

022/2023

Maximum : 100 marks

Time : 1 hour and 30 minutes

1. According to quantum mechanics, it is impossible to precisely and simultaneously specify both the linear momentum and position of a particle. This principle is known as :
 - (A) Pauli's antisymmetric principle
 - (B) Hund's principle of maximum spin multiplicity
 - (C) Heisenberg's uncertainty principle
 - (D) Aufbau principle
2. The Schrödinger equation consists of an energy operator known as :
 - (A) Hermitian
 - (B) Hamiltonian
 - (C) Wave function
 - (D) Legendre
3. The energy required to remove the outermost or valence electron from the isolated gaseous atom is called the first ionization energy. Which of the following elements has the lowest ionization energy?
 - (A) Li
 - (B) Be
 - (C) C
 - (D) F
4. Which of the following is in correct order of electro negativity values in Pauling's scale?
 - (A) $\text{Cl} > \text{Br} > \text{I} > \text{F}$
 - (B) $\text{F} > \text{Cl} > \text{I} > \text{Br}$
 - (C) $\text{F} > \text{Cl} > \text{Br} > \text{I}$
 - (D) $\text{I} > \text{Br} > \text{F} > \text{Cl}$
5. In quantitative chemical analysis, the term precision refers to :
 - (A) Accurate result
 - (B) Theoretical result
 - (C) Abnormal result
 - (D) Reproducible result
6. Which of the following radiation is employed to study vibrational spectrum of a molecule?
 - (A) Infrared radiation
 - (B) Microwave radiation
 - (C) Ultraviolet radiation
 - (D) X-ray
7. In order to record the proton NMR spectrum, which of the following compound is used as reference :
 - (A) Tetramethylsilane
 - (B) Dimethyl sulphoxide
 - (C) D_2O
 - (D) CDCl_3

8. Paper chromatography is an example of :
- (A) Adsorption chromatography
 - (B) Ion exchange chromatography
 - (C) High Performance liquid chromatography
 - (D) Partition chromatography
9. The analytical technique that involves observing the change in weight of the substance as a function of temperature is called :
- (A) Mass spectrometry
 - (B) Differential scanning calorimetry
 - (C) Thermogravimetry
 - (D) Differential thermal analysis
10. For the coagulation of negatively charged As_2S_3 sol, which of the following species will be more effective?
- (A) Na^+
 - (B) Cl^-
 - (C) Al^{3+}
 - (D) Au
11. Gold number of A, B, C, and D are 0.13, 0.013, 0.003 and 0.31. The order of protective power of these is :
- (A) $A > B > C > D$
 - (B) $C > B > A > D$
 - (C) $D > A > B > C$
 - (D) None of the above
12. Considering various theories of adsorption of gases on solids, which of the following is incorrect :
- (A) Langmuir isotherm is based on monolayer adsorption
 - (B) BET isotherm is based on multilayer adsorption
 - (C) Freundlich isotherm is of empirical nature
 - (D) Langmuir isotherm is of empirical nature
13. The gas that is known to damage the ozone layer in stratosphere is :
- (A) HCl
 - (B) CH_3CN
 - (C) CF_2Cl_2
 - (D) $Pb(C_2H_5)_4$
14. The disease itai-itai is caused by pollution due to :
- (A) Hg
 - (B) Cd
 - (C) Pb
 - (D) DDT

15. Eutrophication causes :
- (A) Air pollution (B) Water pollution
(C) Soil pollution (D) Noise pollution
16. Among the following, the main pollutant of leather tanneries is :
- (A) Mercury (B) Lead
(C) Cadmium (D) Chromium
17. Which one of the following is a greenhouse gas?
- (A) O₂ (B) N₂
(C) He (D) O₃
18. The common scientific acoustic unit of sound measurement to study noise pollution is :
- (A) Candela (B) Decibel
(C) Lumen (D) Hertz
19. Which of the following species attacks haemoglobin to form carboxyhaemoglobin thereby causing poisoning effect?
- (A) CO₂ (B) HCOOH
(C) CO (D) C₂H₅OH
20. The polycyclic aromatic hydrocarbon, benzo(α) pyrene is known for its :
- (A) Medicinal use as a chelating agent
(B) Carcinogenic activity
(C) Radioactivity
(D) Use in artificial photosynthesis
21. The organic load of the water body can be expressed in terms of BOD, which refers to :
- (A) The degree of microbially mediated oxygen consumption in water
(B) The degree of chemically mediated oxygen consumption in water
(C) The total organic carbon content in water
(D) The total dissolved oxygen in water
22. The commonly called black lung disease is also known as :
- (A) Byssinosis
(B) Silicosis
(C) Asbestosis
(D) Pneumoconiosis

23. Which one of the following is not matching with the principles of green chemistry?
- (A) It is better to prevent waste than to clean up waste after it is formed during a chemical reaction
 - (B) Chemical products should be designed to preserve efficacy of the function while reducing toxicity
 - (C) The use of auxiliary substances like solvents, separating agents is highly recommended
 - (D) Synthetic methods should be designed to maximise the incorporation of all materials used in the process into the final product
24. Which one of the following statements on water is wrong?
- (A) Water is regarded as a green solvent
 - (B) Heavy metal containing chemicals cannot be dissolved in water
 - (C) Water molecule has polar nature with a net dipole moment
 - (D) Hydrogen bonding is important that helps to hold water molecules together in its liquid and solid state
25. Microwave assisted organic reactions have the advantage of :
- (A) Faster reaction rates
 - (B) Can be easily Scaled-up
 - (C) Prevention of solvent evaporation
 - (D) Any type of containers can be used
26. The dye which is commonly used as a fixative in an electron microscope :
- (A) Ethidium bromide
 - (B) Osmium tetroxide
 - (C) Acridine orange
 - (D) Safranin
27. Which type of chromatographic technique is employed for the purification of large biomolecules of nucleic acids and proteins?
- (A) FPLC
 - (B) HPLC
 - (C) TLC
 - (D) None of the above
28. RNA can be analyzed by which of the following blotting technique?
- (A) Northern blotting
 - (B) Western blotting
 - (C) Southern blotting
 - (D) None of the above
29. Which staining method is used to identify DNA in specimens?
- (A) Volutin staining
 - (B) Feulgen staining
 - (C) Negative staining
 - (D) Both (A) and (C)
30. The annealing temperature in a PCR reaction usually ranges from :
- (A) 75-80°C
 - (B) 35-45°C
 - (C) 55-60°C
 - (D) 90-100°C

31. Identify the correct statement among the following :
- (i) Addition of *Lactobacillus cremoris* in Swiss cheese results in eye formation and flavor enhancement
 - (ii) Kimchi is a fermented fish product
 - (iii) Idli batter fermentation is favoured by *Leuconostoc mesenteroides* and *Streptococcus faecalis*
 - (iv) Shrikhand is a fermented milk product produced by *Rhizopus oryzae*
- (A) (iii) (B) (i) and (ii)
(C) (i) and (iv) (D) (iv)
32. The intestinal bacteria in infants commonly used as probiotic :
- (A) *Streptococcus thermophilus* (B) *Helicobacter*
(C) *Bifidobacteria* (D) *Bacillus pumilus*
33. Which among the statement is correct?
- (A) The codex guidelines for HACCP has eight principles
 - (B) Critical control point aims at preventing physical chemical and biological hazards in food
 - (C) National academy of sciences is an authority on food safety
 - (D) All the above
34. *Bacillus coagulans* causes ————— type of spoilage in canned foods.
- (A) Hydrogen swell (B) TA spoilage
(C) Sulfide spoilage (D) Flat sour spoilage
35. "Sweating" is a type of food preservation in which?
- (A) Moisture is readded to a desired level
 - (B) Moisture is reduced
 - (C) Moisture is increased
 - (D) None of the above
36. Which among the following is an example for enveloped virus?
- (A) Herpes virus (B) Adeno virus
(C) Tobacco mosaic virus (D) All the above
37. Which among the following is a method for cultivation of anaerobic bacteria?
- (A) Lawn culture
 - (B) Roll tube method
 - (C) Stab culture
 - (D) All the above

38. Which genera of archaea lacks cell wall and resembles like mycoplasma?
 (A) *Methanopyrus* (B) *Thermoplasma*
 (C) *Ferroplasma* (D) Both (B) and (C)
39. An example for endospore forming bacteria :
 (A) *Bacillus* (B) *Sporosarcina*
 (C) *Thermoactinomyces* (D) All the above
40. Which among the following is an example for chemolithotrophic microbe?
 (A) *Nitrosomonas* (B) *Halobacterium salinarum*
 (C) *Prochloron* (D) All the above
41. Which among the following is an example for sulphur reducing bacteria?
 (A) *Archaeoglobus* (B) *Thiobacillus*
 (C) (A) and (D) (D) *Desulfococcus*
42. The production of antibiotics by one microorganism that inhibit or kill a susceptible microbe is an example for which types of microbial interaction:
 (A) Amensalism (B) Parasitism
 (C) Competition (D) None of the above
43. Which algae causes Florida red tide bloom?
 (A) *Spirogyra* (B) *Karenia brevis*
 (C) *Palmaria palmata* (D) *Ulothrix*
44. Biological removal of dissolved organic matter is done in which stage of waste water treatment?
 (A) Primary (B) Secondary
 (C) Tertiary (D) (A) and (B)
45. _____ is an airborne pathogen uniquely adapted to internal environment.
 (A) *Puccinia triticina* (B) *Salmonella enteritidis*
 (C) *Salmonella typhimurium* (D) *Legionella pneumophila*
46. Which type of bioremediation technique is commonly used for removal of gaseous pollutants?
 (A) Bioventing (B) Biofilters
 (C) Biopiles (D) None of the above
47. Which of the following indicates the steps in biogas production?
 (A) Hydrolysis – acetogenesis – acidogenesis – methanogenesis
 (B) Hydrolysis – acidogenesis – acetogenesis – methanogenesis
 (C) Acidogenesis – hydrolysis – acetogenesis – methanogenesis
 (D) Acidogenesis – acetogenesis – hydrolysis – methanogenesis
48. Which species of earthworm is commonly employed in vermicomposting?
 (A) *Eisenia foetida* (B) *Perionyx excavates*
 (C) *Lumbricus terrestris* (D) Both (A) and (B)

49. Which among the following is a hydrocarbon degrading bacteria?
 (A) *Alcanivorax* (B) *Oleispira*
 (C) *Marinobacter* (D) All the above
50. Which among the following is a genetically engineered super bug utilized in petroleum biodegradation?
 (A) *Pseudomonas putida* (B) *Bacillus cereus*
 (C) *Acetobacter* (D) None of the above
51. A Non-protein amino acid :
 (A) Ornithine (B) Tyrosine
 (C) Arginine (D) Proline
52. Purity of isolated proteins is checked by :
 (A) Column chromatography (B) Mass spectrometry
 (C) Ammonium sulphate precipitation (D) Dialysis
53. Nature of peritrichous flagella:
 (A) A single flagella located at one polar end
 (B) Flagella distributed all over body
 (C) A Bunch of flagella at two polar ends
 (D) A bunch of flagella at one end
54. A plant geneticist observed a white branch on an otherwise green plant and on crossing the flowers produced on the white branch with pollen produced on the green branch all the progeny was found to be white. On reciprocal crosses all progeny were found to be green. Then, which among the statements are true :
 (A) The white branch was the result of a mutation in the chloroplast DNA
 (B) The white branch is the result of a mutation in the nuclear DNA
 (C) White mutation is dominant to green
 (D) Green and white are co dominant
55. Which one is soil borne bacterial disease?
 (A) Leptospirosis (B) Brucellosis
 (C) Cholera (D) Salmonellosis
56. Immunity obtained through colostrum is :
 (A) Natural passive immunity (B) Natural active immunity
 (C) Artificial passive immunity (D) Artificial active

57. Which among is a neuromuscular autoimmune disease?
(A) Rheumatoid arthritis (B) Pernicious anemia
(C) Crohn's disease (D) Myasthenia gravis
58. Which of the following radiation have longest wavelength?
(A) IR radiation (B) X-rays
(C) Micro waves (D) Radio waves
59. A researcher isolated amylase from the pancreas of an experimental rat and 20 μ l of the enzyme preparation showed an activity of 0.5 Units when allowed to react for 1 minute. The concentration of the protein in the enzyme preparation was 0.25 mg/ml. Find out the specific activity of the enzyme preparation?
(A) 0.1 Units/mg (B) 1 Unit/mg
(C) 10 Units/mg (D) 100 Units/mg
60. Atmospheric pressure is measured by :
(A) Polarography (B) Fluorimetry
(C) Densitometry (D) Manometry
61. Carnegie 20 is :
(A) Transposon vector of Saccharomyces
(B) Transposon vector of E.coli
(C) Transposon vector of Bacillus spp
(D) Transposon vector of Drosophila
62. Kleonw fragment of DNA polymerase I lack :
(A) 3'-5' exonuclease activity (B) 3'-5' polymerase activity
(C) 5'-3' exonuclease activity (D) 5'-3' polymerase activity
63. Which among the following is an expression vector?
(A) pUC 18 (B) pBR 322
(C) pCambia (D) pET
64. T4 DNA ligase is capable of :
(A) Stick end ligation only (B) Blunt end ligation only
(C) Both stick and blunt end ligation (D) None of the above

65. Two statements are given below. Analyse the statements and select the correct answer :
- (a) Blue white colony selection using pUC recombinants work by alpha complementation
 - (b) Blue white colony selection requires a medium with X gal and IPTG
- (A) Both (a) and (b) are correct and (a) is the correct reason of (b)
 - (B) Both (a) and (b) are correct and (b) is the correct reason of (a)
 - (C) (a) is correct and (b) is wrong
 - (D) (a) is wrong and (b) is correct
66. First amino acid commercially produced by fermentation :
- (A) Glutamic acid
 - (B) Phenyl alanine
 - (C) L-Lysine
 - (D) Aspartic acid
67. Which among is considered as GRAS status?
- (A) Bacillus
 - (B) E. coli
 - (C) Lactobacillus
 - (D) Penicillium
68. BOD used for the measurement of :
- (A) Atmospheric pollution
 - (B) Nuclear pollution
 - (C) Sewage pollution
 - (D) Thermal pollution
69. The gas that combines with water to form acid rain :
- (A) Sulphur dioxide
 - (B) Carbon dioxide
 - (C) Carbon monoxide
 - (D) Hydrogen sulphide
70. Microorganisms indigenous to a given ecosystem are called :
- (A) Zymogenous
 - (B) Autochthonous
 - (C) Allochthonous
 - (D) Autogenous
71. The term ecosystem was proposed by :
- (A) Carl Mobino
 - (B) A. Tansley
 - (C) E. Odum
 - (D) E. Clement
72. An animal viral vector :
- (A) CMV
 - (B) TMV
 - (C) SV40
 - (D) Gemini
73. An edible vaccine for foot and mouth disease :
- (A) Banana
 - (B) Tomato
 - (C) Potato
 - (D) Sugar beet
74. In which format sequences submitted in Blast server?
- (A) FASTA
 - (B) FISTA
 - (C) MmCIF
 - (D) PDB file format

75. Which of the following is a protein data base?
(A) DDBJ (B) EMBL
(C) Gen Bank (D) PIR
76. Which of the following will exhibit Tyndall effect?
(A) Copper Sulphate solution (B) Water
(C) Sugar Solution (D) Milk
77. What is an Isotonic solution?
(A) Solutions with different osmotic pressure
(B) Solutions with same vapour pressure
(C) Solutions with same osmotic pressure
(D) Solutions with different vapour pressure
78. The semi-permeable membrane used for carrying reverse osmosis is made up of _____ material.
(A) Potassium nitrate (B) Cellulose acetate
(C) Parchment membrane (D) Cell membrane
79. If 125mL of water is added to 250mL of 0.5M potassium sulphate solution, what will be the molarity of the diluted solution :
(A) 0.65M (B) 0.75M
(C) 0.50M (D) 0.33M
80. Mole fraction is expressed as :
(A) N/n (B) n/N
(C) $n/(n+N)$ (D) $N/(n+N)$
81. Name the primary substance used in the vulcanization of rubber :
(A) Sulphur (B) Phosphorus
(C) Isoprene (D) Lead
82. When you perform Fehling's test, which among the following will give a positive result?
(A) Sucrose (B) Glucose
(C) Lipids (D) Proteins
83. _____ is the sugar molecule present in fruits.
(A) Sucrose (B) Lactose
(C) Fructose (D) Galactose

84. Which of the following will influence Protein folding?
(A) pH (B) Solvent
(C) Salt Concentration (D) All the above
85. _____ is the base not present in DNA.
(A) Adenine (B) Uracil
(C) Thymine (D) Guanine
86. Which bacterial cell wall has a huge percentage of Teichoic acid?
(A) Gram positive
(B) Gram negative
(C) Both Gram positive and Gram negative
(D) Gram Neutral
87. Which of the following is not an indicator of water pollution?
(A) Shigella dysenteriae (B) Streptococcus pyogenes
(C) Clostridium difficile (D) Salmonella enteritidis
88. Food preservation is carried out through cold sterilization, this involves :
(A) Radiation (B) Lyophilization
(C) Dehydration (D) Refrigeration
89. Pasteurization is the process of heating milk :
(A) Above 500 degree Celsius (B) Above 1000 degree Celsius
(C) Above boiling point (D) Below boiling point
90. Name the equipment used for the sterilization of the media after its preparation :
(A) Incubator (B) Autoclave
(C) Laminar air flow chamber (D) Inoculum needle
91. Which of the following is called the particulate pollutant?
(A) Ethylene (B) Flyash
(C) Radon (D) Ozone
92. _____ contaminations lead to Mina Mata disease.
(A) Mercury (B) Lead
(C) Copper (D) Cadmium

93. Which of the following can significantly control global warming?
- (A) Increasing Solid waste
 - (B) Increasing fossil fuel consumption
 - (C) Burning human generated waste
 - (D) Reducing fossil fuel consumption
94. Which of the following is an exsitu conservation method for endangered species?
- (A) Cryopreservation
 - (B) Biosphere reserves
 - (C) Wildlife sanctuaries
 - (D) National Parks
95. Which of the following happens naturally due to aging of lakes?
- (A) Biomagnification
 - (B) Mesotrophic
 - (C) Eutrophication
 - (D) Oligotrophic
96. _____ described cell in a dead cork tissue.
- (A) Louis Pasteur
 - (B) Anton Von Leeuwenhoek
 - (C) Hans Jensen
 - (D) Robert Hook
97. Electron Microscope can provide magnification upto :
- (A) 40X
 - (B) 4,000X
 - (C) 40,000X
 - (D) 400,000X
98. Which chromatography method involves a technique in which the stationary phase is held in a narrow tube and the mobile phase is forced through it under pressure?
- (A) Planar
 - (B) Gas
 - (C) Thin layer
 - (D) Column
99. Burning of wastes is not an acceptable practice of Solid waste management because :
- (A) It is not cost effective
 - (B) It involves lots of space
 - (C) It requires modern technology
 - (D) It causes environmental issues
100. Enzymes used to cut DNA molecule in rDNA technology is :
- (A) Phosphatase
 - (B) Ligase
 - (C) Ribonuclease
 - (D) Restriction enzymes
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