10

QUESTION PAPER SERIES CODE
A

Centre Name : _____

Roll No. : _____

Name of Candidate : _____

S A U

Entrance Test for M.Phil./Ph.D. (Biotechnology), 2014

[PROGRAMME CODE : PBT]

Time : 3 hours *Maximum Marks* : 70

INSTRUCTIONS FOR CANDIDATES

Candidates must carefully read the following instructions before attempting the Question Paper :

(i) Write your Name, Roll Number and Centre Name in the space provided for the purpose on the top of this Question Paper and in the OMR/Answer Sheet.

(ii) This Question Paper has Two Parts : Part—A and Part—B.

(iii) Part—A (Objective-type) has 20 questions of **1** mark each. All questions are compulsory.

(iv) Part—B (Objective-type) has 100 questions (Q. Nos. **21** to **120**) out of which, please attempt 50 questions only. Each question carries **1** mark.

(v) *PLEASE DO NOT ATTEMPT MORE THAN 50 QUESTIONS IN PART—B. IF YOU ATTEMPT MORE THAN 50 QUESTIONS, ONLY first 50 WILL BE EVALUATED.*

(vi) **Please darken the appropriate Circle of 'Question Paper Series Code' and 'Programme Code' on the OMR/Answer Sheet in the space provided.**

(vii) Part—A and Part—B (Multiple choice) questions should be answered on OMR/Answer Sheet.

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

(ix) Calculators and Log Tables may be used. Mobile Phones are **NOT** allowed.

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

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

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

INSTRUCTIONS FOR MARKING ANSWERS IN THE 'OMR SHEET'

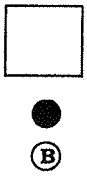
Use BLUE/BLACK Ballpoint Pen Only

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.**

***Example* :**

Question Paper Series Code

Write Question Paper Series Code A or B and darken appropriate circle.



Programme Code

Write Programme Code out of 14 codes given and darken appropriate circle.

Write Programme Code

MEC	○	MAM	○	PCS	○
MSO	○	MLS	○	PBT	●
MIR	○	PEC	○	PAM	○
MCS	○	PSO	○	PLS	○
MBT	○	PIR	○		

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 allowed.
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. There will be <u>no negative marking</u> in evaluation.
10. Write your six digits Roll Number in small boxes provided for the purpose; and also darken 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
●	①	①	①	①	①
②	②	②	②	●	②
③	●	③	③	③	③
④	④	④	④	④	④
⑤	⑤	●	⑤	⑤	⑤
⑥	⑥	⑥	⑥	⑥	⑥
⑦	⑦	⑦	●	⑦	⑦
⑧	⑧	⑧	⑧	⑧	⑧
⑨	⑨	⑨	⑨	⑨	⑨
⓪	⓪	⓪	⓪	⓪	●

PART—A

1. A nonsense mutation results in

   (a) termination of transcription

   (b) genetic rearrangement

   (c) alteration in amino acid sequence

   (d) termination of polypeptide biosynthesis

2. What type of protein is RAS?

   (a) A tyrosine kinase that translocates into nucleus

   (b) A membrane bound serine-threonine kinase

   (c) A small monomeric GTPase switch protein

   (d) An ATP-binding protein

3. Which of the following enzymes protects cells against superoxide generated in oxidation reactions?

   (a) SOD

   (b) Catalase

   (c) Lysozyme

   (d) Glutathione peroxidase

4. At which cell cycle checkpoint is the cell cycle halted if the cell's DNA is damaged?

   (a) G_1–S

   (b) S–G_2

   (c) G_2–M

   (d) G_0–G_1

5. The first acceptor of electrons from an excited cholorophyll molecule of photosystem II is

   (a) quinone

   (b) cytochrome

   (c) iron-sulphur protein

   (d) ferredoxin

6. Which one of the following is not a constituent of cell membrane?

(a) Phospholipid

(b) Cholesterol

(c) Glycolipid

(d) Proline

7. The important site for formation of glycoproteins and glycolipids is

(a) lysosome

(b) vacuole

(c) Golgi apparatus

(d) plastid

8. How many different transfer RNA molecules are present in a cell (not including those present in the mitochondria)?

(a) Between 4 to 11

(b) Between 12 to 21

(c) Between 20 to 61

(d) Between 71 to 101

9. Which second messenger signals the release of Ca^{++} from the endoplasmic reticulum?

(a) Cyclic AMP

(b) Cyclic GMP

(c) 1,2-diacylglycerol

(d) Inositol triphosphate

10. Which of the following proteins is a protease-controlling blood clotting?

(a) Thrombin

(b) Plasmin

(c) Antithrombin

(d) Tissue plasminogen activator

11. Where will you look for the sporozoites of the malarial parasite?

(a) Salivary glands of freshly moulted female Anopheles mosquito

(b) Saliva of infected female Anopheles mosquito

(c) Red blood corpuscles of humans suffering from malaria

(d) Spleen of infected humans

12. Retroviruses have RNA genome, however they replicate through double-stranded DNA formation. This process involves

(a) a polymerase coded by virus itself

(b) a polymerase coded by host

(c) host DNA polymerase

(d) unknown mechanism

13. A nerve impulse is transmitted through synaptic junction by

(a) acetyl CoA

(b) acetocarmine

(c) acetylcholine

(d) acetoorcein

14. When an individual is infected while in hospital or health care facility, the infection is called

(a) nosocomial

(b) latrogenic

(c) vertical

(d) horizontal

15. Which one of the following is required for binding of ribosomal subunits?

(a) Mg^{++}

(b) Mn^{++}

(c) Ca^{++}

(d) Al^{+++}

16. Water potential in leaf is positive during

(a) excessive absorption

(b) low transpiration

(c) excessive transpiration

(d) guttation

17. Which one of the following is a wrong statement about lectins?

(a) Lectins are sugar-binding proteins generally from plants

(b) Lectins have no 100% sugar specificity

(c) Lectins are absent in monocots

(d) Lectins require a metal ion for proper binding to sugar

18. The lightest and smallest seeds in plant kingdom are of

(a) orchids

(b) double coconut

(c) coffee

(d) cotton

19. Pulsation hypothesis to explain ascent of sap was proposed by

(a) Dixon and Jolly

(b) J. C. Bose

(c) Curtis and Clark

(d) Melvin Calvin

20. Movement of ions or molecules against the concentration gradient is called

(a) diffusion

(b) pinocytosis

(c) osmosis

(d) active transport

PART—B

21. A peptide bond

(a) is ionized at physiological pH

(b) is cleaved by agents that denature proteins

(c) has a partial double-bond character

(d) is stable to heating in strong acids

22. The turnover number of chymotrypsin is 100 per second and that for DNA polymerase is 15 per second. This means that

(a) if DNA polymerase is used at 6·7 times the concentration of chymotrypsin, the velocities at saturating substrate concentrations would be equal

(b) Chymotrypsin binds its substrate with higher affinity than DNA polymerase

(c) the K_{-1} chymotrypsin reaction is greater than that of DNA polymerase

(d) the K_3 value at saturating concentration of substrate is lower for DNA polymerase

23. An appropriate technique to separate a protein from a glycoprotein of similar molecular mass would be

(a) molecular sieve chromatography

(b) affinity chromatography

(c) salt fractionation

(d) ion-exchange chromatography

24. Transminases require as coenzyme

(a) pyridoxal phosphate

(b) FAD

(c) thiamine pyrophosphate

(d) cyanocobalamine

25. If one mole of a branched homo-oligosaccharide gave upon exhaustive methylation and hydrolysis 4 moles of 2,3,4,6-tetramethyl glucose

(a) it had 2 branches

(b) it had 4 branches

(c) it had no branch

(d) it had 3 branches

26. Hill reaction refers to

(a) the binding of O_2 to myoglobin

(b) the photolysis of water through photosystem II

(c) the O_2 dissociation curve of hemoglobin

(d) the crossing of the activation energy barrier in enzyme reactions

27. One ^{14}C-labelled acetic acid will appear as ^{14}C-labelled CO_2 after going how many times through TCA cycle?

(a) Once

(b) Twice

(c) Thrice

(d) Even before entering the cycle

28. The G-protein-coupled biochemical receptors are integral membrane proteins comprising a single polypeptide but which crosses the membrane

(a) 3 times

(b) 5 times

(c) 7 times

(d) only once

29. A metabolite common to the catabolic pathway of leucine and anabolic pathway of cholesterol is

(a) hydroxymethylglutarylCoA

(b) hydroxyisobutyric acid

(c) hydroxyisovalerylCoA

(d) hydroxysedoheptulose

30. An alpha-helical segment of a protein has 180 amino acids. The number of alpha-helical turns in this segment would be

(a) 30

(b) 50

(c) 18

(d) 36

31. Na^+ glucose transporter is an example of

(a) facilitated diffusion

(b) ATP-driven active transport

(c) symport

(d) antiport

32. Which of the following organelles is involved in xenobiotic detoxification?

(a) Golgi apparatus

(b) Lysosome

(c) Rough endoplasmic reticulum

(d) Smooth endoplasmic reticulum

33. Which of the following sequence functions as a signal for N-linked glycosylation?

(a) Asn-X-Ser and Asn-X-Thr

(b) Asn-X-Ser and Asn-X-Pro

(c) Asn-X-Thr and Asn-X-Gly

(d) Asn-X-Gly and Asn-X-Ser

34. Inner mitochondrial membrane has

(a) NADH dehydrogenase complex

(b) glutamate dehydrogenase

(c) isocitrate lyase

(d) catalase

35. Which of the following motor proteins is not involved in vesicular transport along the microtubule?

(a) Kinesin-1

(b) Kinesin-2

(c) Cytoplasmic dynein

(d) Kinesin-13

36. The arrangement of microtubules in eukaryotic flagella is referred to as

(a) undulating

(b) basal

(c) 9+2

(d) ciliary

37. The connective tissue fibers are produced by

(a) macrophages

(b) mast cells

(c) fibroblasts

(d) dendritic cells

38. Which of the following cyclin-CDK complexes is involved in M-phase of cell cycle progression?

(a) Cyclin B-CDK1

(b) Cyclin A-CDK1

(c) Cyclin D-CDK2

(d) Cyclin E-CDK4/6

39. Histone proteins are synthesized in

(a) M-phase

(b) S-phase

(c) G_1-phase

(d) G_2-phase

40. You have inserted the gene for a human growth factor into the *E. coli* lactose operon, by replacing the structural genes. What substance must you add to your culture of bacteria to cause them to produce human growth factor for you?

(a) Repressor protein

(b) Operator protein

(c) Human growth factor

(d) Lactose

41. In eukaryotes, DNA packing seems to affect gene expression primarily by

(a) controlling access to DNA

(b) positioning related genes near each other

(c) protecting DNA from mutations

(d) enhancing the recombination of genes

42. Starting with $^{15}N^{15}N$ (heavy) DNA, and after two generations in ^{14}N medium, *Escherichia coli* cells will contain

(a) 25% $^{15}N^{15}N$ DNA, 50% $^{15}N^{14}N$ DNA and 25% $^{14}N^{14}N$ DNA

(b) 50% $^{15}N^{15}N$ DNA and 50% $^{14}N^{14}N$ DNA

(c) 50% $^{15}N^{15}N$ DNA and 50% $^{15}N^{14}N$ DNA

(d) 50% $^{15}N^{14}N$ DNA and 50% $^{14}N^{14}N$ DNA

43. If ^{35}S was found in progeny phages rather than ^{32}P, Hershey and Chase would have concluded that

(a) proteins contain phosphorus

(b) DNA contains sulfur

(c) phage DNA enters the host cell

(d) phage protein enters the host cell

44. A geneticist isolates a eukaryotic gene for a specific trait under study. She also isolates the corresponding mRNA. Upon comparison, the mRNA is found to contain 1000 fewer bases than the DNA sequence. Did the geneticist isolate the wrong DNA?

(a) Yes, mRNA is made from a DNA template and should be the same length as the gene sequence

(b) Yes, the mRNA should contain more bases than the DNA sequence because bases flanking the gene are also transcribed

(c) No, the final mRNA contains only exons, the introns were removed

(d) No, the mRNA was partially degraded after it was transcribed

45. What activity of DNA polymerase I (pol I of Kornberg's enzyme) is responsible for the removal and replacement of the RNA primer?

(a) 5′ to 3′ polymerase

(b) 3′ to 5′ exonuclease

(c) 3′ to 5′ polymerase

(d) 5′ to 3′ exonuclease

46. Genomic DNA is extracted, broken into fragments of reasonable size by a restriction endonuclease and then inserted into a cloning vector to generate chimeric vectors. The cloned fragments are called

(a) clones

(b) genomic library

(c) cDNA library

(d) metagenomic library

47. Control of expression of heat-shock genes involves

(a) an alternative sigma factor

(b) a helix-turn-helix DNA-binding protein

(c) the response regulator of a two-component regulator system

(d) histone modification

48. What would be the effect on the primary structure of the coded protein if a single base was deleted from a messenger RNA transcript?

(a) No effect

(b) Only a single amino acid residue is changed

(c) A complete change in amino acid sequence from the point of the deletion

(d) It will always lead to premature termination

49. The two polynucleotide chains in DNA are

(a) semidiscontinuous

(b) semiconservative

(c) discontinuous

(d) antiparallel

50. The difference in the expression of schizophrenia seen in identical twins can be attributed to

(a) imprinting

(b) position effect

(c) sex of the child

(d) mitochondrial DNA

51. The probability of heterozygous parents who have had one offspring with a recessive disease of having their second child being born with the same recessive condition is

(a) 100%

(b) 50%

(c) 25%

(d) 12·5%

52. If heterozygous genotype results in intermediate phenotype, it is because of

(a) imprinting

(b) dominance-recessive

(c) incomplete dominance

(d) penetrance

53. Continuous phenotype is caused by

(a) polygenic inheritance

(b) multiple alleles

(c) X-linked genes

(d) Environment alone as genes are not responsible for it

54. A mutation in Xist will prevent chromatin compaction that would in turn interfere with

(a) initiation of X-inactivation

(b) spreading of X-inactivation

(c) maintenance of X-inactivation

(d) T_{six} expression

55. Topoisomers are DNA molecules that vary in

(a) length

(b) sequence

(c) conformation

(d) backbone orientation

56. How many different bands would an individual have for a polymorphic STR?

(a) 1

(b) 2

(c) 4

(d) Multiple

57. You observe a population of humans where 82% have recessive albino and the rest have normal pigmentation. What is the allelic frequency of the dominant allele?

(a) 0·82

(b) 0·18

(c) 0·41

(d) 0·094

58. Which of the following is not an example of natural selection?

(a) Stabilizing selection

(b) Disruptive selection

(c) Operational selection

(d) Directional selection

59. Sex is determined differently in different species. However, few commonalities still exist. Which of the following mechanisms is common to sex determination in *Drosophila*, *C. elegans*, mammals and plants?

(a) Alternative splicing in sex-specific manner

(b) Transcriptional regulation

(c) Environmental control of sex determination

(d) Y chromosome

60. Cancer cells often have reduced amounts of cell surface proteins, including class I MHC antigens. Which of the following cells of the immune system can exploit this property to kill cancer cells?

(a) Cytotoxic T-cells

(b) Natural killer cells

(c) Helper T-cells

(d) Macrophages

61. Which of the following molecules is recognized by T-cell receptor?

(a) Immunoglobulin

(b) MHC complex

(c) B-cell receptor

(d) Integrin

62. Which of the following proteins is not a part of pre-B-cell receptor?

(a) VpreB

(b) λ5

(c) μ heavy chain

(d) β-2-microglobulin

63. Which of the following molecules does not belong to immunoglobulin superfamily?

(a) MHC class II molecules

(b) ICAM molecule

(c) β-2-microglobulin

(d) LFA 1 molecule

64. Which of the following proteins is not involved in LPS signaling?

(a) CD14

(b) G protein

(c) TLR4

(d) myD88

65. Which of the following cell-surface molecule/molecules on T-helper cells bind(s) HIV?

(a) CD4 molecule alone

(b) CD4 and CCR5 molecules

(c) CD8 molecule alone

(d) CD8 and CXCR4 molecules

66. Which of the following molecules serves as opsonins?

(a) C5a

(b) C3a

(c) Light chains

(d) C3b

67. Inflammatory reaction results in the generation of

(a) C-reactive protein

(b) interleukin 2

(c) antigen specific IgG

(d) IgE

68. Affinity maturation of antibodies does not require

(a) DNA rearrangement

(b) B-cell division

(c) antigen

(d) genetic mutations

69. The rule of 12 and 23 is about

(a) DNA rearrangement in constant domains of IgG light chains

(b) DNA rearrangement in variable Ig domains of IgG heavy chains

(c) RNA splicing of heavy chain transcripts

(d) RNA splicing of light chain transcipts

70. The weekly wages earned by 10 persons are ₹ 75, ₹ 205, ₹ 315, ₹ 34, ₹ 340, ₹ 1,025, ₹ 521, ₹ 791, ₹ 695 and ₹ 2,344. The median wage would be

(a) ₹ 521

(b) ₹ 340

(c) ₹ 430·5

(d) ₹ 1,025

71. Quartile deviation is

(a) $Q_4 - \frac{Q_2}{2}$

(b) $Q_3 - \frac{Q_2}{2}$

(c) $Q_3 - \frac{Q_1}{2}$

(d) $Q_4 - \frac{Q_1}{2}$

72. What is the standard deviation of the following data set?

11,12, 13, 14, 15

(a) $\sqrt{2}$

(b) $\sqrt{3}$

(c) $\sqrt{1}$

(d) $\sqrt{4}$

73. How many ways can 5 students occupy 3 vacant seats?

(a) 30

(b) 40

(c) 50

(d) 60

74. Which one of the following is not a condition for binomial distribution?

(a) Variable is discrete

(b) Variable is continuous

(c) Number of trials is small

(d) Events must be independent

75. A normal man (*A*) whose grandfather had galactosemia and a normal woman (*B*) whose mother was galactosemic, get married and plan for their first child. What is the probability that their first child will be galactosemic?

(a) $\frac{1}{12}$

(b) $\frac{1}{4}$

(c) $\frac{1}{16}$

(d) $\frac{1}{8}$

76. *Z*-test refers to the deviation from the mean in a

(a) Poisson distribution

(b) normal distribution

(c) covariance

(d) binomial distribution

77. In a perfect positive correlation, the correlation co-efficient is

(a) between −1 and 0

(b) between +1 and 0

(c) +1

(d) −1

78. Which one of the following is not a condition for Poisson distribution?

(a) Discrete variables

(b) Dichotomy exists

(c) Independent variables

(d) P should be large

79. A plant breeder has 45 different inbred strains of brinjal plants. How many different hybrids can be obtained from a total of 45 plants?

(a) 445

(b) 990

(c) 2025

(d) 90

80. Clavulanic acid irreversibly inactivates β-lactamases which are produced by antibiotic-resistant bacteria in response to indiscriminate abuse of penicillin and its derivatives. Clavulanic acid forms adduct with a serine residue in the active site and acylates the enzyme. This is an example of

(a) competitive inhibition

(b) non-competitive inhibition

(c) mixed inhibition

(d) suicide inactivator

81. In the ear, which of the following structures transduces pressure waves to action potentials that are carried by the cochlear nerve?

(a) Tympanic membrane

(b) Organ of Corti

(c) Semicircular canals

(d) Malleus, incus and stapes

82. The ABO blood group system is based on the differences in the expression of

(a) glycerophospholipids

(b) glycospingolipids

(c) gangliosides

(d) proteoglycans

83. In the intestinal microvilli, several disaccharidases are present that break down food to simple monosaccharides. Which of the following is not a disaccharidase in the intestine?

(a) Amylase

(b) Lactase

(c) Sucrase

(d) Trehalose

84. Rational drug design approach is the method of designing molecules complementary in shape and charge to the biomolecular target to which they bind. Cimetidine was one of the first drugs discovered through such an approach at GlaxoSmithKline by Sir James Black who was awarded the Nobel Prize in 1988 (for a different molecule). Cimetidine is the first line of therapeutic against peptic ulcer. It acts by targeting

(a) pepsin

(b) chloride channels

(c) histamine H_2 receptors

(d) Na^+ / H^+ antiporter

85. The commonly 'good cholesterol' refers to

(a) chylomicrons bound cholesterol

(b) very low-density lipoproteins bound cholesterol

(c) low-density lipoprotein bound cholesterol

(d) high-density lipoprotein bound cholesterol

86. Aquatic inverterbrates such as Cnidarians, Cephalopods, Crustaceans, and Echinoderms contain statocyst which is lined with sensory setae. The animal itself introduces minute sand grains (statoliths) that remain attached to the setae due to the glandular secretions from the tissue. The purpose of these statocysts is essentially to

(a) maintain the equilibrium of the body

(b) camouflage in the presence of a predator

(c) increase sensory perception

(d) provide a protective shell to the underlying nervous system

87. The bicuspid or mitral valve separates

(a) right auricle and ventricle

(b) left auricle and ventricle

(c) right ventricle and pulmonary aorta

(d) left ventricle and systematic or left aorta

88. The end product of glycolysis in erythrocytes is always

(a) carbon dioxide

(b) oxaloacetate

(c) acetyl-CoA

(d) lactate

89. A cardiac muscle differs from a skeletal muscle in that

(a) it is striped or striated

(b) it has autonomic innervations

(c) it requires calcium for contraction

(d) it acts voluntarilly

90. Which of the following is not a component of bacterial lipopolysaccharide?

(a) Lipid A

(b) Cholesterol

(c) Endotoxin

(d) Abequose

91. Leaves on a stem or branch are arranged so as to avoid shading one another, for example, in China rose the sixth leaf stands over the first, and the genetic spiral completes two circles to come to that particular leaf. Such arrangements are generally termed as

(a) leaf mosaic

(b) phyllotaxy

(c) aestivation

(d) Fibonacci series

92. Which of the following structures is a modification of the root?

(a) Rhizome

(b) Bulb

(c) Tuber

(d) Velamen

93. In C_4 plants, carbon dioxide is fixed in the mesophyll cells in the form of

(a) 3-phosphoglycerate

(b) erythrose 4-phosphate

(c) ribulose 1,5-bisphosphate

(d) oxaloacetate

94. Which of the cell wall components is impermeable to water and thus assists in preventing evaporation of water?

(a) Cellulose

(b) Lignin

(c) Suberin

(d) Inulin

95. Nitrogen fixation is essentially an anaerobic process because

(a) of the high electrophilic property of oxygen

(b) of the presence of leghemoglobin

(c) all nitrogen-fixing bacteria are anaerobic

(d) nitrogen is fixed as ammonia rather than as nitrate

96. Annual rings, which are readily seen with the naked eye in the logs of a tree trunk, as in pine, can be counted to approximately determine the age of a plant. These annual rings are formed due to the activity of

(a) cambium

(b) duramen

(c) alburnum

(d) phellogen

97. Bipyridinium herbicides such as diquat and paraquat act through

(a) inhibition of acetyl-CoA carboxylase in the lipid biosynthetic pathway, thus effecting production of meristems in the grass

(b) inhibition of enolpyruvylshikimate 3-phosphate synthase in the biosynthesis of aromatic amino acids, precursors to plant growth hormones

(c) accepting electrons from photosystem I and transferring further to molecular oxygen, thus producing reactive oxygen species

(d) mimicking the action of plant growth regulator auxin, thus effectively controlling dicot plants

98. In plants, nitrogen is metabolized and ultimately results in

(a) excretion in the form of gaseous ammonia

(b) excretion in the form of urea or uric acid

(c) excretion in the form of nitrates or nitrites in the soil

(d) salvaging as nitrogen is rarely ever excreted

99. Which of the following enzymes is found both in a plant cell and a vertebrate cell?

(a) Ribulose 5-phosphate kinase

(b) Isocitrate lyase

(c) Malate synthase

(d) Ribose 5-phosphate epimerase

100. Microorganisms are classified into chemotrophs and phototrophs on the basis of

(a) carbon source

(b) electron source

(c) energy source

(d) nutrition

101. Which of the following bacteria is the most frequent cause of chronic pharyngitis?

(a) *Streptococcus*

(b) *Pneumococcus*

(c) *Klebsiela pneumonia*

(d) *Haemophilus influenza*

102. Pathogenic mechanisms involved in tuberculosis can be primarily attributed to which of the following?

(a) Toxin production by the mycobacteria

(b) Specific cell adhesion sites

(c) Cell-mediated hypersensitivity

(d) Humoral immunity

103. Iodine used in Gram staining serves as

(a) chelator

(b) catalyst

(c) mordant

(d) cofactor

104. DNA transfer from one bacterium to another through phages is termed as

(a) transduction

(b) induction

(c) transfection

(d) infection

105. Edit distance between the sequences (1) ACCGTGA and (2) AGCTTA is

(a) 7

(b) 8

(c) 3

(d) 5

106. Which one of the following is not true for Smith-Waterman algorithm?

(a) A gap penalty can be used

(b) BLOSUM scoring matrix can be used

(c) Alignment is local

(d) A word-size of 3 can be used

107. Sensitivity can be calculated as (TP—true positive, TN—true negative, FP—false positive, FN—false negative)

(a) TP/FP

(b) TP/(TP + FN)

(c) (TP + FP)/(TN + FN)

(d) FP/TP

108. Which one of the following databases contains crystal structures?

(a) Protein data bank

(b) NCBI genebank

(c) PUBMED

(d) KEGG

109. Which one of the following E-values (BLAST) may indicate homology between the query and the subject sequence?

(a) 0·1

(b) 10

(c) 1

(d) 0·00001

110. Hydropathy plot can help to detect

(a) membrane spanning regions in a protein

(b) interior of the protein

(c) exposed surface area

(d) All of the above

111. Enthalpy is a —— function and entropy is a —— function.

(a) state, state

(b) state, path

(c) path, state

(d) path, path

112. A fluorescence microscope detects light

(a) scattered by the sample

(b) emitted by the sample

(c) both scattered and emitted by the sample

(d) absorbed by the sample

113. Low 'Reynolds number' particles

(a) are dominated by viscous drag

(b) are large in size (meter scale)

(c) are dominated by gravitational pull

(d) always move in one direction

114. Which one of the following rotational symmetries is non-crystallographic?

(a) 2-fold

(b) 4-fold

(c) 5-fold

(d) 6-fold

115. Solvent relaxation will

(a) increase the wavelength of the fluorescent emission

(b) decrease the wavelength of the fluorescent emission

(c) cause phosphorescence instead of fluorescence

(d) cause a change of electron spin

116. The wavelength of the radiation used by an FM radio transmitter broadcasting at 92·0 MHz is

(a) 3·26 m

(b) 4·26 m

(c) 2·13 m

(d) 3·89 m

117. The wavelength of a scattered (elastic) wave is

(a) larger than the incident wave

(b) smaller than the incident wave

(c) same as the incident wave

(d) Can be any one of the above, depending upon the energy of the incident wave

118. Which one of the following symmetry elements is absent in natural proteins?

(a) 2-fold rotational symmetry

(b) A tetrahedral symmetry

(c) An icosahedral symmetry

(d) An inversion center of symmetry

119. Which one of the following is an odd pair?

(a) Nuclear magnetic resonance and radiofrequency

(b) Electron paramagnetic resonance and microwave

(c) Crystallography and X-ray

(d) Atomic force microscopy and electron beam

120. Which one of the following molecules has zero dipole moment?

(a) HCl

(b) H_2O

(c) CCl_4

(d) O_3