tissue culture (B) Hybridoma technology
    (C) Recombinant DNA technology (D) None of the above

31. For construction of _____, shotgun approach can be used.

(A) cDNA library
(B) Genomic library
(C) Both (A) and (B)
(D) Neither (A) nor (B)

32. Which is wrong about agarose gel electrophoresis ?

(A) Bigger fragments of DNA move faster than smaller ones
(B) DNA/DNA fragments will move towards anode (Positive electrode)
(C) Ethidium bromide can be used for visualization of DNA
(D) Supercoiled DNA moves faster than nicked DNA

33. Vaccine is a :

(A) Collection of antibiotics
(B) Collection of saving drugs
(C) Collection of killed disease bacteria and viruses
(D) Collections of lysins

SEAL

34. The aim of hybridoma technology is to :

(A) Produce polyclonal antibody
(B) Produce monoclonal antibody
(C) Create site directed mutagenesis
(D) Clone a gene

35. Skull develops from :

(A) Ectoderm
(B) Mesoderm
(C) Endoderm
(D) Ecto and endoderm

36. While pricking an unfertilized egg with a micro needle, it will :

(A) Start dividing
(B) Die immediately
(C) Remain undivided
(D) None of the above

37. From following given characteristics, which one is not a distinguished characteristics of Prokaryotic cells ?

(A) They usually have a single, circular DNA (Chromosome)
(B) They lack membrane enclosed organelles
(C) They have cell walls containing peptidoglycan
(D) They lack a plasma membrane

38. Cells receiving proper signal, usually divide at :

(A) G_1 phase (B) G_2 phase

(C) S phase (D) M phase

39. The total protein content present in plasma under normal conditions is :

(A) 2 – 4 g/100 ml (B) 6.3 – 7.8 g/100 ml

(C) 0.2 – 0.4 g/100 ml (D) 10 – 12 g/100 ml

40. Nerve tissues constitute about _____ of the body weight.

(A) 4.8% (B) 2.4%

(C) 1.2% (D) 0.6%

41. Which amino acid is contributing for the buffering action of Hb near physiological pH ?

(A) Lysine (B) Glutamine

(C) Histidine (D) Proline

42. If cells are not receiving enough oxygen, then a hormone signals the bone marrow to produce more :

(A) Leukocytes (B) Platelets

(C) Plasma (D) Erythrocytes

43. The Warburg-Dickens pathway is also called as :

(A) Pentose phosphate pathway (B) Glycolysis

(C) Glucouronic acid pathway (D) None of the above

44. Out of 38 ATP molecules produced per glucose, 32 ATP are formed from $(NADH^+ + H^+)/FADH_2$ in :

(A) Respiratory chain (B) Krebs's cycle

(C) Oxidative decarboxylation (D) None of the above

45. Lovastatin is competitive inhibitor of :

(A) Succinate dehydrogenase

(B) Citrate synthase

(C) Glycerol phosphate dehydrogenase

(D) HMG CoA reductase

46. For the formation of one urea molecule, _____ are utilized.
(A) 2 ATP
(B) 3 ATP
(C) 4 ATP
(D) 1 ATP

47. Kidney function tests are being carried out by :
(A) Urea clearance tests
(B) Creatinine clearance tests
(C) Inulin clearance tests
(D) All of the above

48. The BMR of a normal adult person with 72 kg weight and 1.7 m^2 surface areas will be :
(A) 2200 calories/day
(B) 1600 calories/day
(C) 3200 calories/day
(D) 4200 calories/day

49. Normal reference range for PSA is 1—5 mg/L. Values higher than 10 mg/L is indicative of :
(A) Cardiac infarction
(B) Lung cancer
(C) Prostate cancer
(D) Liver enlargement

50. Which among following antibody has low carbohydrate content ?
(A) IgG
(B) IgM
(C) IgD
(D) IgA

51. Which among the following is wrongly matched ?
(A) ΔS ... Joules/mole/Kelvin
(B) ΔS ... Joules/mole/sec.
(C) ΔH ... Joules/mole
(D) ΔH ... Calories/mole

52. A system absorbs 20 kJ of heat and also does 10 kJ of work. The net internal energy of the system :
(A) Increases by 10 kJ
(B) Decreases by 10 kJ
(C) Increases by 30 kJ
(D) Decreases by 30 kJ

53. The sign of ΔG for a spontaneous reaction is :
(A) Always (+ve)
(B) Always (–ve)
(C) Always (+ve) with exception to reactions like photosynthesis
(D) Always (– ve) with exception to reactions like photosynthesis

54. The laws of electrolysis were proposed by :

(A) Kohlrausch (B) Faraday

(C) Daniel (D) Nernst

55. $B(OH)_3$ when dissolved in water will act as a/an :

(A) Base (B) Acid

(C) Salt (D) None of the above

56. The maximum buffering capacity of a buffer is :

(A) 1 pH unit below its pK

(B) 1 pH unit above its pK

(C) Near its pK

(D) pK has no concern with the buffering capacity of a buffer

57. If the electronegativity between two elements A and B is 1.7, then the % ionic character of the bond between them is about :

(A) 51 (B) 58

(C) 72 (D) 17

58. Zn^{+2} is essential for the biological activity of :

(A) Carbonic anhydrase (B) Insulin

(C) Both (A) and (B) (D) Neither (A) nor (B)

59. The numbers of π bonds in naphthalene are :

(A) 2 (B) 3

(C) 5 (D) 6

60. In a fat, the fat molecules are associated through :

(A) Hydrogen bonding (B) Hydrophobic interactions

(C) Ionic bonding (D) Covalent bonding

1. For the formation of double helical DNA from its single strands in a solution, which of the following is not applicable ?
   (A) The entropy of the surrounding is increased
   (B) The entropy of the solution is increased
   (C) Appreciable enthalpy change results
   (D) Does not obey second law of thermodynamics

2. Biological systems make the thermodynamically unfeasible reactions possible by :
   (A) Manipulating the concentrations of products and reactants such that free energy change favors the reaction to occur
   (B) Coupling them to the hydrolysis of ATP
   (C) Coupling them with exergonic reactions via a common intermediate
   (D) All of the above

3. The entropy may be expressed as a function of :
   (A) Pressure and temperature
   (B) Temperature and volume
   (C) Heat and work
   (D) All of the above

4. On passing electric current through aqueous solutions of the following substances, which one shall decompose ?
   (A) Urea
   (B) $AgNO_3$
   (C) Glucose
   (D) Ethyl alcohol

5. pH of a solution is defined as $pH = -\log [H^+]$, where $[H^+]$ is in units of :
   (A) Molarity
   (B) Molality
   (C) Normality
   (D) Normality or Molality

6. Single strands of a DNA molecule separate at :
   (A) High pH
   (B) Low pH
   (C) High temperature
   (D) All of the above

7. Most of the important functional groups in biological molecules contain :
   (A) Oxygen and a phosphate
   (B) Oxygen and/or nitrogen and are acidic
   (C) Nitrogen and a phosphate
   (D) Oxygen and/or nitrogen and are polar

8. Essential trace elements in biological systems can play following role/s :
   (A) They can behave as macrominerals and can serve as structural components
   (B) They can participate in the catalysis of group-transfer reactions
   (C) They can participate in oxidation-reduction reactions
   (D) All of the above

9. The ion that is isoelectronic with CN^- is :
   (A) CO
   (B) O_2^+
   (C) O_2^-
   (D) N_2^+

10. Which of the following is the effect of electron displacement in a molecule ?
   I. Inductive effect
   II. Electrometric effect
   III. Resonance or mesmeric effect
   IV. Hyperconjugation
   (A) I and II
   (B) I, II and III
   (C) II, III and IV
   (D) I, II, III and IV

11. The biggest impact dipole interactions have on living organisms is :
   (A) In form of protein folding
   (B) Antigen recognition and antibody production
   (C) Cell-cell communication
   (D) All of the above

12. The nonpolar molecules comparatively show an increased tendency to associate with one another in water, this tendency is because of :
   (A) Relaxing the ordered arrangement of water molecules around the nonpolar molecules
   (B) Hydrophilic effect due to induction of electronic displacements in nonpolar molecules
   (C) Hydrogen bonding with water molecules
   (D) All of the above except C

13. Which of the following is true ?
   (A) Maleic acid and Fumaric acid are geometric isomers
   (B) Maleic acid is cis isomer and fumaric acid is trans isomer
   (C) These configurations are possible due to presence of a double bond
   (D) All of the above

14. In RS system of nomenclature each group attached to the chiral carbon is assigned a priority. The sequence in which the priorities are assigned is as :

(A) $-OCH_3 > -OH > -COOH > -NH_2 > -H$

(B) $-OCH_3 > -NH_2 > -H > -OH > -COOH$

(C) $-OCH_3 > -OH > -NH_2 > -COOH > -H$

(D) $-H > -NH_2 > -COOH > -OH > -OCH_3$

15. Antimicrobial action of the soaps is because :

(A) they act as surfactants (B) their pH is alkaline

(C) alter the cell membranes (D) all of the above

16. Why is it generally preferable to use absorbance as a measure of absorption rather than % transmittance ?

(A) Because % T cannot be measured as accurately as absorbance

(B) Because % T is dependent on the power of the incident radiation

(C) Because absorbance is proportional to the concentration of the analyte, whereas % T is not

(D) None of the above

17. The light reaction of photosynthesis can be summarized as :

(A) Light is absorbed and the energy is used to drive electrons from water to generate NADPH and to drive the protons across a membrane. The protons return through ATP synthase to make ATP

(B) Light is absorbed and the energy is used to drive electrons from water to generate $NADP^+$ to make ATP

(C) Light is absorbed and the energy is used to drive electrons from NADPH to make glucose and to drive the protons across a membrane to make ATP

(D) None of the above is correct

18. For production of one oxygen molecule, we need absorption of :

(A) 2 photons (B) 4 photons

(C) 8 photons (D) 12 photons

19. Match them :

a.	Complex I	1.	Q-cytochrome C oxidoreductase
b.	Complex II	2.	Coenzyme Q
c.	Complex III	3.	Succinate-Q reductase
d.	Complex IV	4.	NADH-Q oxidoreductase
e.	Ubiquinone	5.	Cytochrome-C oxidase

(A) a – 1; b – 2; c – 3; d – 4; e – 5 (B) a – 4; b – 1; c – 3; d – 5; e – 2

(C) a – 2; b – 3; c – 1; d – 5; e – 4 (D) a – 4; b – 3; c – 1; d – 5; e – 2

20. Water is lost in a liquid state in some plants through hydathodes. These hydathodes :

(A) Remain closed at night
(B) Remain closed during day
(C) Remain always open
(D) Don't show any specificity in opening and closing

21. The Red Data Book maintains a record of the :

(A) Extinct plants and animals species
(B) Relationship between man and flora and fauna in atmosphere
(C) Forest wealth in the developing world
(D) Plants and animals which are known to be endangered

22. The tropical forests in India are located in :

(A) Himachal Pradesh (B) Jammu and Kashmir
(C) Andamans (D) Orissa

23. The most visually striking evidence of global warming is :

(A) The increased precipitation along the Gulf coast states
(B) Highly varying temperature fluctuations felt during the winter months
(C) Rapid melting of glacial ice on nearly every continent
(D) All of the above

24. Nitrogen fixation involves :

I. Microorganisms and ATP
II. Powerful reductant, reduced ferredoxin
III. Iron-molybdenum cluster in nitrogenase
IV. Conversion of N_2 to NH_3

(A) I and II (B) I, II, III and IV
(C) I, III and IV (D) I, II and III

25. Viral genome can be :

(A) Single or double stranded RNA or DNA
(B) Both RNA and DNA together
(C) Always linear
(D) All of the above

26. In Viral infection, cellular injury may be because of :

I. Early non-structural proteins shut down the DNA and protein synthesis of host.

II. Large amount of viral macromolecular accumulation distort the cellular structure and exert toxic effects.

III. Permeability of the membranes may be altered, releasing lysosomal enzymes and leading to autolysis.

IV. Fusion of the cell membranes and formation of polykaryocytosis or syncytium due to alteration in membranes by viral infection.

(A) All the above except IV

(B) All of the above except III and IV

(C) All of the above include in the reasons that cause cellular damage

(D) None of the above

27. The physical factors that influence microbial growth are :

(A) Temperature, oxygen, pH and hydrostatic/osmotic pressure

(B) Temperature, host cell contents, availability of nutrients etc.

(C) Genes and host organism's nutritional and immunological features

(D) All of the above

28. Which of the following is incorrect ?

(A) Genetic engineering is an out growth of studies in bacterial generic recombination

(B) Plasmid can be isolated from a bacterial cell, spliced with foreign genes

(C) DNA probes can be used to detect pathogens

(D) Recombination implies a non-horizontal transfer of DNA fragments between bacterial cells

29. The basis of the preference of L amino acids used in proteins include :

(A) D amino acids are more soluble

(B) L amino acids are more soluble

(C) Enzymes that can use D amino acids for proteins synthesis are unavailable

(D) None of the above

30. Which of the following pairs of sugars consists of epimers ?

I. D-glyceraldehyde and dihydroxyacetone

II. D-glucose and D-mannose

III. D-ribose and D-ribulose

IV. D-galactose and D-glucose

(A) All pairs are epimers

(B) III and IV are epimer pairs

(C) II and IV are epimer pairs

(D) I and IV are epimer pairs

31. The stacking of base pairs in DNA contributes to stability of the double helix by :
    (A) Stacking forces, which come to existence due to hydrophobic effect that results into stacking of bases on top of one another
    (B) Hydrogen bonding and van der Waals forces
    (C) Covalent and hydrogen bonding
    (D) None of the above

32. Which of the following is true regarding membrane fluidity in animals ?
    (A) Cholesterol by interacting with phospholipids non specifically regulate membrane fluidity
    (B) Cholesterol can also specifically interacting with membrane components in highly dynamic regions, lipid rafts and affect membrane fluidity
    (C) The transition temperature depends on the length of the fatty acids chains and on their degree of unsaturation
    (D) All of the above

33. Recombinant DNA technology creates specific mutations which are feasible in vitro by making directed changes as :
    (A) Deletions
    (B) Insertions
    (C) Substitutions
    (D) All of the above

34. What is the linking number of a 5000 bp circular duplex DNA molecule with a nick in one strand ?
    (A) Will have no linking number
    (B) 476
    (C) 460
    (D) 464

35. Which of the following is correct ?
    (A) DNA polymerases are unable to correct errors and this does not prevent mutation in daughter cell
    (B) RNA polymerase have quite limited proof reading capacity and even if an error in transcription happens will affect a single protein molecule and cell will be normal
    (C) Both DNA and RNA polymerases have a strong editing and proof reading functions that prevent all possible errors
    (D) More mutations are possible in DNA replication than in transcription

36. Pick up the wrong statement :
    (A) IF-2 and eIF2 facilitate the binding of initiating Met-tRNA to ribosomal subunits in bacteria and eukaryotes, respectively
    (B) IF-1 prevents premature binding of tRNA to A site
    (C) eIF5 promotes dissociation of other factors from 40S subunit as a prelude to association of 60S subunit to form 80S initiation complex
    (D) eIF4B binds to 23S rRNA and prevents incorporation of wrong amino acid loaded tRNA

37. The defective transducing particles cannot initiate the normal viral infection because :
    (A) They do not contain viral DNA
    (B) They don't contain host DNA
    (C) Host cell develops resistance against such viruses
    (D) All of the above

38. Which of these is a correct description of a form of genetic recombination in bacteria ?
    (A) Crossing-over occurs between paired chromosomes in meiosis
    (B) Conjugation occurs when a cell passes DNA to another cell by means of a sex pilus
    (C) Transformation occurs when a bacteriophage carries a bit of DNA from a previous host cell to a new host cell
    (D) Transduction occurs when a live bacterium picks up DNA from dead bacteria that have shed it into the environment of the living cell

39. The restriction enzymes cut up invading viral DNA, but not host cell's own DNA because :
    (A) Almost all restriction enzymes are paired with methylases that recognize and methylate the same DNA sites for protection
    (B) During replication DNA suffers damage due to restriction digestion
    (C) Methylated DNA in Bacteria does not go for replication
    (D) All of the above

40. What is an enrichment culture ?
    (A) Something that provides growth for all microorganisms
    (B) Something that inhibits growth for all microorganisms
    (C) An infectious culture
    (D) Something that provides growth for a certain microorganism but not for others

41. The rapid progress in biotechnology was possible due to :
    I. Restriction enzymes and blotting techniques
    II. DNA sequencing and solid phase synthesis of nucleic acids
    III. Polymerase chain reaction and computation
    IV. Discovery of small RNAs
    (A) All of the above
    (B) I and IV
    (C) II and IV
    (D) I, II and III

42. Gene's function is probed by :

(A) Gene knockout
(B) RNA interference
(C) Both of the above
(D) None of the above

43. Cloning vectors, a class of plasmids are suitable for rapid insertion and replication of inserts because :

(A) The creative placement of antibiotic resistance genes or reporter genes or both in these vectors help rapid identification of insert harboring vector
(B) Are vectors that can accommodate an inserts of human chromosome size
(C) Does not need to have an antibacterial resistance gene
(D) Just need promoter sequences for rapid identification

44. Which of the following bacterium is considered as 'natural genetic engineer' ?

(A) *Pseudomonas putida*
(B) *Thermos aquaticus*
(C) *Agrobacterium tumefaciens*
(D) *Agrobacterium radiobactor*

45. A cell preparing to enter mitosis is subjected to UV irradiation, arrests in G_2. Which of the proteins are involved in this cell cycle arrest :

(A) ATR kinase and ChK1
(B) Cdc25 and Cdk
(C) All of the above
(D) None

46. One of the ways of controlling cell cycle by a cell is regulation of Cdk activity, which can happen by :

(A) Use of inhibitors like Sic1 in yeast
(B) Regulating concentration of cyclins
(C) Subcellular localization
(D) All of the above

47. Which of the following are functions of cell membranes ?

I. Compartmentalization
II. Scaffold for biochemical activities
III. Intercellular interaction
IV. Energy transduction

(A) All but IV are functions of cell membrane
(B) All but III are functions of cell membrane
(C) All but II are functions of cell membrane
(D) All (I, II, III and IV) are functions of cell membranes

48. Which of the following metal pairs (in ionic form) have a role in mitochondrial electron transport ?

(A) Calcium and magnesium
(B) Zinc and iron
(C) Iron and copper
(D) Selenium and copper

49. Which of the following is the most abundant protein type in blood ?

(A) Globulins
(B) Albumins
(C) Fibrinogen
(D) Clotting factors

50. Which of the following tissues is most dependent upon a constant blood supply of glucose ?

(A) Liver
(B) Brain
(C) Skeletal muscle
(D) Cardiac muscle

51. Most of the CO_2 that is transported in blood :

(A) Is dissolved in the plasma
(B) Is bound to hemoglobin
(C) Is in carbonic acid form
(D) Is in bicarbonate ion form

52. Which of the following statements is not true of the endocrine system ?

(A) It is one of two major regulatory systems of the body and it influences and is influenced by the nervous system
(B) It is composed of glands that secrete chemical messengers into the blood
(C) It is an important regulator of homeostatic mechanisms
(D) None of the above

53. Which of the following statements concerning energy storage in the body is true ?

(A) Most is stored in the form of ATP
(B) Most is stored in the form of glucose
(C) Most is stored in the form of fat
(D) Most is stored in the form of protein

54. In animals which of the following cannot be used as a non-carbohydrate precursor of gluconeogenesis ?

(A) Lactate
(B) Amino acids
(C) Glycerol
(D) Fatty acids

55. In glycogen synthesis, glycogenin :

(A) Serves as primer as RNAs in DNA synthesis
(B) Is glycosyltransferase
(C) Is in core of a glycogen molecule when synthesized
(D) All of the above

56. Urea cycle is linked to :

(A) Glycolysis
(B) Gluconeogenesis
(C) Pentose phosphate pathway
(D) Beta oxidation

57. Associate them :

1.	Excessive urate	a.	Spina bifida
2.	Lack of adenosine deaminase	b.	Immunodeficiency
3.	Lack of folic acid	c.	First step in pyrimidine synthesis
4.	Single ring	d.	Gout
5.	Carbamoyl phosphate	e.	Pyrimidine

(A) 1-d; 2-a; 3-b; 4-e; 5-c
(B) 1-d; 2-b; 3-a; 4-c; 5-e
(C) 1-d; 2-b; 3-a; 4-e; 5-c
(D) 1-d; 2-a; 3-b; 4-c; 5-e

58. Which of the following does not protect body surfaces ?

(A) Skin and mucus
(B) Gastric acid
(C) Salivary amylase
(D) Gut microflora

59. This nutrient is needed for a healthy immune system and strong connective tissue :

(A) Fiber
(B) Vitamin K
(C) Vitamin C
(D) Fluoride

60. Your alkaline phosphatase level may be higher than normal in following conditions except :

(A) You have a liver infection such as viral hepatitis
(B) You have a blockage in your liver or gallbladder caused by gallstones or a tumor
(C) You have a bone disease
(D) You have anemia

M.Sc. Biochemistry/B

1. When chromosome sets are present in multiple of 'n', the condition is termed as :
   (A) Aneuploidy (B) Euploidy
   (C) Haploidy (D) Diploidy

2. An ideal cloning vector should have following characteristics :
   (A) It should have its own origin of replication
   (B) It should be small in size
   (C) It should have an antibiotic resistant site
   (D) All of the above

3. Kary Mullis is associated with the discovery of :
   (A) SDS- PAGE (B) Gel chromatography
   (C) PCR (D) Western blotting

4. The DNA probe, 3'-GGCTTA, will hybridize with which of the following ?
   (A) 5'-CCGUUA (B) 5'-CCGAAT
   (C) 5'-GGCTTA (D) 3'-CCGAAT

5. Which among the following is considered to be the nature's best genetic engineer ?
   (A) *Agro bacterium* (B) *E.Coli*
   (C) *Rhizobium* (D) None of the above

6. Exchange of germplasm is carried out preferably through shoot tip culture because they are :
   (A) Virus free
   (B) Germplasm is present at shoot tip only
   (C) Shoot tip is disease free
   (D) All of the above

7. Seed banks, orchards, tissue culture and cryopreservation are related most closely to :
   (A) Gene clone only (B) Agriculture
   (C) Gene banks (D) Genetics

8. Which among the following is/are DNA polymerase ?
   (A) taq (B) vent
   (C) pfu (D) All of the above

9. DNA as a Genetic material has been proved through :
   (A) Transformation experiments (B) Transduction experiments
   (C) Both (A) and (B) are correct (D) Both (A) and (B) are incorrect

10. During the ovulatory phase, the structure called corpus luteum is formed from :
   (A) Ruptured graafian follicle (B) Epididymis
   (C) Isogametes (D) Endometrium

11. Colleterial gland is found in :
   (A) Male cockroach (B) Female cockroach
   (C) Both (A) and (B) are correct (D) None of the above

12. RUBISCO is abundant in :
   (A) Chloroplasts (B) Golgi bodies
   (C) Mitochondria (D) Endoplasmic reticulum

13. Formation of new cytoplasmic organelles mitochondria, ribosomes take place during :
   (A) G_1 phase of cell cycle (B) G_2 phase of cell cycle
   (C) S phase (D) M phase

14. Hemoglobin is very important protein present in red blood cells, what is not true about it ?
   (A) It has only two polypeptide chains (B) It has a buffering action
   (C) It has a transport property (D) It is a conjugated protein

15. *Arbor vitae* is mainly composed of :
   (A) Grey matter (B) Neuroglial cells
   (C) White matter (D) All of the above

16. Inulin is a homo polysaccharide and is used to test the excretory function of :
   (A) Liver (B) Kidney
   (C) Pancreas (D) Gastric

17. Acromegaly and gigantism are two defects produced due to improper functioning of :

(A) Thyroid (B) Pituitary
(C) Thyroid and pituitary (D) Thyroid, pituitary and thymus

18. Glycogenin is a protein involved in :

(A) Glycogensis (B) Gluconeogensis
(C) HMP pathway (D) Glycolysis

19. One of the following enzymes not involved in β - oxidation of fatty acids, is ?

(A) Fatty acyl CoA -dehydrogenase (B) Enoyl CoA hydratase
(C) Homogentsic acid oxidase (D) Thiolase

20. In Hartnup's disease, the urine of a patient is containing highly increased amounts of :

(A) Tryptophan only (B) Indole acetic acid only
(C) Tyrosine only (D) Both (A) and (B)

21. The correct sequence of electron acceptors in ATP synthesis is :

(A) Cyt. a, a_3, b, c (B) Cyt. b, c, a, a_3
(C) Cyt. c, b, a, a_3 (D) Cyt. b, c, a_3, a

22. Pick odd one out in terms of basic principle of the following processes :

(A) ELISA (B) RIA
(C) PCR (D) Western blot

23. A balanced diet should contain calories from carbohydrate, proteins, and fat in the ratio of :

(A) 60 : 20 : 20 (B) 20 : 20 : 60
(C) 30 : 20 : 50 (D) 30 : 30 : 40

24. The normal serum level of alanine amino transferase (SGPT) in adult human is :

(A) 13 – 40 U/L (B) 8-20 U/L
(C) 40-125 U/L (D) None of the above

25. During de-novo synthesis of purine nucleotides, the $N_{1\ (Nitrogen)}$ of the purine bases is contributed by :

(A) Glycine
(B) Alpha amino group of aspartate
(C) Amide nitrogen (N) of glutamine
(D) None of the above

26. During conversion of milk into curd :

(A) Entropy decreases
(B) Entropy increases
(C) Entropy does not change
(D) None of the above

27. During expansion of a gas from volume of $4dm^3$ to $6dm^3$ against a constant external pressure of 3 atm, the work done will be :

(A) – 304 J
(B) + 304 J
(C) – 608 J
(D) + 608 J

28. Select the correct order in the following :

(A) 1 cal > 1 J > 1 erg
(B) 1 erg > 1 J > 1 cal
(C) 1 erg > 1 cal > 1 J
(D) 1 J > 1 cal > 1 erg

29. A smuggler could not carry gold by depositing iron on the gold surface since :

(A) Gold is denser
(B) Iron rusts
(C) Gold has higher reduction potential than iron
(D) Gold has lower reduction potential than iron

30. Which has highest % ionic character ?

(A) HF
(B) HCl
(C) HBr
(D) HI

31. An acidic buffer is having same pK and pH values, the ratio of salt to acid concentration is :

(A) 1 : 10
(B) 10 : 1
(C) 1 : 1
(D) None of the above

32. Which one of the following molecules possesses zero dipole moment ?

(A) Para-dichlorobenzene (B) Chlorobenzene

(C) H_2O (D) OCl_2

33. Zinc is an important trace element required for normal maintenance of human health and is present in metalloenzyme/s like :

(A) Carbonic anhydrase (B) Glutamate dehydrogenase

(C) Alcohol dehydrogenase (D) All of the above

34. On the basis of molecular orbital theory, the paramagnetism of O_2 molecule is believed to be due to the presence of two electrons with parallel spins in :

(A) Bonding π orbitals (B) Anti bonding π orbitals

(C) Bonding σ orbitals (D) Anti bonding σ orbitals

35. In case of DNA structure, G is paired with C through :

(A) Triple bond (B) Double bond

(C) Three hydrogen bonds (D) Two hydrogen bonds

36. The acidic nature of phenol could be explained mainly on the basis of :

(A) Inductive effect (B) Resonance effect

(C) Hyper conjugation effect (D) None of the above

37. In case of a peptide bond, which one of the following statements is incorrect ?

(A) It is unable to rotate freely

(B) It is a trans in nature

(C) It is having partial double bond character

(D) It is connecting nucleotides together

38. The number of anomers possible for D-glucose are :

(A) 2 (B) 3

(C) 4 (D) 16

39. SDS is an/ a :

(A) Anionic detergent (B) Cationic detergent

(C) Non-ionic detergent (D) None of the above

40. Proteins absorb maximally at 220 nm mainly due to the presence of :

(A) Aromatic amino acids (B) Aliphatic amino acids

(C) Peptide bonds (D) None of the above

41. In $Cl–CH_2–CHCl_2$, the methine proton appears in the PMR spectrum as a :

(A) Downfield triplet (B) Downfield singlet

(C) Up field triplet (D) Up field singlet

42. *Hydrilla* is used for demonstrating photosynthesis because it shows :

(A) Little respiration

(B) Little transpiration

(C) Rapid photosynthesis

(D) Evolution of oxygen bubbles which can be collected over water

43. In C_4 plants, the 1st CO_2 acceptor is :

(A) Phosphoenol pyruvate (B) Ribulose-1,5 bi phosphate

(C) Oxaloacetic acid (D) Phosphoglyceric acid

44. In the form of chloride ions, chlorine is involved specifically in :

(A) Photolysis' of water and oxygen evolution in photosynthesis

(B) Cell division in leaves and roots

(C) Osmotically active important solute

(D) All of the above

45. Potometers can be used for the measurement of :

(A) Rate of respiration (B) Rate of photosynthesis

(C) Rate of transpiration (D) Absorbance/ fluorescence

46. B.O.D. is a parameter for observing :

(A) Soil pollution (B) Noise pollution

(C) Water pollution (D) Air pollution

47. One of the skeletal deformities called *itai-itai* (Ouch-ouch) is because of :

(A) Mercury toxicity (B) Cadmium toxicity

(C) Cobalt toxicity (D) Chromium toxicity

48. The half life period of a radioactive sample is 20 min, starting from 2 g of the sample, how much will be left behind after 40 min ?

(A) 2 g (B) 1 g
(C) 0.5 g (D) 0.25 g

49. Humming bird and hawk illustrate :

(A) Convergent evolution (B) Parallel evolution
(C) Adaptive radiation (D) All of the above

50. If one has isolated a motile, gram positive cell with no visible nucleus, then one can assume that cell has :

(A) Ribosomes (B) A Golgi complex
(C) Mitochondria (D) All of the above

51. *Thiobacillus ferroxidans* catalyze an oxidation reaction :

(A) $Fe^{2+} \rightarrow Fe^{3+}$ (B) $Fe^{3+} \rightarrow Fe^{2+}$
(C) $Fe^{0} \rightarrow Cu^{0}$ (D) None of the above

52. The ability of a virus to infect an organism is regulated by :

(A) The host species
(B) The type of cells
(C) The availability of an attachment site
(D) All of the above

53. Bacteria can acquire antibiotic resistance by :

(A) Mutations (B) Insertion of transposons
(C) Acquiring plasmids (D) All of the above

54. Which of the following is not a glyceride ?

(A) Fat (B) Oil
(C) Soaps (D) Phospholipids

55. The name of an enzyme has been coined by :

(A) Carl Neuberg (B) W.F. Khune
(C) Tom Chech and Sydney Altman (D) None of the above

56. K_M of an enzyme is equal to substrate concentration at :

(A) $\frac{1}{2} V_{max}$ (B) $2 V_{max}$

(C) $\frac{1}{4} V_{max}$ (D) None of the above

57. BCA method is used for the estimation of :

(A) Nucleic acids (B) Proteins

(C) Fats (D) Carbohydrates

58. A segment of DNA is having 100 guanine and 100 thymine bases, the total number of nucleotides present in the segment is :

(A) 50 (B) 100

(C) 200 (D) 400

59. AUG codes for :

(A) Lysine (B) Glycine

(C) Phenylalanine (D) None of the above

60. Mammalian cells have three RNA polymerases namely, RNA pol I, RNA pol II and RNA pol III respectively, which among these is highly sensitive to α -Amanitin ?

(A) RNA pol I (B) RNA pol II

(C) RNA pol III (D) None of the above

1. IARI is located in :

   (A) Delhi (B) Lucknow

   (C) Chandigarh (D) Bangalore

2. Bolivar and Rodriguez are associated with the construction of Plasmid :

   (A) pBR322 (B) pUC108

   (C) YAC (D) None of the above

3. After amplifying a gene product through PCR technique, the amplified product can be separated and visualized usually running on :

   (A) 2–3 % agarose gel (B) 0.7–1 % agarose gel

   (C) 7.5–10 % agarose gel (D) 4–5 % agarose gel

4. The palindromic sequence $\overset{\downarrow}{GG}\ ATCC$ / $CCTAGG\overset{\uparrow}{}$ is recognized by :

   (A) EcoRI (B) Bam H1

   (C) Hind III (D) Hae III

5. Lining up of the blastocyst in the wall of the uterus is known as :

   (A) Fertilization (B) Implantation

   (C) Impregnation (D) Placentation

6. The rate of cleavage in a zygote depends up on :

   (A) Amount of yolk (B) Amount of cytoplasm

   (C) Size of nucleus (D) All of the above

7. One of the organelle richest in enzymes is :

   (A) Lysosomes (B) Golgi bodies

   (C) Mitochondria (D) Endoplasmic reticulum

8. The proper sequence of cell cycle is :

(A) S, M, G1 and G2 (B) G1, S, G2 and M

(C) G1, G2, S and M (D) M, G1, G2 and S

9. The GFR in an average man is :

(A) 75 ml/min (B) 100 ml/min

(C) 125 ml/min (D) 200 ml/min

10. The nerves are made up exclusively from the :

(A) Dendrons (B) Axons

(C) Node of ranvier (D) Nissl body

11. The buffering capacity of hemoglobin near physiological pH is due to the presence of :

(A) Glycine (B) Threonine

(C) Histidine (D) Proline

12. The clear fluid obtained after centrifugation of coagulated blood is called :

(A) Plasma (B) Serum

(C) Lymph (D) None of the above

13. The main function of HMP shunt is to provide :

(A) ATP only (B) ATP and NADPH

(C) NADPH and ribose-5-phosphate (D) ATP and ribose

14. Phenylketonuria is due to absence of :

(A) Phenylalanine hydroxylase (B) Tyrosinase

(C) Homogentisic acid oxidase (D) Xanthine oxidase

15. The net ATP's produced during complete oxidation (through β oxidation) of Palmitic acid are :

(A) 131 (B) 129

(C) 146 (D) 148

16. In case of urea cycle the two steps taking place in mitochondria are the :

(A) Formation of urea and carbamoyl phosphate

(B) Formation of carbamoyl phosphate and arginosuccinate

(C) Formation of urea and arginosuccinate

(D) Formation of carbamoyl phosphate and citrulline

17. In gout patients, high level of which of the following is found in blood ?

(A) Urea (B) Uric acid

(C) Cholesterol (D) Amino acid

18. The highest BMR will be shown by :

(A) Rat (B) Cow

(C) Horse (D) Elephant

19. The SGOT levels are elevated in :

(A) Cardiac infarction (B) Liver disease

(C) Pancreatic disease (D) Kidney failure

20. Waldenstrom's macroglobulinemia is associated with :

(A) Increased levels of IgG (B) Increased levels of IgM

(C) Increased levels of IgD (D) Increased levels of IgA

21. In case of protein denaturation which one of the following condition prevails ?

(A) $\Delta S < 0$ (B) $\Delta S > 0$

(C) $\Delta S = 0$ (D) None of the above

22. Which pair of thermodynamic parameters do not possess same set of units ?

(A) ΔG and ΔH (B) ΔE and ΔH

(C) ΔG and ΔE (D) ΔG and ΔS

23. The heat of combustion of few gases namely CH_4, C_2H_6, C_2H_4, and C_2H_2 are $-212, -373, -337$ and -310 k cal/ mole respectively at the same temperature, the best fuel among these gases is :

(A) CH_4 (B) C_2H_6

(C) C_2H_4 (D) C_2H_2

24. In case of half cell involving the reaction as :

Cu^{+2} (0.1 M) + $2e^- \leftrightarrow$ Cu (s); E^o = 0.34 V at 25° C, the value of E will be :

(A) 0.34 V (B) 0.40 V

(C) 0.37 V (D) 0.31 V

25. NH_4Cl in liquid ammonia will act as a /an :

(A) Base (B) Acid

(C) Salt (D) Double salt

26. In case of an acidic buffer, the pK and pH values are 4.7 and 3.7 respectively, the ratio of concentration of salt to acid is :

(A) 1 : 10 (B) 10 : 1

(C) 2 : 5 (D) None of the above

27. Dipole moment of a molecule is related to electro negativity and geometry (shape), which one of the following molecules possesses permanent dipole moment ?

(A) SO_4^{-2} (B) CO_2

(C) C_2H_2 (D) SO_2

28. The healthy adult human body contains iodine as :

(A) 40–50 mg (B) 15–20 mg

(C) 10–12 mg (D) 1–2 mg

29. Taking molecular orbital predictions into consideration, the net bond in linear CO_2 molecules are :

(A) 2 σ (B) 1 σ, 3 π

(C) 2 π (D) 2 σ, 2 π

30. Acetone is a liquid because of :

(A) Hydrogen bonding (B) Dipole-dipole interactions

(C) Ionic bonding (D) Covalcnt bonding

31. The length of all C-C bonds of benzene is same because of :

(A) Resonance
(B) Inductive effect
(C) Hyper conjugation
(D) All of the above

32. In case of a molecule A-B, the electro negativity difference of two elements is 2.8, the % ionic character of the molecule is :

(A) 50%
(B) 43%
(C) 72.24%
(D) 55.3%

33. Which of the following amino acid is optically inactive ?

(A) Serine
(B) Tyrosine
(C) Glycine
(D) Glutamic acid

34. Which of the following is/are non-ionic detergent(s) ?

(A) CTAB
(B) SDS
(C) Triton-X 100
(D) All of the above

35. The basic principle involving electronic transitions is for :

(A) U.V. spectroscopy
(B) NMR spectroscopy
(C) I.R. spectroscopy
(D) All of the above

36. While performing NMR spectroscopy of CH_3OH, how many peaks one would expect ?

(A) 2
(B) 1
(C) 3
(D) 4

37. Photosynthetic pigments in chloroplast are embedded in the membrane of :

(A) Matrix
(B) Photoglobin
(C) Thyalokoids
(D) Chloroplast envelope

38. Which of the following protein/enzyme is most abundant in nature ?

(A) RUBISCO
(B) LDH
(C) Hexose Kinase
(D) Succinate dehydrogenase

39. Unicellular symbiotic organisms improve yield of legumes by :

(A) Fixing nitrogen without colonizing roots of host

(B) Fixing atmospheric nitrogen and colonizing roots of host

(C) Inducing the host plant to absorb more phosphorous

(D) Stimulating the host plant to become tolerant to drought

40. The rate of transpiration can be determined by :

(A) Photometers (B) Potometers

(C) Polari meters (D) Conductivity meters

41. Chief source of soil and water pollution is/are :

(A) Agro industry (B) Thermal power plant

(C) Mining (D) All of the above

42. Pollutant of automobile exhausts that affects nervous system and produces mental disease is :

(A) Mercury (B) Nitric oxide

(C) Sulphur dioxide (D) Lead

43. Mn^{54} has a half life of 314 days, the %age of initial radioactivity remaining in a sample after 80 days will be :

(A) 83.75 (B) 50

(C) 75 (D) 92.5

44. Phosphorous is not present in :

(A) Nucleic acids (B) Nucleotides

(C) Nucleosides (D) Phospholipids

45. Which of the following types of media would not be used to culture aerobes ?

(A) Selective media (B) Reducing media

(C) Differential media (D) Complex media

46. Which of the following does not kill endospores ?

(A) Autoclaving
(B) Incineration
(C) Hot air sterilization
(D) Pasteurization

47. An example of lysogeny in animals could be :

(A) Slow viral infections
(B) Latent viral infections
(C) T-even bacteriophages
(D) Infections resulting in cell death

48. Micro organisms themselves are industrial products. Which of the following pairs is mismatched ?

(A) *Pencillium* – treatment of disease
(B) *S. servisiae* – for fermentation
(C) *Rhizobium* – increases nitrogen in the soil
(D) *B. thuringiensis* – insecticide

49. Estimation of proteins is done by :

(A) Lowry's method
(B) Biurrett method
(C) Bradford's method
(D) All of the above

50. In case of competitive inhibition of enzymes :

(A) K_M increases
(B) V_{max} decreases
(C) Both K_M and V_{max} decrease
(D) K_M decreases

51. Victor Ambros is associated with :

(A) Discovery of DNA
(B) Discovery of mRNA
(C) Discovery of t-RNA
(D) Discovery first micro-RNA

52. In response to chemical nature of some bio molecules tick odd one out :

(A) Sucrose
(B) Maltose
(C) Lactose
(D) Cholesterol

53. There are faster and less expensive procedures for the preliminary screening of potential carcinogen, one of these which uses bacteria as carcinogen indicators is :

(A) Seliwanoff's test
(B) Fehling's test
(C) Ames test
(D) Biurrett test

54. AAA codes for :

(A) Lysine
(B) Glycine
(C) Phenylalanine
(D) Methionine

55. A specific inhibitor of DNA dependent RNA polymerase at the initial stage is :

(A) Puromycin
(B) Rifamycin
(C) Streptomycin
(D) Cycloheximide

56. The syndrome in which individual somatic cells contains three sex chromosomes XXX is called :

(A) Turner syndrome
(B) Down's syndrome
(C) Super female
(D) Klinefelter's syndrome

57. The restriction enzymes were first discovered with the observation that :

(A) DNA is restricted to the nucleus
(B) Phage DNA is destroyed in a host cell.
(C) Foreign DNA is kept out of a cell
(D) Foreign DNA is restricted to the cytoplasm

58. If a foreign gene is put in a virus in order to achieve a genetic modification then the next step of such modification would be :

(A) Transformation
(B) Transduction
(C) PCR
(D) Southern blotting

59. One is interested in amplifying a small gene by PCR and added radioactively labeled nucleotides to PCR thermo cycler. After three replication cycles, the %age of radioactively labeled DNA single strand is :

(A) 0%
(B) 50%
(C) 75%
(D) 87.5%

60. HAT medium is associated with technique/s :

(A) Plant tissue culture
(B) Hybridoma technology
(C) Recombinant DNA technology
(D) All of the above

Bio-chemistry

1. Which Law of thermodynamics provides the criterion for spontaneity ?

   (a) First Law (b) Second Law

   (c) Third Law (d) None of the above

2. Maximum entropy will be in the following :

   (a) Snow (b) Liquid water

   (c) Water vapour (d) Ice

3. The molar conductivity will be maximum for the solution with which of the following concentrations ?

   (a) 0.001M (b) 0.005M

   (c) 0.008M (d) 0.009M

4. In an endothermic reaction the change in enthalpy (ΔH) is :

   (a) Positive (b) Negative

   (c) Zero (d) None of these

5. Which of the following is the correct order of electronegativity in hybridisation ?

   (a) $SP < SP^2 < SP^3$ (b) $SP > SP^2 > SP^3$

   (c) $SP^2 > SP > SP^3$ (d) $SP^3 > SP > SP^2$

6. BF3 is an acid according to :

   (a) Arrhenius Concept (b) Lowry Bronsted Concept

   (c) Lewis Concept (d) Hendersons Concept

7. The amount of Acetic acid (Mol. weight=60) present in one litre of its solution having degree of dissociation (α) =1% and dissociation constant $K_\alpha = 1.8 \times 10^{-5}$ is :

   (a) 10.8g (b) 0.18g

   (c) 1.08g (d) 108g

8. Which of the following statement is NOT true ?

(a) Fluorine helps in mineralization of bones

(b) Fluorine can cause a disease called fluorosis

(c) Calcium acts as secondary messenger

(d) None of the above

9. Crystalline compounds are characterised by the presence of :

(a) Covalent bond (b) Ionic bond

(c) Hydrogen bond (d) None of the above

10. Nitrogenous bases present in nucleic acids exhibit solution properties typical of a :

(a) Hydrophilic molecule

(b) Hydrophobic molecule

(c) Both (a) & (b)

(d) Do not interact with solvent at any point

11. Heat of formation for apolar molecules to complex in water will :

(a) Dramatically increase with the size of the apolar group

(b) Dramatically decrease with the size of the apolar group

(c) Remain unchanged

(d) None of the above

12. Choose the correct order of bond strength :

(a) Covalent bond>Hydrogen bond>Vanderwals interaction

(b) Hydrogen bond>Covalent bond> Vanderwals interaction

(c) Vanderwals interaction>Covalent bond>Hydrogen bond

(d) Hydrogen bond>Van der Waals interaction>Covalent bond

13. In spectroscopy, specific wavelength at which two chemical species have same molar absorbance is called :

(a) Iso merge point (b) Iso Convergent point

(c) Isosbestic point (d) Isofocal point

14. Maleic acid and Fumaric acids are :

(a) Tautomers
(b) Geometrical Isomers
(c) Chain Isomers
(d) Functional Isomers

15. The number of Isomeric Xylenes are :

(a) 2
(b) 3
(c) 4
(d) 5

16. Sodium lauryl sulphate is :

(a) Cationic detergent
(b) Anionic detergent
(c) Neutral detergent
(d) None of the above

17. Phosphoglycolate is formed when :

(a) Rubisco bind with O_2
(b) Rubisco bind with CO_2
(c) Rubisco bind with H_2O
(d) All of the above

18. Glyceraldehyde-3-phosphate generated during Calvin cycle, is used :

(a) Inside chloroplast only
(b) Outside chloroplast only
(c) Both inside and outside
(d) None of the above

19. Which of the following would decrease the rate of transpiration ?

(a) Abscisic acid
(b) Auxins
(c) Cytokinins
(d) All of the above

20. Colors of light, most useful in photosynthesis are :

(a) Green, Yellow, and Orange
(b) Red, Blue, and Violet
(c) Infrared, Red, and Yellow
(d) Red, White, and Blue

21. Minamata disease is caused due to :

(a) Lead toxicity
(b) Zinc toxicity
(c) Mercury Toxicity
(d) Arsenic toxicity

22. Which of the following was absent in Miller-Urey experiment for origin of life ?

(a) H_2 (b) CH_4

(c) NH_3 (d) None of the above

23. Which of these diagnostic techniques uses radiation from a radioisotope source

(a) CT Scan (b) PET Scan

(c) MRI Scan (d) Ultrasound Scan

24. Which of the following organisms present in Ganges river has been suggested to maintain its water purity by parasiting on other harmful bacteria ?

(a) Bdello vibrio (b) Bacillus polymyxa

(c) Streptomyces aureofaciens (d) Bacillus cereus

25. Icosahedral shapes of viruses is :

(a) 30 triangles faces and 12 corners

(b) 20 triangles faces and 12 corners

(c) 12 triangles faces and 20 corners

(d) 12 triangles faces and 30 corners

26. E. coli present in large intestine of human beings synthesizes Vitamin K and Vitamin B. These are used by the host and E. coli in turn gets nutrients from large intestine. This relationship is :

(a) Commensalism (b) Parasitism

(c) Mutualism (d) All of the above

27. Which of the following is incorrectly matched ?

(a) Monotrichous → Single flagella at the end

(b) Lophotrichous → Flagella over the entire cell

(c) Amphitrichous → Tufts of flagella at each end of the cell

(d) None of the above

28. Bacillus cereus divides every 30 minutes. You inoculate a culture with exactly 100 bacterial cells. After 3 hours, how many bacteria are present ?

(a) 6400 (b) 5400

(c) 4400 (d) 3400

29. Which of the following is true about peptide torsion angles ?

(a) C_α-------N (ϕ), C_α-------H (ψ) (b) C_α-------H (ψ), C_α-------C (ϕ)

(c) C_α-------N (ϕ), C_α-------C (ψ) (d) C_α-------O (ϕ), C_α-------H (ψ)

30. 9,12-Octadecadienoic acid is commonly known as :

(a) Linolenic acid (b) Oleic acid

(c) Arachidonic acid (d) Palmitolic acid

31. If an enzyme belongs to 6th group of classification then it is :

(a) Hydrolase (b) Oxidoreductase

(c) Lyase (d) Ligase

32. Which of the following reagent is used to detect presence of carbohydrate in a solution ?

(a) Molish reagent (b) Anthrone reagent

(c) Ninhydrin reagent (d) Both (a) & (b)

33. Which of the following protein is not involved in DNA synthesis ?

(a) DNA gyrase (b) Primase

(c) Helicase (d) None of the above

34. Shine Dalgaro sequence is present in :

(a) Eukaryotic m -RNA (b) 16s rRNA

(c) 23s rRNA (d) None of the above

35. Base intercalating agents, like ethidium bromide cause mutations usually by :

(a) Thymidine dimmers formations

(b) De-amination of cytosine

(c) Mismatches between DNA strands

(d) Frame shift

36. Inducer of Lac operon is a :

(a) Carbohydrate (b) Protein

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

37. Which of the following hexameric DNA sequence is a type II restriction endonuclease site ?

(a) 5-GAATTC-3 (b) 5-GATCGC-3

(c) 5-GATCAC-3 (d) 5-AACCAT-3

38. Which of the following method is NOT used for transformation ?

(a) Calcium chloride method

(b) Electroportion methods

(c) Agrobacterium tumefaciens mediated method

(d) None of the above

39. Murashige and Skoog medium is used for :

(a) Plant cell culture (b) Animal cell culture

(c) Yeast culture (d) All of the above

40. Which of the following statements is NOT true ?

(a) In callus tissue, concentration of auxin and cytokinin is same

(b) Plant cell is totipotent in nature

(c) Plantlets grown in invitro conditions lack cuticle

(d) None of the above

41. What is common between a cloning and expression vector ?

(a) Origin of replication

(b) Promoter for desirable expression of gene of interest

(c) Both (a) & (b)

(d) None of the above

42. Which of the following vector is used for making transgenic plants ?

(a) Ti plasmid
(b) Ri plasmid
(c) Both (a) & (b)
(d) All of the above

43. Golden rice has :

(a) Golden colour
(b) Herbicide resistance
(c) Largest quantity of protein
(d) None of the above

44. National Dairy Research Institute, Karnal, India has developed cloned :

(a) Buffalo
(b) Cow
(c) Sheep
(d) Rabbit

45. Endoplasmic reticulum is involved in :

(a) Lipid biosynthesis
(b) Drug Metabolism
(c) Muscle contraction
(d) All of the above

46. Phase transition temperature of plasma membrane (temperature above which plasma membrane is in fluid state and temperature below which it acts as solid structure) is :

(a) Inversely proportional to unsaturated fatty acids present in membrane
(b) Directly proportional to unsaturated fatty acids present in membrane
(c) Sometimes directly and sometimes inversely to unsaturated fatty acids present in membrane
(d) No correlation between the two

47. Elaioplasts are a type of leucoplast which is specialized for the storage of :

(a) Proteins
(b) Carbohydrates
(c) Lipids
(d) All of the above

48. Nuclear envelop remains intact during mitosis in :

(a) Bacteria
(b) Yeast
(c) Virus
(d) Mycoplasma

49. Which of the following is not associated with lymphatic system ?

(a) Tonsils
(b) Spleen
(c) Peyers patch
(d) None of the above

50. Which of the following hormones is a modified amino acid ?

(a) Epinephrine
(b) Prostaglandin
(c) Progesterone
(d) Estrogen

51. Broca's area is associated with :

(a) Vision
(b) Intelligence
(c) Speech
(d) All of the above

52. Choose the wrong match :

(a) Bowman's Capsule→Glomerular filtration
(b) Distal Convoluted tubule→Absorption of glucose
(c) Henles loop→Concentration of urine
(d) Proximal Convoluted tubule →Absorption of Na^+ & K^+ ions

53. Which of the following is NOT a product of Pentose Phosphate pathway ?

(a) NADPH
(b) Ribose-5-phosphate
(c) Xylulose-5-phosphate
(d) None of the above

54. Urea cycle occur in :

(a) Cytosol
(b) Mitochondria
(c) Both (a) & (b)
(d) Peroxisome

55. Deficiency of glucose-6- phosphatase in liver will have one of the following consequences :

(a) Hypoglycemia
(b) Defective glycogen synthesis
(c) Glycolysis
(d) None of the above

56. Which of the following fatty acid is the precursor of prostaglandin ?

(a) 6,9,12,15 eicosatetraenoic acid

(b) 5,8,11,14 eicosatetraenoic acid

(c) 7,10,13,16 eicosatetraenoic acid

(d) 8,11,14, 17 eicosatetraenoic acid

57. T-helper cell is :

(a) $CD4^+$ (b) $CD5^+$

(c) $CD6^+$ (d) $CD7^+$

58. Hinge region is absent in :

(a) IgA (b) IgG

(c) IgD (d) IgE

59. In an eukaryotic cell, the precursor of dTMP :

(a) dCTP (b) dATP

(c) dUTP (d) dGTP

60. In humans, uric acid is mostly the degradation product of :

(a) Purines (b) Pyrimidines

(c) Proteins (d) Urea

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}

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(b) ~S is + ve

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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 :
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(b) 10^{-37}
(c) 10^{18}
(d) 10^{17}

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(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*
Bio. Tech. 24

BIO-TEGHNOLOGY 2007

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
Biotechnology 8

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

BIO-TEGHNOLOGY 2008

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