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Entrance Test for M.Sc. (Biotechnology) 2017

[PROGRAMME CODE : 30001]

Question Paper Series Code : A

QUESTION 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 Roll Number in the space provided for the purpose on the top of this Question Paper and in the OMR 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) **A wrong answer will lead to the deduction of one-fourth (¼) of the marks assigned to that question.**

(vi) *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 OMR Sheet in the space provided.**

(viii) Answers written by candidates on the Question Paper will **NOT** be evaluated.

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

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

(xi) **Return the Question Paper and the OMR Sheet** to the Invigilator at the end of the Test.

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

/1-**A**

INSTRUCTIONS FOR MARKING ANSWERS ON THE 'OMR SHEET'

Use BLUE/BLACK Ballpoint Pen Only

1. **Please ensure that you have darkened the appropriate circle of 'Question Paper Series Code' and 'Programme Code' on the OMR Sheet in the space provided.**
   Question Paper Series Code
   Write Question Paper Series Code **A** or **B**
   in the box and darken the appropriate circle.

   A or B

   ●
   Ⓑ

2. Use only Blue/Black Ballpoint Pen to darken the circle. Do not use Pencil to darken the circle for Final Answer.

3. Please darken the whole circle. ●

4. Darken <u>ONLY ONE CIRCLE</u> for each question as shown below in the example :

   Example :

Wrong	Wrong	Wrong	Wrong	Correct
● ⓑ ⓒ ●	⍉ ⓑ ⓒ ⓓ	⍉ ⓑ ⓒ ⍉	⊙ ⓑ ⓒ ●	ⓐ ⓑ ⓒ ●

5. Once marked, no change in the answer is possible.

6. Please do not make any stray marks on the OMR Sheet.

7. Please do not do any rough work on the OMR Sheet.

8. Mark your answer only in the appropriate circle against the number corresponding to the question.

9. **A wrong answer will lead to the deduction of one-fourth of the marks assigned to that question.**

10. Write your six-digit Roll Number in small boxes provided for the purpose; and also darken the appropriate circle corresponding to respective digits of your Roll Number as shown in the example below.

    Example :

    ROLL NUMBER

1	3	5	7	2	0	2
●	①	①	①	①	①	①
②	②	②	②	●	②	●
③	●	③	③	③	③	③
④	④	④	④	④	④	④
⑤	⑤	●	⑤	⑤	⑤	⑤
⑥	⑥	⑥	⑥	⑥	⑥	⑥
⑦	⑦	⑦	●	⑦	⑦	⑦
⑧	⑧	⑧	⑧	⑧	⑧	⑧
⑨	⑨	⑨	⑨	⑨	⑨	⑨
⓪	⓪	⓪	⓪	⓪	●	⓪

PART—A

1. The sum total of all chemical reactions occurring in the body is called

   a. anabolism

   b. catabolism

   c. metabolism

   d. carboxylation

2. Insects have

   a. 2 pairs of legs

   b. 3 pairs of legs

   c. 4 pairs of legs

   d. 1 pair of legs

3. Lysosomes are reservoirs of

   a. hydrolytic enzymes

   b. secretory glycoproteins

   c. RNA and protein

   d. fats

4. Mitotic spindle fibers are composed of

   a. microtubules

   b. centromeres

   c. centrosomes

   d. kinetochores

5. Maximum energy per unit mass is produced by oxidation of

   a. carbohydrates

   b. proteins

   c. fats

   d. minerals

6. Which of the following metabolites links glycolytic and Krebs cycle pathways?

   a. Pyruvic acid

   b. Glucose

   c. Acetyl CoA

   d. ATP

7. An antidiuretic substance

   a. increases free water reabsorption

   b. increases water release

   c. increases Na^+ reabsorption

   d. decreases urea synthesis

8. The ultimate source of energy in an ecosystem is

   a. glucose

   b. ATP

   c. nucleic acid

   d. sunlight

9. Which one of the following is **not** a pyrimidine nucleotide?

   a. UTP

   b. CTP

   c. ADP

   d. TMP

10. $\ln(x) + \ln(y)$ is equal to

   a. $\ln(xy)$

   b. $\ln(x/y)$

   c. $\ln(x+y)$

   d. $\ln(x^y)$

11. If $A \cdot \exp(\omega t)$ represents a wave, then A is the

    a.   amplitude

    b.   phase

    c.   wavelength

    d.   frequency

12. An equation of the form $f = k \cdot x^{1/3}$ can be linearized as

    a. $\log f = \log k + \dfrac{1}{3} \log x$

    b. $\log f = \log k + 3 \log x$

    c. $\log f = 3k \cdot \log x$

    d. $\log f = k^3 \cdot \log x$

13. A cross-product $A \times B$ of two vectors A and B is a

    a.   scalar

    b.   vector perpendicular to both A and B

    c.   vector parallel to either A or B

    d.   vector perpendicular to either A or B

14. If i, j and k are unit vectors, which one of the following is generally *not* correct?

    a. $i \times j = k$

    b. $i \times k = - k \times i$

    c. $i \times k = - j$

    d. $j \times k = - i$

15. $A \times (B \times C)$ is equal to

    a. $B(A \cdot C) - C(A \cdot B)$

    b. $B(A \cdot C) - A(B \cdot C)$

    c. $B(C \cdot A) + A(A \times B)$

    d. $(A \times B) \times C$

16. The determinant of the matrix $\begin{bmatrix} 3 & 2 \\ 6 & 5 \end{bmatrix}$ is

   a. 27

   b. 3

   c. 0

   d. 30

17. If two masses of 1 g and 4 g are moving with equal kinetic energies, the ratio of magnitudes of their momenta is

   a. 4 : 1

   b. $\sqrt{2}$: 1

   c. 1 : 2

   d. 1 : 16

18. In an electric circuit, current is

   a. inversely proportional to voltage

   b. directly proportional to resistance

   c. a product resistance and voltage

   d. voltage divided by resistance

19. How much of a 2 N sodium hydroxide solution should be added to 500 ml water to get a pH of 11·0?

   a. 250 µl

   b. 500 µl

   c. 1000 µl

   d. 2500 µl

20. In $KMnO_4$, the oxidation number of Mn is

   a. −5

   b. −7

   c. +5

   d. +7

21. Gamma rays

    a. have no charge

    b. have zero energy

    c. are positively charged

    d. represent fast-moving nuclei of hydrogen

22. Burning one gram of cyclohexene produces 100 calorie energy. How much energy will be produced by burning half a mole of cyclohexene?

    a. 50 cal

    b. 2100 cal

    c. 4200 cal

    d. 3900 cal

23. Which one of the following bonds is uncommon in biomolecules?

    a. Hydrogen bond

    b. Covalent bond

    c. Ionic bond

    d. Metallic bond

24. Complete reduction of acetic acid will yield

    a. ethanol

    b. ethane

    c. propane

    d. methane

25. If a bird of mass 50 g flies from the ground to a branch 10 m above, the work it has to do against gravity is

    a. $4 \cdot 9 \text{ kg m}^2 \text{s}^{-2}$

    b. $4 \cdot 9 \text{ gm m}^2 \text{s}^{-2}$

    c. Cannot be determined from the above information

    d. $0 \cdot 49 \text{ kg m}^2 \text{s}^{-1}$

26. The potential energy of an object kept at a certain height from the surface of earth is

    a. inversely proportional to its mass

    b. directly proportional to its mass

    c. proportional to the square of its height from the earth's surface

    d. proportional to the under-root of its height from the earth's surface

27. If under the influence of a uniform magnetic field, a charged-particle is moving in a circle of radius R with constant speed V, then the time period of the motion will

    a. depend on R and not on V

    b. depend on V and not on R

    c. depend on both R and V

    d. be independent of both R and V

28. A beam of electrons passes undeflected through mutually perpendicular electric and magnetic fields. If the electric field is switched off, and the same magnetic field is maintained, the electrons move

    a. along a straight line

    b. in an elliptical orbit

    c. in a circular orbit

    d. along a parabolic path

29. A transformer is used to light a 100 W and 110 V lamp from a 220 V mains. If the main current is 0·5 A, the efficiency of the transformer is approximately

    a. 10%

    b. 30%

    c. 50%

    d. 90%

30. If a hollow metal sphere of radius 5 cm is charged such that the potential on its surface is 10 V, then the potential at the centre of the sphere is

    a. zero

    b. 5 V

    c. 10 V

    d. 20 V

PART—B

Answer *any seventy* questions

31. Which one of the following is a mucopolysaccharide?

    a. Glycogen

    b. Starch

    c. Heparin

    d. Chitin

32. The only ketogenic amino acid is

    a. L-leucine

    b. L-isoleucine

    c. L-lysine

    d. L-cysteine

33. Glycine and succinic acid are biosynthetic precursors of

    a. rubber

    b. proteins

    c. haem

    d. glucose

34. Urea can arise in many ways. Which one of the following processes does not produce urea?

    a. Degradation of purine ring

    b. Action of arginase

    c. Urea cycle in ureotelic organisms

    d. Degradation of pyrimidine ring

35. How many mg of polyethylene glycol are there in one microliter of a 40% solution?

   a. 40 mg

   b. 4 mg

   c. 0·4 mg

   d. 0·04 mg

36. If a mg/mL solution of DNA gives an absorbance of 20 at 260 nm, the concentration of DNA in a solution giving 0·5 OD in µg/mL would be

   a. 2500

   b. 250

   c. 25

   d. 2·5

37. 50 mL of a 0·15 M solution of NaCl has

   a. 0·15 mole

   b. 0·015 mole

   c. 0·0015 mole

   d. 0·0075 mole

38. L-serine has

   a. two amino groups

   b. two carboxyl groups

   c. two hydroxyl groups

   d. one hydroxyl group

39. The chemical bond linking nucleotides in DNA/RNA is called

a. phosphodiester bond

b. N-glycosidic bond

c. O-glycosidic bond

d. peptide bond

40. Which one of the following is *not* a hydrophobic amino acid?

a. Leucine

b. Valine

c. Phenylalanine

d. Cysteine

41. The difference between alpha amylase and beta amylase is that

a. alpha amylase cleaves alpha 1,4-glycosidic bonds while beta amylase cleaves beta 1,4-glycosidic bonds

b. alpha amylase hydrolyses starch while beta amylase hydrolyses glycogen

c. alpha amylase was discovered first in history while beta amylase was found later

d. alpha amylase cleaves 1,6-glycosidic bonds also but beta amylase does not

42. One turn of B-DNA rises by

a. 34 nm

b. 34 angstroms

c. 3·4 cm

d. 0·34 meter

43. Insulin is a

   a. heterodimer but has single mRNA

   b. heterodimer with two separate mRNAs

   c. homodimer with one mRNA

   d. single polypeptide

44. Hair

   a. is a polysaccharide

   b. is a polynucleotide

   c. is a polypeptide

   d. has no disulphide bond

45. Which one of the following terms is used to designate the number of bacteria or viruses required to kill 50% of an experimental group of hosts?

   a. ID50

   b. LD50

   c. CFU50

   d. Standard infective dose

46. Various populations of species in their habitats or environment are best described as

   a. a niche

   b. an ecosystem

   c. a biosphere

   d. a biomass

47. The first person to visualize individual microbes was

a. Antonie van Leeuwenhoek

b. Robert Hooke

c. Louis Pasteur

d. Edward Jenner

48. The use of agar as the gelling agent in solid media was first suggested by

a. Robert Koch

b. Ignaz Semmelweis

c. Angelina Hesse

d. Richard Petri

49. What is the basis for the smallpox vaccine?

a. Chickenpox virus

b. Cowpox virus

c. Rabies virus

d. A mixture of chickenpox and cowpox viruses

50. The theory of the 'RNA world' resulted from the discovery of

a. archaea

b. prions

c. ribozymes

d. endosymbionts

51. A useful application of darkfield optics is the study of bacterial

   a. motility

   b. surfaces

   c. interiors

   d. shape

52. Which one of the following forms of microscopy is based on the difference in refractive index between cell components and the surrounding medium?

   a. Fluorescence

   b. Darkfield

   c. Phase contrast

   d. Confocal

53. Which one of the following neurotransmitters is *not* derived from an amino acid?

   a. Serotonin

   b. Adrenaline

   c. Adenosine

   d. Histamine

54. Which one of these structures is unique to neurons?

   a. Plasmalemma

   b. Synaptic vesicles

   c. Voltage-gated sodium channels

   d. Nissl granules

55. Which one of the following is an allergic reaction?

    a. Hay fever

    b. Malaria

    c. AIDS

    d. Elephantiasis

56. IgE is secreted by

    a. T-lymphocytes

    b. B-lymphocytes

    c. mast cells

    d. basophils

57. Which one of the following cells is *not* involved in natural immunity?

    a. NK cells

    b. Neutrophils

    c. Macrophages

    d. Cytotoxic T-cells

58. J-chain is associated with

    a. IgG1

    b. IgM

    c. IgE

    d. IgG4

59. If a serum has circulating anti-A blood group antibodies, the blood group of the person would be

   a. A

   b. B

   c. AB

   d. AB, Rh+

60. Which one of the following pairs is **not** correctly matched?

   a. IAA—Cell wall elongation

   b. Abscisic acid—Stomatal closure

   c. Gibberellic acid—Leaf fall

   d. Cytokinin—Cell division

61. If the atmospheric pressure is low, the rate of transpiration will

   a. increase

   b. decrease rapidly

   c. decrease slowly

   d. remain unaffected

62. Guard cells help in

   a. transpiration

   b. protection against grazing

   c. fighting against infection

   d. guttation

/1-**A**   16

63. Steroid hormones easily pass through the plasma membrane by simple diffusion because they

   a.   enter through pores

   b.   contain carbon and hydrogen

   c.   are water soluble

   d.   are lipid soluble

64. Living cells of animals placed in isotonic solution (0·9% saline) retain their size and shape due to

   a.   facilitated diffusion

   b.   diffusion

   c.   osmosis

   d.   transpiration

65. Transport of food material in higher plants takes place through

   a.   tracheids

   b.   transfusion tissue

   c.   companion cells

   d.   sieve elements

66. The word 'vaccination' is derived from the Latin word 'vacca' which means

   a.   inject

   b.   smallpox

   c.   immunize

   d.   cow

67. An example of an epimerization reaction is the

a. conversion of glucose to galactose

b. conversion of glucose to gluconic acid

c. conversion of gulonic acid to gulonic acid lactone

d. conversion of L-erythrose to D-erythrose

68. Which one of the following is **not** a monoterpene?

a. Camphor

b. Menthol

c. Geraniol

d. Cedrol

69. Which one of the following is a non-cyclic chemical?

a. Squalene

b. Progesterone

c. Cholesterol

d. Androst-4-ene-3,17-dione

70. An α-1,6-glycosidic bond is found in

a. amylose

b. cellulose

c. chitin

d. glycogen

71. Careful hydrolysis of diketopiperazines results in the formation of

   a. pyridine

   b. pepper

   c. dipeptide

   d. pyrrole

72. All L-amino acids possess S-configuration at the α-carbon, ***except***

   a. L-leucine

   b. L-isoleucine

   c. L-cysteine

   d. L-lysine

73. Which one of the following statements is true?

   a. Cellular respiration occurs in mitochondria and in chloroplasts.

   b. Photosynthesis occurs in chloroplasts and cellular respiration occurs in mitochondria.

   c. Photosynthesis occurs in mitochondria and in chloroplasts.

   d. Neither cellular respiration nor photosynthesis occurs in mitochondria and in chloroplasts.

74. The function of the Calvin cycle is to

   a. absorb light energy

   b. synthesize RuBP

   c. fix carbon

   d. convert glucose into CO_2-yielding energy

75. Arachidonic acid has

   a. 2 double bonds

   b. 3 double bonds

   c. 4 double bonds

   d. no double bond

76. At which one of the following stages, does crossing-over occur?

   a. Pachytene

   b. Zygotene

   c. Leptotene

   d. Diplotene

77. Agrobacterium naturally infects

   a. monocots

   b. dicots

   c. both monocots and dicots

   d. none of the above

78. The primary cell wall of plants is primarily composed of

   a. starch

   b. glycogen

   c. cellulose

   d. pectin

79. In C4 plants, the step catalyzed by RuBisCO occurs in

    a. bundle sheath cells

    b. mesophyll cells

    c. stomata

    d. epidermal cells

80. Photolysis of water occurs at

    a. PS I

    b. PS II

    c. dark reaction

    d. Krebs cycle

81. Which one of the following enzymes is usually not possessed by autotrophic plants but possessed by insectivorous plants?

    a. Cellulase

    b. Amylase

    c. Xylanase

    d. Chitinase

82. Carl Woese's discovery replaced the classification scheme of five kingdoms with which of the following scheme of three?

    a. Phyla

    b. Domains

    c. Classes

    d. Orders

83. Which of these two are believed to be the product of ancestral engulfment of prokaryotic cells followed by evolution of endosymbiosis?

    a. Nucleus and Mitochondria

    b. Chloroplasts and Golgi apparatus

    c. Nucleolus and Nucleus

    d. Mitochondria and Chloroplasts

84. Directed movements towards or away from a chemical or physical signal are known as

    a. gliding

    b. flagellation

    c. taxis

    d. locomotion

85. Which one of the following features is associated with gram-positive bacteria?

    a. Having a two lipid bilayer cell membranes as a part of the cell wall

    b. Having a thick peptidoglycan layer in cell wall

    c. Having lipopolysaccharide in cell wall

    d. Having a periplasmic space

86. The bacteria killed in Alexander Fleming's experiment during his discovery of penicillin were

    a. *Pseudomonas aeruginosa*

    b. *Escherichia coli*

    c. *Staphylococcus aureus*

    d. *Streptococcus pyogenes*

87. When the population doubles during each given unit of time, the growth is

a. linear

b. semilogarithmic

c. exponential

d. geometric

88. Which one of these is typically evolved to survive multiple extreme environments?

a. Psychrophiles

b. Extremophiles

c. Halophiles

d. Thermophiles

89. Antibiotic treatment is **not** typically prescribed for staphylococcal food poisoning because

a. the bacterium is a multidrug-resistant pathogen

b. no antibiotic is useful as it is a mixed infection

c. no vegetative cells are involved in the disease

d. the causative agent is an MRSA

90. If the heat capacity of water is 0·5 kJ K^{-1} and temperature of water changes by 4 K, the heat transferred to the water is

a. 2 kJ

b. −2 kJ

c. 20 kJ

d. −0·2 kJ

91. Which one of the following is a longitudinal wave?

   a. Sound

   b. X-ray wave

   c. Visible light·

   d. Infrared wave

92. The Coulomb energy between two opposite charges placed in water as compared to being placed in vacuum is

   a. increased

   b. reduced

   c. unaltered

   d. all of the above, depending upon the chemical nature of the ions

93. The oxidation numbers of chlorine atoms in $CaOCl_2$ are

   a. +1 and −1

   b. +2 and −2

   c. +1 for both

   d. +2 for both

94. The rate of forward reaction decreases when

   a. concentration of products is increased

   b. concentration of reactants is increased

   c. concentration of products is decreased

   d. both b. and c. above

95. Which one of the following is related to phosphorescence?

a. Internal conversion

b. Inter-system crossing

c. Solvent relaxation

d. None of the above

96. Circular dichroism can help to detect

a. change in handedness

b. change in mass

c. change in color

d. change in viscosity

97. The resolution of a light microscope can be increased by

a. reducing the wavelength

b. increasing the wavelength

c. decreasing the refractive index

d. changing the aperture of the lens

98. Flux is the amount of material passing through

a. a unit area per unit time

b. a unit volume per unit time

c. a unit volume

d. a unit area

99. The number of times the DNA helix crosses itself on a planar projection is called

    a.   twist

    b.   writhe

    c.   linking number

    d.   supercoiling number

100. Diffusion constant is

    a.   inversely proportional to temperature

    b.   inversely proportional to particle radius

    c.   directly proportional to viscosity

    d.   directly proportional to the square of temperature

101. To test a categorical vs. categorical variable, which one of the following tests is used?

    a.   Paired t-test

    b.   Unpaired t-test

    c.   Chi-square test

    d.   ANOVA test

102. Which one of the following tests is a non-parametric test?

    a.   Student's t-test

    b.   Mann-Whitney U-test

    c.   McNemar's test

    d.   ANOVA test

103. In which one of the following statistical study designs is the outcome not known?

   a. Cross-sectional study

   b. Case control study

   c. Case report

   d. Cohort study

104. How many different sequences may be generated for a natural tetrapeptide?

   a. 160000

   b. 80000

   c. 8000

   d. 80

105. The cross AaBb×aabb is called

   a. dihybrid cross

   b. backcross

   c. testcross

   d. reciprocal cross

106. Full pod shape (C) is dominant to constricted pod shape (c), and yellow pod color (G) is dominant to green pod color (g) in pea plants. What is the genotype of a yellow plant with a constricted pod?

   a. CCgg

   b. CCGG

   c. CcGg

   d. ccGG

107. How many chromosomes and chromatids are there in metaphase I of meiosis in human beings?

    a. 46, 46

    b. 23, 92

    c. 23, 46

    d. 46, 92

108. If a fruit fly is a normal diploid for its autosomes but has one X and no Y chromosome to which sex does it belong?

    a. Male

    b. Female

    c. Intersex

    d. Metafemale

109. In an interrupted mating experiment, gene (a) first appears at 12 minutes, gene (b) first appears at 7 minutes and gene (c) first appears at 5 minutes. What is the order in which these genes are present in the bacterial genome?

    a. abc

    b. cba

    c. cab

    d. bca

110. Segmental genes in *Drosophila* are turned on by

    a. σ factors

    b. autoregulation

    c. morphogens

    d. homeotic genes

111. The largest molecule in a cell is

a. DNA

b. lipid

c. protein

d. RNA

112. Zinc finger nucleases are used in

a. DNA replication

b. *in vitro* transcription

c. gene targeting

d. chemical processing of zinc

113. The electron-releasing ability of the methyl group attached to the benzene ring is due to

a. inductive effect

b. hyperconjugation

c. lone pair of electrons

d. none of the above

114. Which of the following is *not* a colligative property?

a. Freezing point

b. Boiling point

c. Vapour pressure

d. Molecular weight

115. A qualitative test for the presence of unsaturation is

    a. Baeyer's reagent test

    b. bromine test

    c. both a. and b.

    d. Schiff's reaction

116. The dicarboxylic acid used as a precursor for nylon synthesis is

    a. picric acid

    b. adipic acid

    c. citric acid

    d. benzoic acid

117. How many different compounds have the formula C_3H_8O ?

    a. One

    b. Two

    c. Three

    d. Four

118. Deuterium is an isotope of hydrogen that contains

    a. one proton and one neutron in the nucleus

    b. one proton and two neutrons in the nucleus

    c. one proton and three neutrons in the nucleus

    d. one proton and zero neutron in the nucleus

119. The Henderson-Hasselbalch equation essentially describes

    a.   enzyme kinetics

    b.   the affinity of a ligand for a receptor

    c.   the titration curve of buffer

    d.   the rate of formation of catalytic intermediates

120. A 9·8 N force causes a 1 kg mass to have an acceleration of 9·8 m/s^2. This follows from Newton's

    a.   first law of motion

    b.   second law of motion

    c.   third law of motion

    d.   law of universal gravitation

121. The earth is about $1·5 \times 10^{11}$ m from the sun and takes a year (about $3·1 \times 10^7$ s) to make one revolution around the sun. The earth's orbital speed around the sun will be

    a. $4·8 \times 10^3$ m/s

    b. $2·3 \times 10^{15}$ m/s

    c. $3·0 \times 10^4$ m/s

    d. $7·3 \times 10^{14}$ m/s

122. Can an object have increasing speed while its acceleration is decreasing?

    a.   No, this is impossible because of the way in which acceleration is defined

    b.   No, because if acceleration is decreasing the object will be slowing down

    c.   Yes, as in an object falling in the absence of air friction

    d.   Yes, as in an object released from rest in the presence of air friction

123. A ball dropped from rest is falling vertically under the influence of gravity. The ratio of the distance it falls in a 1 s interval after 4 s to the distance it falls in the next 1 s interval after 5 s is

    a. 9/11

    b. 36/25

    c. 25/16

    d. 36/16

124. Which one of the following processes takes place in smooth endoplasmic reticulum?

    a. Lipid synthesis

    b. Carbohydrate metabolism

    c. Detoxification of drugs

    d. All of the above

125. Puromycin is commonly used for the inhibition of

    a. DNA replication

    b. transcription

    c. translation

    d. topoisomerases

126. Which one of the following plant hormones is responsible for cell division and shoot formation?

    a. Auxin

    b. Gibberellin

    c. Cytokinin

    d. Ethylene

127. A complete digestive system is present in

    a.   platyhelminthes

    b.   nematoda

    c.   coelenterata

    d.   both a. and b.

128. Which of the following amino acids does not contribute to the fluorescence of a protein?

    a.   Tyrosine

    b.   Phenylalanine

    c.   Cysteine

    d.   Tryptophan

129. Pernicious anemia is due to

    a.   blockage of vitamin B_{12} absorption

    b.   blockage of vitamin A absorption

    c.   deficiency of vitamin C

    d.   deficiency of vitamin B_2

130. The advantage of hemoglobin having high histidine content is that

    a.   histidine binds to oxygen

    b.   histidine carries oxygen to the tissues

    c.   histidine imparts buffering capacity to hemoglobin

    d.   R group of histidine has low pK_a

131. The pH at which the number of positive and negative charges on an amino acid are equal is referred to as the

    a.   isoelectric point

    b.   saturation point

    c.   neutral point

    d.   common point

132. Embryonic cleavage in most teleost fishes is

    a.   holoblastic

    b.   semi-holoblastic

    c.   meroblastic

    d.   all of the above

133. Placental connection is typical of

    a.   viviparous reproduction

    b.   ovoviviparous reproduction

    c.   oviparous reproduction

    d.   all of the above

134. The optic lobe is also referred to as

    a.   cerebellum

    b.   tegmentum

    c.   tectum

    d.   pons

135. Larvae of the crab genus *Carcinus* swim towards the water surface when pressure increases. This is an example of

    a. photokinesis

    b. thigmokinesis

    c. barokinesis

    d. orthokinesis

136. The ciliary wheel organ used for locomotion is typical of

    a. molluscs

    b. sponges

    c. rotifers

    d. none of the above

137. Retting is biodegradation of

    a. cellulose

    b. lignin

    c. pectin

    d. retinol

138. The value of which one of the following parameters is zero when the cell is fully turgid?

    a. Turgor pressure

    b. Wall pressure

    c. Osmotic pressure

    d. Diffusion pressure deficit

139. The edible part of black pepper is the

   a. aril

   b. perisperm

   c. embryo

   d. cotyledon

140. The advanced character in cucurbitaceae is its

   a. inferior ovary

   b. pepo fruit

   c. tendril

   d. parietal placentation

141. Kranz anatomy is seen in

   a. all monocots

   b. monocots with C_4 pathway

   c. monocots and dicots with C_4 pathway

   d. legumes

142. The number of pyrrole rings included in a porphyrin is

   a. three

   b. four

   c. five

   d. six

143. A triatomic molecule will have _____ degrees of freedom.

a. 3

b. 6

c. 9

d. 1

144. The pressure exerted by 1·22 gm of carbon dioxide confined to a volume of 500 ml at 37 °C is

a. 143 kPa

b. 12·3 kPa

c. 1·39 kPa

d. 225 kPa

145. Which of the following statements about the radii of atoms and their ions is correct?

a. Cations are smaller than their atoms, but anions are larger.

b. Cations and anions are both smaller than their atoms.

c. Cations and anions are both larger than their atoms.

d. Cations are larger than their atoms, but anions are smaller.

146. The process by which fine particles clump together to form flakes is called

a. precipitation

b. peptization

c. flocculation

d. extraction

147. Which one of the following properties of a liquid does not increase with increasing strengths of intermolecular forces?

   a.   Boiling point

   b.   Enthalpy of vaporization

   c.   Vapor pressure

   d.   Viscosity

148. Which of the following techniques can be used to determine the number of components in a plant pigment?

   a.   Calorimetry

   b.   Chromatography

   c.   Colorimetry

   d.   Gravimetry

149. The IUPAC name of adipic acid is

   a.   hepatanedioic acid

   b.   propanedioic acid

   c.   hexanedioic acid

   d.   butanedioic acid

150. Which one of the following functional groups is *not* commonly found in proteins?

   a.   Alcohol

   b.   Aldehyde

   c.   Amide

   d.   Amine

★ ★ ★