Registration N0. :

Centre of Exam. :

Name of Candidate :

S A U

Entrance Test for M.Sc. (Biotechnology)

[Sample paper]

Time : 3 hours *Maximum Marks : 100*

INSTRUCTIONS FOR CANDIDATES

Candidates must read carefully the following instructions before attempting the question paper:

(i) Write your Name and Registration Number in the space provided for the purpose on the top of this Question Paper and in the Answer Sheet.

(ii) This Question Paper has Two Parts.

(iii) Part-A has 30 questions of **1** mark each. Please attempt all the questions of Part-A.

(iv) Part-B has 120 questions out of which please attempt 70 questions only. Each question carries **1** mark.

(v) **One fourth of marks assigned to any question will be deducted for wrong answers in both Part—A and Part—B.**

(vi) *PLEASE DO NOT ATTEMPT MORE THAN 70 QUESTIONS IN PART-B. IF YOU ATTEMPT MORE THAN 70 QUESTIONS, ONLY THE FIRST 70 WILL BE EVALUATED.*

(vii) **Please darken the appropriate Circle of Question Paper Series Code on the Answer Sheet in the space provided.**

(viii) Answer written by the candidates inside the Question Paper will not be evaluated.

(ix) Pages at the end have been provided for Rough Work.

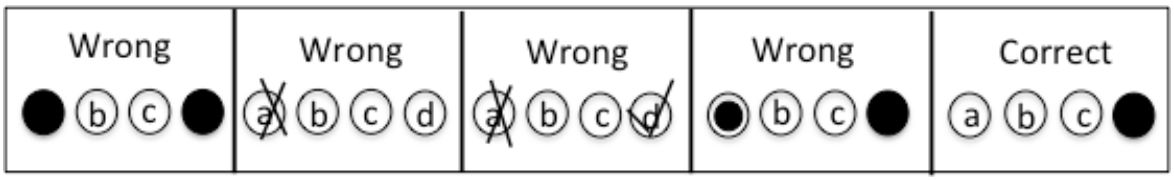
(x) Simple calculators are allowed. Mobile phones are **NOT** allowed.

(xi) Return the Question Paper and the Answer Sheet to the Invigilator at the end of the Entrance Examination.

(xii) **DO NOT FOLD THE ANSWER SHEET.**

INSTRUCTIONS FOR MARKING ANSWERS IN THE OMR SHEET

1. Use only Blue/Black Ballpoint Pen (do not use Pencil) to darken the Circle.
2. Please darken the whole Circle.
3. Darken ONLY ONE CIRCLE for each question as shown below in the example :



4. Once marked, no change in the answer is allowed.
5. Please do not make any stray marks on the Answer Sheet.
6. Please do not do any rough work on the Answer Sheet.
7. Mark your answer only in the appropriate space against the number corresponding to the question.
8. **Ensure that you have darkened the appropriate Circle of Question Paper Series Code on the Answer Sheet in the space provided.**

Part --A

1. Restriction endonucleases are most widely used in recombinant DNA technology. They are obtained from
    a) Bacteriophages
    b) Bacteria
    c) Insect cells
    d) Plasmids

2. The term antibiotic was coined by
    a) Selman Waksman
    b) Louis Pasteur
    c) Edward Jenner
    d) Luc Montagnier

3. Carcinoma refers to
    a) Malignant tumor of skin or mucus tissue
    b) Malignant tumor of colon
    c) Malignant tumor of connective tissue
    d) Benign tumor of connective tissue

4. Subunit vaccines are administered for
    a) Hepatitis A
    b) Hepatitis B
    c) Hepatitis E
    d) Hepatitis C

5. A single strand of nucleic acid tagged with a radioactive molecule is called
    a) Plasmid
    b) Probe
    c) Primer
    d) Vector

6. The hardest part of a tooth is the
    a) dentine
    b) enamel
    c) pulp
    d) dental tubules

7. Collagen is a
    a) Globular Protein
    b) Fibrous protein
    c) Lipid
    d) Carbohydrate

8. D-Ribulose is a:
    a) Pentose
    b) Hexose
    c) Tetrose
    d) Triose

9. A beaker is filled to the brim with water and weighs 950 grams. A pure gold bar is dropped in the beaker upon which 50 ml water spills out of the beaker and the beaker now weighs 1.865 Kg. What is the density of gold?
    a) 19.3
    b) 18.3
    c) 17.3
    d) 16.3

10. In a triangle ABC, $\angle B=\pi/2$ and $\angle C=\pi/4$. Let D divides BC internally in the ratio 1:3, then $\frac{\sin \angle BAD}{\sin \angle CAD}$ is equal to-
    a) $1/\sqrt{6}$
    b) $1/3$
    c) $1/\sqrt{3}$
    d) $\sqrt{2}/3$

11. The area of the equilateral triangle, in which three coins of radius 1cm are placed, as shown in the figure, is-
    a) $(6+4\sqrt{3})$ cm^2
    b) $(4\sqrt{3}-6)$ cm^2
    c) $(7+4\sqrt{3})$ cm^2
    d) $4\sqrt{3}$ cm^2

12. Ten different alphabets are given. Words with five alphabets are formed from these. Then, the number of words which have at least one alphabet repeated, is-
    a) 69760
    b) 30240
    c) 99748
    d) D.39520

13. Two events A and B have probabilities 0.25 and 0.50 respectively. The probability that both A and B occur simultaneously is 0.14. Then the probability that neither A nor B occurs is-
    a) 0.11
    b) 0.25
    c) 0.39
    d) 0.86

14. The value of Y in the equation $56X + 8Y + 16=0$ is:
    a) 7X+2
    b) 4.5X-2
    c) 2X-7
    d) -7X-2

15. All angles inside an octagon will add up to
    a) 1000^o
    b) 1080^o
    c) 1260^o
    d) 1440^o

16. Value of $[(x^3.x^{-6})/(x^2.x^{-3})]$ is
    a) x^{-2}
    b) x^{-3}
    c) $x^{4.5}$
    d) x^{-4}

17. In gymnosperms, the pollen chamber represents:
    a) the microsporangium in which pollen grains develop
    b) a cell in the pollen grain in which the sperms formed
    c) a cavity in the ovule in which pollen grains are stored after pollination
    d) an opening in the mega gametophyte through which the pollen tube approaches the egg.

18. Two identical circular loops of metal wire are lying on a table without touching each other. Loop A carries a current which increases with time. In response, the loop B
    a) remains stationary
    b) is attracted by the loop A
    c) is repelled by the loop A
    d) rotates about its circumference

19. If the radius of the earth were to shrink by one percent, its mass remaining the same, the acceleration due to gravity on the earth's surface would
    a) decrease
    b) remain unchanged
    c) increase
    d) be zero

20. If the distance between the earth and the sun were half its present value, the number of days in a year would have been
    a) 64.5
    b) 129
    c) 182.5
    d) 730

21. A converging lens is used to form an image on a screen. When the upper half of the lens is covered by an opaque screen
    a) half of the image will disappear
    b) complete image will be formed
    c) intensity of the image will increase
    d) No image will be formed

22. A ship of mass $3x10^7$ kg initially at rest, is pulled by a force of $5x\ 10^4$ N through a distance of 3 m. Assuming that the resistance due to water is negligible, the speed of the ship is
    a) 1.5 m/s
    b) 60 m/s
    c) 0.1 m/s
    d) 5 m/s

23. A car is moving in a circular horizontal track of radius 10 m with a constant speed of 10 m/s. A plumb bob is suspended from the roof of the car by a light rigid rod. The angle made by the rod with the vertical is (take g=10m/s^2)
    a) Zero
    b) 30^o
    c) 45^o
    d) 60^o

24. Which one of the following metals is present in chlorophyll?
    a) Mg
    b) Be
    c) Ca
    d) Cu

25. Zinc does not show variable valency like d-block elements because
    a) It is a soft metal
    b) It has lower melting temperature
    c) Two electrons are present in the outermost orbit
    d) d-orbital is complete

26. Basicity of orthophosphoric (H_3PO_4) acid is
    a) 2
    b) 3
    c) 4
    d) 5

27. A maximum _____ number of electrons can be accommodated in the p-orbitals.
    a) 3
    b) 4
    c) 6
    d) 8

28. According to the Pauli exclusion principle, each orbital in an atom can be occupied by
    a) two electrons
    b) four electrons
    c) one electron and one positron
    d) many electrons

29. Which of the following is NOT a state function -
    a) internal energy
    b) work
    c) entropy
    d) enthalpy

30. The temperature at which the vapour pressure is equal to the atmospheric pressure is called
    a) Critical temperature
    b) Boiling point
    c) Melting temperature
    d) Saturation point

Part-- B

31. The number of times a eukaryotic cell can undertake replication of its DNA per cell cycle is
    a) Once, irrespective of cell type
    b) Infinite for a stem cell
    c) As many as the number of chromosomes in the cell
    d) Can be altered chemically by over activating CDKs

32. DNA fragments during replication are synthesized with the orientation
    a) 5' → 3'
    b) 3' → 5'
    c) 5' → 3' for leading, 3' → 5' for lagging strands
    d) 3' → 5' for leading, 5' → 3' for lagging strands

33. If the Meselson-Stahl experiment were to be performed such that the bacteria growing in normal media are introduced to heavy isotope media before cell division, the banding pattern in F3 generation would resemble most
    a) 75% N14 – 25% hybrid – 0% N15
    b) 44% N14 – 50% hybrid – 6% N15
    c) 0% N14 – 25% hybrid – 75% N15
    d) 6% N14 – 50% hybrid – 44% N15

34. The correct definition of "gene" refers to
    a) Any unit of chromosome with a specific sequence
    b) Sequence of DNA encoding for primary RNA transcript
    c) Sequence of DNA corresponding to mature mRNA
    d) Sequence of DNA between translational START and STOP sites

35. In order to identify if a cell is undergoing active transcription, one could use radiolabelled ATP and measure the amount of radioactivity in RNA isolated from these cells. In order for the radioactivity to be detected, which radiolabel should be used?
    a) [α-P^{32}] ATP
    b) [β-P^{32}] ATP
    c) [γ-P^{32}] ATP
    d) [α-P^{32}] TTP

36. While DNA polymerase misincorporates nucleotides at the rate of 1 in 10^5, the actual error rate observed in replicating cells is 1 in 10^9. This is mainly achieved due to
    a) Excision of misincorporated nucleotides
    b) 3' → 5' proofreading activity of DNA polymerase
    c) 5' → 3' proofreading activity of DNA polymerase
    d) Replication fork arrest

37. Gene transposition does not result in
    a) Increased genome size
    b) Somatic variation
    c) Genome restructuring
    d) Epigenetic variations

38. An important subcellular site for formation of glycoproteins and glycolipids is:
    a) Lysosome
    b) Vacuole
    c) Golgi apparatus
    d) Plastid

39. Particle bombardment method
    a) Does not require a selection marker
    b) Inserts DNA randomly in the genome
    c) Cannot be used in many plant species because of cell wall
    d) Inserts DNA specifically in mitochondria

40. Which is not a technique to analyze gene expression?
    a) Microarray
    b) SAGE
    c) Southern
    d) Northern

41. Venation of monocot leaves would best be described as
    a) palmate
    b) alternate
    c) parallel
    d) pinnate

42. Plant protoplast culture involves removal of
    a) cell wall
    b) cell membrane
    c) cellular proteins
    d) chloroplast

43. Primary growth in plants is initiated by the
    a) apical meristems
    b) vascular cambium
    c) lateral meristems
    d) ground tissue

44. Skeletal muscle fibre is
    a) Multinucleated
    b) Uninucleated
    c) Binucleated
    d) Anucleated

45. Sodium and Glucose transport is an example of
    a) Facilitated diffusion
    b) ATP driven active transport
    c) Symport
    d) Antiport

46. Which of the following motor proteins is not involved in the vesicular transport along the microtubule?
    a) Kinesin-1
    b) Kinesin-2
    c) Cytoplasmic dynein
    d) Kinesin 13

47. All of the following may serve as intracellular messengers except
    a) Acetylcholine
    b) cAMP
    c) 1,2 Diacylglycerol
    d) Calcium ions

48. Connective tissue fibers are produced by;
    a) Macrophages
    b) Mast cells
    c) Fibroblasts
    d) Kupffer cells

49. Which of the following is the important function of protein kinases?
    a) Hydrolyze proteins
    b) Polymerize amino acids
    c) Bind cGMP
    d) Add phosphate groups to proteins

50. Which of the following pairs of cyclin and cyclin dependent kinase is involved in G1 phase of cell cycle clock?
    a) Cyclin A/ CDK2 complexes
    b) Cyclin D/ CDK4/6 complexes
    c) Cyclin E/ CDK2 complexes
    d) Cyclin B/ CDK1

51. Which of the following sets of reactions occurs in the stroma of the chloroplast in plant cells?
    a) Calvin cycle
    b) Krebs Cycle
    c) Ammonification
    d) Decarboxylation

52. The pH of acetic acid which is 90% dissociated would be (given pK of acetic acid=4.76):
    a) Between 5.5 and 6.76
    b) Between 7.0 and 8.0
    c) Between 4.0 and 5.0

d) Between 3.76 and 4.76

53. An L-amino acid which is also R- amino acid is:
    a) L-Leucine
    b) L-Cysteine
    c) L-glutamic acid
    d) L-Lysine

54. With regard to enzymes, one of the following statements is wrong:
    a) Enzymes lower the activation energy for the reaction they catalyze.
    b) Enzymes are mostly proteins, but some RNAs possess catalytic ability, as do some antibodies.
    c) Enzymes affect equilibrium of the reaction they catalyze.
    d) Enzymes enhance the rate compared to the un-catalyzed reaction.

55. One of the following is not an essential amino acid for humans:
    a) Valine
    b) Methionine
    c) Serine
    d) Threonine

56. Protein denaturation does not include:
    a) Loss of primary structure
    b) Loss of secondary structure
    c) Loss of tertiary structure
    d) Decrease in water solubility

57. An amino acid precursor for heme is:
    a) Tyrosine
    b) Tryptophan
    c) Glycine
    d) Leucine

58. The most important buffer in our blood plasma is:
    a) Phosphate
    b) Bicarbonate
    c) Citrate
    d) Histidines

59. One of the following vitamins is not obtained from plants:
    a) Vitamin B_{12}
    b) Vitamin B_6
    c) Vitamin B_3
    d) Vitamin E

60. The caloric value for a gram of fat is:
    a) 6
    b) 3
    c) 9
    d) 4

61. The most common defects found in DNA after exposure to UV light is:
    a) Double strand breaks
    b) Pyrimidine dimers
    c) Purine dimers
    d) Base deletions

62. Gel filtration is an example of:
    a) Ion-exchange chromatography
    b) Adsorption chromatography
    c) Affinity chromatography
    d) Molecular-sieve chromatography

63. Which is NOT true about the cell theory?
    a) Its various parts were described by Schleiden, Schwann, and Virchow.
    b) It states that all organisms are composed of cells.
    c) It states that all cells come from preexisting cells.
    d) It states that bacteria and other small organisms can arise spontaneously.

64. Cellular organelles containing hydrolytic enzymes are called
    a) Lysosomes
    b) Peroxisomes
    c) Ribosomes
    d) Mesosomes

65. Na^+ and Glucose transport is an example of;
    a) Facilitated diffusion
    b) ATP driven active transport
    c) Symport
    d) Antiport

66. Microfilaments are made of:
    a) Actin
    b) Tubulin and actin
    c) Desmin
    d) Vimentin

67. Which of the following motor protein is not involved in the vesicular transport along the microtubule:
    a) Kinesin-1
    b) Kinesin-2
    c) Cytoplasmic dynein
    d) Kinesin-13

68. Urea was synthesized from silver/ammonium cyanate by:
    a) Fredrick Sanger
    b) Fredrick Wohler
    c) Francis Bacon
    d) RB Woodward

69. An instrument has a built in grating for diffraction of light but works in visible range only. It can be named as:
    a) Spectrophotometer
    b) Spectrocolorimeter
    c) Photoelectric colorimeter
    d) Spectrograph

70. Which of the following cells are most rare in blood circulation?
    a) Basophils
    b) Neutrophils
    c) Monocytes
    d) Eosinophils

71. Immunoglobulin molecules contain:
    a) One lambda and one kappa light chains
    b) Two Lambda light chains of different type
    c) Two Kappa light chains of different type
    d) Two identical lambda or kappa light chains

72. Human immunodeficiency virus infects
    a) T helper cells
    b) B cells
    c) NK cells
    d) T cytotoxic cells

73. Which of the following pathogens has recently come into limelight from South America?
    a) Human immunodeficiency virus
    b) Zika virus
    c) Ebola virus
    d) Swine fever virus

74. A protein was found to contain 0.204% as tryptophan (mol. Wt. 204). The minimum molecular weight of the protein would be:
    a) 204000
    b) 102000
    c) 100000
    d) 20400

75. When the chromosome replicates, how is the newly made strand related to its template strand?
    a) The two strands have identical sequences and are parallel to each other.
    b) The two strands have complementary sequences and are parallel to each other.
    c) The two strands have identical sequences and are antiparallel to each other.
    d) The two strands have complementary sequences and are antiparallel to each other.

76. In the benzyloxycarbonyl method for the synthesis of peptides, one of the following is not formed:
    a) Toluene
    b) Carbon dioxide
    c) Carbon monoxide
    d) Unreacted amino acid.

77. One of the following reagents is not useful to bind the free sulfhydryl groups in proteins:
    a) Ellman reagent
    b) Parachloromercury benzoate
    c) Iodo acetamide
    d) Ethylchloroformate.

78. In which type of newly replicated DNA, DNA sequences are invisible to a restriction enzyme.
    a) mutated
    b) single-stranded
    c) modified
    d) hemimethylated

79. Infections that are acquired during a stay in a hospital are called:
    a) clinical
    b) nosocomial
    c) gnotobiotic
    d) resistant

80. A bond with maximum covalent character between non-metallic elements is found between-
    a) Atoms of same size
    b) Chemically similar atoms
    c) Identical atoms
    d) Atoms of widely differing electronegativities

81. A hemolysis reaction (on a blood agar plate) with an unidentified colony that results in a green zone due to oxidized iron in nonlysed red blood cells would be called:
    a) beta-hemolytic
    b) nonhemolytic
    c) gamma-hemolytic
    d) alpha-hemolytic

82. What is the best description of blood?
    a) Sol
    b) Foam
    c) Solution
    d) Aerosol

83. Which one of the following dispersions does not have liquid continuous phase?
    a) Nanosuspension
    b) Microemulsion
    c) Gel
    d) Foam

84. Which of the following sequences correctly describes the change in domain structure as more oil is added to a water-in-oil emulsion?
    a) Bicontinuous, spherical, cylinder-like
    b) Spherical, cylinder-like, bicontinuous
    c) Spherical, bicontinuous, cylinder-like
    d) Cylinder-like, spherical, bicontinuous

85. The scattering of light by coarse and colloidal dispersed systems is known as?
    a) Contrast matching
    b) DLVO theory
    c) Tyndall effect
    d) Creaming

86. Which of the following is not a mechanism for the separation of a physically unstable suspension of magnesium hydroxide in water?
    a) Flocculation
    b) Aggregation
    c) Ostwald ripening
    d) Hydrolysis

87. What must be done to a specimen to increase the contrast of the structures being viewed?
    a) Illuminated
    b) Stained
    c) Placed under acover slip
    d) Thinly sliced

88. The field of view of a microscope with a 10X ocular and a 4X objective is 5mm. What is will be the field of view with a 10X objective?
    a) 3.14 mm^2
    b) 20mm
    c) 2mm
    d) $2mm^2$

89. For which of the following specimens would you use a dissecting microscope?
    a) Human skin cells
    b) E.coli
    c) Insect mouth parts
    d) Virus

90. Which one of the following is a characteristic of gamma radiation particle?
    a) Positively charged
    b) Negatively charged
    c) Has no charge and no mass
    d) Has low penetrating capability

91. ^{14}C has a half-life of 5730 years how many grams of a 4.0 g sample would be left after 3.5 half-lives?
    a) 1 g
    b) 0.50 g
    c) 0.38 g
    d) 0.35 g

92. In which one of the following types of microscopy is the specimen shadowed with heavy metal?
    a) atomic force microscopy
    b) SEM
    c) TEM
    d) X-ray diffraction

93. All of the following are true of supercoiling in chromosomal DNA EXCEPT:
    a) DNA doubles back and twists upon itself.
    b) In bacteria and eukaryotic cells, there is positive supercoiling.
    c) It is maintained by DNA-binding proteins and results in compaction
    d) It is generated by gyrase.

94. Which of the following statements is false about the E. coli phosphotransferase system (PTS)?
    a) The EnzI complex in the cytoplasm is shared between all PTS transporters.
    b) The EnzII complex is specific to the sugar being transported.
    c) The phosphate group transferred to the sugar comes from phosphoenolpyruvate.
    d) The PTS transport requires energy in the form of ATP.

95. A cafeteria worker who fails to wash his hands thoroughly and fails to wear gloves inoculates a quiche with 4 E. coli when he uses his finger to test whether it is done. By the time you purchase the quiche, there are 128 E. coli cells in it. How many generations did the cells go through?
    a) 4
    b) 5
    c) 8
    d) 32

96. A null event is
    a) a result of more than two sample points
    b) a result with either yes or no sample point
    c) a result with only one sample point
    d) a result with no sample point

97. A DNA segment has 10 base pairs. How many different sequences are possible?
    a) 4,000
    b) 40,000
    c) 4,00,000
    d) More than a million

98. Discrete variable is a
    a) fractional value
    b) whole number
    c) whole number with a decimal value
    d) continuous variable

99. Which of the following is a non-parametric test?
    a) ANOVA
    b) Kruskal-wallis
    c) Student's t-test
    d) F-test

100. Which one does not refer to central tendency
    a) Mean
    b) Standard deviation
    c) Median
    d) Mode

101. Before it travels through the earth's atmosphere, sunlight is mostly
    a) Infrared radiation
    b) Visible light
    c) Ultraviolet radiation
    d) Blue light

102. The difference in the light emitted from a candle, an incandescent light bulb, and the sun is basically from differences in
    a) energy sources
    b) materials
    c) temperatures
    d) phases of matter

103. The sky appears to be blue when the sun is high in the sky because
    a) Blue is the color of air, water, and other fluids in large amounts
    b) Red light is scattered more than blue
    c) Blue light is scattered more than the other colors
    d) blue color does not reach the earth

104. The ratio of the speed of light in a vacuum to the speed of light in some transparent materials is called
    a) the critical angle
    b) total internal reflection
    c) the law of reflection
    d) the index of refraction

105. A chemical was heated in dry form along with copper oxide and the emanating gasses were directed towards a solution of lime water. It was observed that the lime water turned turbid and affine precipitate was observed. This indicated that the original chemical had:
    a) Sulphur
    b) Carbon
    c) Chlorine
    d) Nitrogen

106. A small quantity of a chemical was warmed with a small volume of concentrated Sulphuric acid. Some gas was observed to emanate but the sample did not get blackened. It can be assumed that the sample is:
    a) Sucrose
    b) Formate
    c) Starch
    d) Resorcinol

107. The energy of a photon of wavelength 350 nm is *(given values h = 6.626 X 10^{-34} Js; c = 2.998 X 10^{8} m s^{-1})*
    a) 5.68 X 10^{-19} J
    b) 568 X 10^{-19} J
    c) 32.8 X 10^{-19} J
    d) 4.5 X 10^{-19} J

108. The number of N_2 molecules present in 28 gm of nitrogen is approximately
    a) $3x10^{11}$
    b) $6x10^{23}$
    c) $3x10^{13}$
    d) $6x10^{3}$

109. Which of the following methods <u>cannot</u> be used to determine the Molecular size of a protein
    a) Mass spectrometry
    b) Hydrodynamic methods
    c) Static light scattering
    d) Circular dichroism

110. Which of the following is the wavelength of an electron (mass= $5.31x10^{6}$ Kg) traveling at $5.31X10^{6}$ m.s^{-1} is
    a) 1.37 Angstrom
    b) 137 Angstrom
    c) 0.243 Angstrom
    d) 2430 Angstrom

111. Which one of the following statements is NOT correct?
    a) An electrophile accepts a pair of electrons
    b) A nucleophile donates a pair of electrons
    c) A free radical contains an unpaired electron
    d) A nucleophile attacks the atomic nucleus

112. Which one of the following statements is NOT correct?
    a) Carbonium is positively charged
    b) Carbanion is negatively charged
    c) Carbene is negatively charged
    d) Carbo-cation is positively charged

113. To an aqueous solution of a chemical, bromine water was added slowly. Initial discoloration was followed by formation of a yellowish-white precipitate was observed. The original chemical must be:
    a) α –naphthol
    b) catechol
    c) hydroquinone
    d) phenol

114. The number of neutrons in the nucleus of tritium is
    a) 1
    b) 2
    c) 3
    d) 4

115. Rate of diffusion of a gas is
    a) directly proportional to its density
    b) directly proportional to its molecular weight
    c) directly proportional to the square of its molecular size
    d) Inversely proportional to the square of its molecular size

116. A small quantity of a chemical was heated in a dry test tube till it melted. A solid was observed to form. Few drops of an alkaline copper sulphate solution was added. A purple coloration of the liquid was observed. The original chemical could not be:
    a) Oxamide
    b) Peptide
    c) Oxalic acid
    d) Malonamide

117. If we pass a current of 10.0 A from a 12 V supply for 300 s, then the energy supplied as heat is
    a) 36 kJ
    b) 4.0 kJ
    c) .4 kJ
    d) 360 kJ

118. Gibbs free energy of a spontaneous process is
    a) negative
    b) positive
    c) zero
    d) can be either negative or positive

119. A reaction has a rate law of the form $k[A]^2[B]$ and the reaction rate is measured in $mol.dm^{-3}.s^{-1}$. The unit of the rate constant k is
    a) $dm^6.mol^{-2}.s^{-1}$
    b) $mol.dm^{-3}.s^{-1}$
    c) $dm^3.mol^{-2}.s^{-1}$
    d) s^{-1}

120. In which of these process platinum is used as a catalyst?
    a) Oxidation of ammonia to form HNO_3
    b) Hardening of oils
    c) Production of synthetic rubber
    d) Synthesis of methanol

121. During a neutron scattering experiment, the neutron beam interacts with the
    a) nuclei
    b) outer shell electrons
    c) electrons in an ionized atom
    d) electrons in inner shell

122. The following nuclear reaction, $_{47}Ag^{110}$ -> $_{48}CD^{110}$, will emit
    a) a positron
    b) an alpha particle
    c) an electron
    d) gamma rays

123. The bond angle X-C-Y centered at an SP^2 hybridized carbon atom is
    a) 109 degree
    b) 120 degree
    c) 180 degree
    d) 45 degree

124. The oxygen atom in a water molecule contains
    a) one lone pair of electrons
    b) two lone pairs of electrons
    c) no lone pair of electrons
    d) four lone pairs of electrons

125. If we wish to locate an electron within an atom so that uncertainty in position (Dx) is ~50 pm, the uncertainty in momentum (Dp) is
    a) $1.3X\ 10^{-23}\ kg.m.s^{-1}$
    b) $3.2X\ 10^{-23}\ kg.m.s^{-1}$
    c) $13X\ 10^{-23}\ kg.m.s^{-1}$
    d) $2.4X\ 10^{-23}\ kg.m.s^{-1}$

126. Lead tetraethyl is used as
    a) Fire extinguisher
    b) Pain killer
    c) Petroleum additive
    d) Mosquito repellent

127. Raman scattering is associated with
    a) an increase in the wavelength
    b) a decrease in the wavelength
    c) both A and B
    d) no change in the wavelength

128. Two protons move parallel to each other, keeping distance r between them, both moving with same velocity ^{è}v. Then the ratio of the electric and magnetic force of interaction between them is
    a) c^2/v^2
    b) $2c^2/v^2$
    c) $c^2/2v^2$
    d) $c^2/4v^2$

129. When the pH of a solution is 2, the hydrogen ion concentration in moles per litre is
    a) 1×10^{-14}
    b) 1×10^{-12}
    c) 1×10^{-7}
    d) 1×10^{-2}

130. What is the effect of adding sodium acetate crystals to one liter of 0.5 M acetic acid solution?
    a) Decrease in the sodium ion concentration
    b) Decrease in the Hydrogen ion concentration
    c) Increase in the hydrogen ion concentration
    d) Decrease in the sodium ion as well as hydrogen ion concentration

131. The heat evolved in combustion of benzene is given by the following equation
    $C_6H_6 + 7\ ½\ O_2 \longrightarrow 3H_2O + 6CO_2$; delta H= -3264.6 kj per mole.
    How much heat energy will be evolved when 39 g C_6H_6 are burnt in an open container?
    a) 816.15 kj per mole
    b) 1632.3 kj per mole
    c) 6528.2 kj per mole
    d) 2448.45 kj per mole

132. Circular dichroism can help to detect the following:
    a) Change in handedness
    b) Change in mass
    c) Change in color
    d) Change in viscosity

133. Flux is amount of material passing through an unit
    a) area per unit time.
    b) volume per unit time.
    c) volume
    d) area

134. The number of times the DNA helix crosses itself on a planar projection is
    a) Twist
    b) Writhe
    c) Linking number
    d) Supercoiling number

135. The molecule, which has zero dipole moment is
    a) CH_4
    b) BF_3
    c) NF_3
    d) ClO_2

136. Carbon reacts with metal to form
    a) Carbide
    b) Carbonate
    c) Hydroxide
    d) Oxide

137. Which of the followings will turn limewater milky?
    a) CO_2
    b) CO
    c) NO_2
    d) Cl_2

138. The isomers have the same
    a) Structural formula
    b) Chemical properties
    c) Molecular formula
    d) Physical properties

138. The number of possible alcohol isomers for $C_4H_{10}O$ are
    a) 4
    b) 2
    c) 3
    d) 5

139. Which one of the following is not a colloid?
    a) Chlorophyll solution in alcohol
    b) Smoke
    c) Ruby glass
    d) Milk

140. Variable number of tandem repeats (VNTRs) in the DNA molecule are highly useful in
    a) Monoclonal antibody production
    b) DNA fingerprinting
    c) DNA footprinting
    d) DNA Cloning

141. Which of the followings are palindromic sequences?
    a) CACGTA and CTCAGT
    b) CGTTCG and ATGGTA
    c) GATATG and CTACTA
    d) GAATTC and CTTAAG

142. PCR and Restriction Fragment Length Polymorphism are methods for
    a) DNA sequencing
    b) Study of enzymes
    c) Genetic Transformation
    d) DNA fingerprinting

143. One of the following dietary sugars is linked to Atherosclerosis:
    a) Fructose
    b) Glucose
    c) Sorbitol
    d) Galactose

144. Prostaglandins are mediators of inflammation. One of the following inhibits their biosynthesis in our body:
    a) Aspirin
    b) Rifamycin
    c) Cimetidine
    d) Glucose

145. Allopurinol is prescribed to patients suffering from gout. It inhibits:
    a) Xanthine oxidase
    b) Uricase
    c) Allantoinase
    d) Allantoicase

146. In eukaryotic flagellum, the bending of microtubule is driven by;
    a) The basal body
    b) The motor protein ciliary dynein
    c) The myosin motor protein
    d) The fluid that surrounds the flagellum

147. Adherence of cells may involve
    a) Integrin
    b) Actin filaments
    c) Lemin A
    d) Ubiquitin

148. Which of these codons does not serve to end translation?

a) AUG
b) UAA
c) UAG
d) UGA

149. Differentiation of shoot is controlled by:

a) High auxin : cytokinin ratio
b) High cytokinin : auxin ratio
c) High gibberellin : auxin ratio
d) High gibberellin : cytokinin ratio

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

a) do not show any specificity in opening and closing
b) remain closed during day
c) remain closed at night
d) remain always open