

Scripture Ash ...

**BCSA2**

Booklet Series

**A**

Register Number

[Empty box for Register Number]

**2010  
BIO-CHEMISTRY**

Time Allowed : 3 Hours ]

[ Maximum Marks : 300

**Read the following instructions carefully before you begin to answer the questions.**

**IMPORTANT INSTRUCTIONS**

1. This Booklet has a cover ( this page ) which should not be opened till the invigilator gives signal to open it at the commencement of the examination. As soon as the signal is received you should tear the right side of the booklet cover carefully to open the booklet. Then proceed to answer the questions.
2. This Question Booklet contains **200** questions.
3. Answer **all** questions.
4. **All** questions carry equal marks.
5. The Test Booklet is printed in *four* series e.g. **A** **B** **C** or **D** (See Top left side of this page). The candidate has to indicate in the space provided in the Answer Sheet the series of the booklet. For example, if the candidate gets **A** series booklet, he/she has to indicate in the side 2 of the Answer Sheet with Blue or Black Ink Ball point pen as follows :

**A** [ ] [B] [C] [D]

6. You must write your Register Number in the space provided on the top right side of this page. Do not write anything else on the Question Booklet.
7. An Answer Sheet will be supplied to you separately by the Invigilator to mark the answers. You must write your Name, Register No. and other particulars on side 1 of the Answer Sheet provided, failing which your Answer Sheet will not be evaluated.
8. You will also encode your Register Number, Subject Code etc., with Blue or Black ink Ball point pen in the space provided on the side 2 of the Answer Sheet. If you do not encode properly or fail to encode the above information, your Answer Sheet will not be evaluated.
9. Each question comprises *four* responses (A), (B), (C) and (D). You are to select **ONLY ONE** correct response and mark in your Answer Sheet. In case you feel that there are more than one correct response, mark the response which you consider the best. In any case, choose **ONLY ONE** response for each question. Your total marks will depend on the number of correct responses marked by you in the Answer Sheet.
10. In the Answer Sheet there are **four** brackets [ A ] [ B ] [ C ] and [ D ] against each question. To answer the questions you are to mark with Ball point pen **ONLY ONE** bracket of your choice for each question. Select one response for each question in the Question Booklet and mark in the Answer Sheet. If you mark more than one answer for one question, the answer will be treated as wrong. e.g. If for any item, (B) is the correct answer, you have to mark as follows :

[A] [ ] [C] [D]

11. You should not remove or tear off any sheet from this Question Booklet. You are not allowed to take this Question Booklet and the Answer Sheet out of the Examination Hall during the examination. After the examination is concluded, you must hand over your Answer Sheet to the Invigilator. You are allowed to take the Question Booklet with you only after the Examination is over.
12. The sheet before the last page of the Question Booklet can be used for Rough Work.
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14. Do not tick-mark or mark the answers in the Question Booklet.

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1. Tumefaciens induce which disease in plant ?
  - A) Crown gall
  - B) Hairy root
  - C) Necrosis
  - D) Chlorosis.
2. Which immunoglobulin is found in secretion such as milk ?
  - A) IgG
  - B) IgM
  - C) IgA
  - D) IgD.
3. PBAD vector uses
  - A) arabinose operon
  - B) gal operon
  - C) lactose operon
  - D) Trp operon.
4. An experiment began with 4 cells and ended with 128 cells. How many generations did the cells go through ?
  - A) 64
  - B) 6
  - C) 5
  - D) 4.
5. As membrane fluidity increases, the following occurs *except*,
  - A) permeability to water increases
  - B) lateral mobility of integral proteins increases
  - C) the rate of transport by transport proteins
  - D) permeability of large hydrophilic molecules increases.
6. The highest mass peak in the mass spectrum of  $PF_3$  comes at  $m/z = 88$  and is a single peak. Which statement is consistent with these data ?
  - A) Fragmentation of  $PF_3$  occurs in the mass spectrometer
  - B) P - F bond cleavage is facile in the mass spectrometer
  - C) F and P are monotopic
  - D) Either P or F, but not both, is monotopic.



7. A double-stranded RNA genome isolated from a virus in the stool of a child with gastroenteritis was found to contain 15% Uracil. What is the percentage of Guanine in this genome ?
- A) 15    B) 25  
C) 35    D) 75.
8. Oxidation and phosphorylation in intact mitochondria is completely blocked by
- A) Pleurocidin A    B) Antimycin A  
C) Oligomycin    D) Amobarbital.
9. What is the role of zinc ion in liver alcohol dehydrogenase catalysis ?
- A) General acid catalysts    B) General base catalyst  
C) Nucleophilic catalyst    D) Electrophilic catalyst.
10. Under normal conditions, which of the following blood energy sources is the preferred fuel of muscle ?
- A) Glucose    B) Ketone bodies  
C) Amino acids    D) Free fatty acids.
11. *Bacillus thuringiensis* is a
- A) Virus    B) Algae  
C) Fungi    D) Bacteria.
12. Immunoglobulin class is determined by
- A) Heavy chain    B) Light chain  
C) J chain    D) Variable region.

13. Splicing involving ligation of the flanking protein fragment is called as
- A) Exons    B) Extens  
C) Inteins     D) Introns.
14. "Superbug" was a name coined for organisms engineered for
- A) Antibiotic production                        B) Probiotic production  
C) Hydrocarbon degradation                D) Enzyme production.
15. Match **List I** correctly with **List II** and select your answer using the codes given below the lists :

| <b>List I</b>                   | <b>List II</b>           |
|---------------------------------|--------------------------|
| a) Plasma                       | 1. ATP synthase          |
| b) Endoplasmic reticulum        | 2. 5'-nucleotidase       |
| c) Golgi apparatus              | 3. Glucose 6-phosphatase |
| d) Inner mitochondrial membrane | 4. Sialyl transferase.   |

Codes :

|    | <b>a</b> | <b>b</b> | <b>c</b> | <b>d</b> |
|----|----------|----------|----------|----------|
| A) | 3        | 1        | 4        | 2        |
| B) | 2        | 3        | 4        | 1        |
| C) | 4        | 2        | 3        | 1        |
| D) | 2        | 4        | 1        | 3.       |





16. Which of the following phenomena of absorption of light at one wavelength and emission at a longer wavelength is used ?
- A) Visible spectroscopy                      B) Fluorescence spectroscopy  
C) X-ray diffraction                          D) None of these.
17. All of the following are features of glycosylated hemoglobin *except*.
- A) can be separated from normal HbA by ion exchange chromatography  
B) is formed by enzymatic glycosylation of amino terminals of Hb by glucose  
C) fraction of glycosylated hemoglobin is normally 5%  
D) reflects average blood glucose concentration for past 6-8 weeks.
18. Which among the following carries electron from  $FADH_2$  to Cytochrome reductase ?
- A) Flavins    B) Fe-S cluster  
C) Hemes    D) Ubiquinone.
19. If analysis of the early part of an enzyme-catalyzed reaction shows it to be first order, this means that the initial substrate concentration was
- A) approximately equal to the  $K_m$  value  
B) much less than the  $K_m$  value  
C) much greater than the  $K_m$  value  
D) equal to or greater than  $k_{cat}/K_m$ .
20. The major source of extracellular cholesterol for human tissues is
- A) VLDL    B) LDL  
C) HDL    D) albumin.

21. The scientist who first cultured the isolated plant cells *in vitro* on artificial medium is
- A) P.R. White                                      B) S.C. Maheswari  
 C) W.J. Robbins                                    D) G. Haberlandt.
22. Which of the following is not true ?
- A) IgM and IgG can fix complement  
 B) IgA is a secretory immunoglobulin  
 C) IgE mediates hypersensitivity  
 D) IgD provides most passively acquired material immunity.
23. p<sup>ET</sup> vectors use which of the following promoters for expression ?
- A) T4 promoter                                    B) T7 promoter  
 C) Ara promoter                                   D) Trp promoter.
24. The medium of Vitamin B<sub>12</sub> production should contain which one of the following mineral sources ?
- A) Cobalt    B) Fe  
 C) Se    D) Cu.
25. Cardiolipin contains
- A) 3 molecules of glycerol  
 B) 2 molecules of glycerol  
 C) 2 molecules of glycerol and one sphingosine  
 D) None of these.





26. According to the Beer-Lambert Law, on which of the following does absorbance not depend ?
- A) Solution concentration
  - B) Colour of the solution
  - C) Extinction coefficient of the sample
  - D) Distance that the light has travelled through the sample.
27. The water soluble vitamin biotin, is not a coenzyme in
- A) Acetyl CoA carboxylase
  - B) Propionyl CoA carboxylase
  - C) Pyruvate carboxylase
  - D) Pyruvate dehydrogenase.
28. Number of ATP produced for a pair of electrons via cytochrome c is
- A) 1
  - B) 1.5
  - C) 2
  - D) 2.5.
29. If a plot of  $V$  vs  $[S]$  is sigmoidal, it most likely means that
- A) the enzyme is allosteric
  - B) there is a competitive inhibitor present
  - C) there is a non-competitive inhibitor present
  - D) there is a mechanism-based inhibitor present.
30. Lesch-Nyhan syndrome is due to a defect in
- A) HGPRT
  - B) Hypoxanthine oxidase
  - C) Glucokinase
  - D) Xanthine oxidase.
31. Von Gierke's disease is due to the deficiency of
- A) Glucokinase
  - B) Glucose-6-phosphatase
  - C) Glyceraldehyde-3-phosphate dehydrogenase
  - D) None of these.



32. The transition state has an estimated life-time of about
- A) microsecond ( $10^{-6}$  s)
  - B) nanosecond ( $10^{-9}$  s)
  - C) picosecond ( $10^{-12}$  s)
  - D) 10-100 femtosecond ( 1 femtosecond =  $10^{-15}$  s ).
33. The tight coupling of electron transport and phosphorylation in mitochondria is disrupted by
- A) CCCP
  - B) 2, 4 dinitrophenol
  - C) Dinitrocresol
  - D) Pentachlorophenol.
34. Turanose is a
- A) deoxy sugar
  - B) 7-membered sugar
  - C) non-reducing disaccharide
  - D) reducing disaccharide of glucose and fructose.
35. Which of the following statements regarding mass spectrometry is *incorrect* ?
- A) Parent ions are not always observed in the mass spectra of compounds
  - B) Provides direct structural data
  - C) Isotopic distribution patterns are observed in mass spectra
  - D) Gives information about fragmentation patterns.







43. Hydrogen peroxide is the substrate for

- I. Catalase
- II. Peroxidase
- III. Oxygenase
- IV. Hydroxylase.

*Of these*

- A) I is correct
- B) I and II are correct
- C) I, II and III correct
- D) I, II, III and IV are correct.

44. Hydroxyproline synthesis requires

- A) Vitamin A
- B) Vitamin C
- C) Vitamin D
- D) Retinol.

45. Cocaine

- A) decreases heart rate and lowers body temperature
- B) causes pupil dilation in normal people
- C) causes pupil constriction in Horner's syndrome
- D) does not affect accommodation.

46. Bt produces a toxin called

- A)  $\delta$ -endotoxin
- B)  $\alpha$ -endotoxin
- C)  $\beta$ -endotoxin
- D)  $\gamma$ -endotoxin

47. Which antibody type protects against bacteria, virus and toxins in secondary immune response ?

- A) IgA
- B) IgD
- C) IgE
- D) IgG.



48. The chromogenic substrate for enzyme  $\beta$ -galactosidase is
- A) 5-bromo-5-fluoroindoxyl
  - B) 5-bromo-4-chloro-3 indolyl- $\beta$ -D-galactopyranoside
  - C) Isopropyl- $\beta$ -D-thiogalactoside
  - D) 5-dibromo-4, 4,-dichloroindigo.
49. What is the daily requirement of Vitamin  $B_{12}$  for human being ?
- A) 0.001 mg/day
  - B) 0.1 mg/day
  - C) 0.1  $\mu$ g/day
  - D) 1g/day.
50. High cholesterol and sialic acid are chemical markers for
- A) Plasma membrane
  - B) Lysosomes
  - C) Golgi apparatus
  - D) Endoplasmic reticulum.
51. What is the optimum condition to sterilize the medium ?
- A) 100° C for 10 minutes
  - B) 110° C for 15 minutes
  - C) 120° C for 20 minutes
  - D) 115° C for 30 minutes.
52. B cells secrete
- A) Cytokines
  - B) Antibodies
  - C) Antigen
  - D) Helper T-cells.
53. Isopropyl thiogalactoside is ..... of lac operon.
- A) inducer
  - B) repressor
  - C) inhibitor
  - D) polymer.

54. An organism is capable of oxidising fatty acids to obtain energy, hydrogen, electrons and carbon. Which type of metabolism does this organism possess ?

- A) Photo-lithotrophic autotroph
- B) Chemo-organotrophic heterotroph
- C) Photo-organotrophic heterotroph
- D) Not enough information to determine which type.

55. Match **List I** correctly with **List II** and select your answer using the codes given below the lists :

| List I                     | List II             |
|----------------------------|---------------------|
| a) Lysosomes               | 1. Cardiolipid      |
| b) Endoplasmic reticulum   | 2. Acid phosphatase |
| c) Nucleosomes             | 3. Cytochrome P 450 |
| d) Mitochondrial membranes | 4. Histone.         |

Codes :

|    | <b>a</b> | <b>b</b> | <b>c</b> | <b>d</b> |
|----|----------|----------|----------|----------|
| A) | 2        | 3        | 4        | 1        |
| B) | 3        | 1        | 4        | 2        |
| C) | 2        | 4        | 1        | 3        |
| D) | 4        | 3        | 2        | 1.       |





56. The dichromate ion absorbs light of wavelength close to 500 nm. Based on this information, what can you conclude ?
- A) The dichromate ion absorbs within the visible region
  - B) The dichromate ion absorbs outside the visible region
  - C) The dichromate ion absorbs in the ultraviolet region
  - D) Solutions of the dichromate ion are colourless.
57. Yeast ferments all the following sugars *except*.
- A) Glucose
  - B) Lactose
  - C) Maltose
  - D) Sucrose.
58. Which one of the following is correctly matched ?
- A) Phenolase — Laccase
  - B) Cytochrome oxidase — Warburg's respiratory enzymes
  - C) *p*-diphenol oxidase — Facultative oxidase
  - D) Aerobic dehydrogenase — Tyrosinase.
59. Enzyme catalysts accelerate chemical reactions by
- A) increasing the free energy of the reactants
  - B) lowering the activation energy by stabilizing the transition state
  - C) raising the activation energy by destabilising the transition state
  - D) decreasing the entropy of the reactants
60. Of the following statements which one is wrong about corticosteroids ?
- A) They are 21-carbon structures
  - B) They increase renal excretion of potassium
  - C) They are synthesized in the adrenal medulla
  - D) ACTH is essential for the production of corticosteroids from cholesterol.

61. Vitamin D is also called as
- A) Antirachitic                                B) Ascorbic acid  
C) Retinol                                        D) Folic acid.
62. Of the choices below, the best description of a zymogen is
- A) an enzyme that consists of RNA rather than protein  
B) a metal ion dependent enzyme  
C) an enzyme that contains zinc  
D) a protease precursor that is inactive until it is cleaved.
63. Which one of the following is correctly matched ?
- A) PMF    — Co Q H<sub>2</sub>-cytochrome reductase  
B) NADH-Co Q reductase                  — pH gradient and electric potential  
C) Q cycle                                        — FMN and Fe-S  
D) Valinomycin                                 — Ionophore.
64. A glucose molecule is to starch as
- A) an amino acid is to a protein            B) an amino acid is to a nucleic acid  
C) a fat is to glycerol                        D) a nucleic acid is to a polypeptide.
65. A solution of a dye absorbs light of wavelength 480 nm, and for this absorption, the extinction coefficient is  $18600 \text{ dm}^3 \text{ mol}^{-1} \text{ cm}^{-1}$ . A sample of the dye of unknown concentration is placed in an optical cell of path length 1 cm and the absorbance reading is 0.18. What is the concentration of the solution ?
- A)  $3.0 \times 10^{-4} \text{ mol dm}^{-3}$                         B)  $9.7 \times 10^{-6} \text{ mol dm}^{-3}$   
C)  $0.026 \text{ mol dm}^{-3}$                             D)  $2.0 \times 10^{-8} \text{ mol dm}^{-3}$ .



66. In phospholipids the 3-phosphate is esterified to an alcohol such as *except*.
- |             |                  |
|-------------|------------------|
| A) choline  | B) ethanol amine |
| C) inositol | D) sphingosine.  |
67. The microorganism which synthesises all vitamins is
- |                 |                    |
|-----------------|--------------------|
| A) Prototrophic | B) Pleotrophic     |
| C) Hydrotrophic | D) methanotrophic. |
68.  $p^{\text{BR} 325}$  has a unique ECORI site in
- |                          |                                 |
|--------------------------|---------------------------------|
| A) Amp <sup>R</sup> gene | B) tet <sup>R</sup> gene        |
| C) Cm <sup>R</sup> gene  | D) Geneticyn <sup>R</sup> gene. |
69. Macrophages can be activated by
- |                |                |
|----------------|----------------|
| A) Neutrophils | B) Antibodies  |
| C) Interferons | D) Complement. |
70. Vero cells are derived from
- |          |               |
|----------|---------------|
| A) lung  | B) kidney     |
| C) heart | D) intestine. |
71. Anomalous structure that develops during organogenesis is called as
- |                 |               |
|-----------------|---------------|
| A) meristemoids | B) rhizoids   |
| C) callus       | D) organoids. |
72. Activated macrophages can kill microorganisms by producing
- |                 |                  |
|-----------------|------------------|
| A) Toxins       | B) Interferons   |
| C) Nitric oxide | D) Interleukins. |

73. Phage  $\lambda$  genome sequencing was determined by

- A) Max Gilbert    B) Linus Pauling  
C) Jacob and Monod    D) Fred Sanger.

74. The pyruvate decarboxylase is used for ethanol production and it requires thiamine pyrophosphate and

- A)  $Mg^{2+}$     B)  $Mn^{2+}$   
C)  $Fe^{2+}$     D)  $Ca^{2+}$ .

75. The fatty acid having two double bonds in it is

- A) myristic acid    B) oleic acid  
C) linoleic acid    D) palmitic acid.

76. The wavelength of an absorption is 495 nm. In what part of the electromagnetic spectrum does this lie ?

- A) Radio wave    B) Microwave  
C) Ultraviolet-visible    D) Infrared.

77. All of the following are glutathione *except*.

- A) Participates in metabolism of xenobiotics  
B)  $\gamma$ -Glutamyl-cysteinyl-glutamine  
C) Contains a non- $\alpha$  peptide bond  
D) Participates in protein folding.

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78. Match the enzymes in **Column I** with inhibitors in **Column II** and select the correct answer from the codes given below :

| <b>Column I</b>         | <b>Column II</b> |
|-------------------------|------------------|
| a) NADH Q-reductase     | 1. Antimycin A   |
| b) Cytochrome oxidase   | 2. Oligomycin    |
| c) Cytochrome reductase | 3. Cyanide       |
| d) ATP synthase         | 4. Rotenone.     |

Codes :

|    | <b>a</b> | <b>b</b> | <b>c</b> | <b>d</b> |
|----|----------|----------|----------|----------|
| A) | 4        | 1        | 3        | 2        |
| B) | 4        | 2        | 1        | 3        |
| C) | 4        | 3        | 1        | 2        |
| D) | 3        | 4        | 2        | 1.       |

79. What is likely to happen to the reaction velocity (or rate) of an enzyme catalyzed reaction already at very high [S] when the [E] is increased 2X ?

- |                |                 |
|----------------|-----------------|
| A) Increase 2X | B) Decrease 4X  |
| C) Increase 4X | D) Increase 8X. |

80. Which of the body reserves, a starving man first consumes ?

- |            |              |
|------------|--------------|
| A) Fat     | B) Glycogen  |
| C) Protein | D) Vitamins. |

81. Which form of auxin is most stable ?

- |        |            |
|--------|------------|
| A) IAA | B) NAA     |
| C) IBA | D) Zeatin. |



82. Mononuclear phagocytic system comprises

- A) Eosinophils                      B) Basophils  
C) Macrophages                     D) Neutrophils.

83. If  $\lambda$  phage is  $S_{pi}^+$ , it is

- A) Sensitive to  $P_2$  inhibition            B) Resistant to  $P_2$  inhibition  
C) Sensitive to  $P_1$  inhibition            D) Resistant to  $P_1$  inhibition.

84. What was the first synthetic antibiotic ?

- A) Gentamycin                      B) Penicillin  
C) Chloromycetin                  D) Streptomycin.

85. The following are pancreatic hormones *except*,

- A) pancreatic polypeptide            B) insulin  
C) glucagon like peptide              D) somatostatin.

86. The frequency of a transition is  $3.1 \times 10^{10}$  Hz. What is the energy of this transition ?

- A)  $2.1 \times 10^{-44}$  kJ                      B)  $2.0 \times 10^{-23}$  J  
C)  $2.1 \times 10^{-44}$  J                      D)  $2.0 \times 10^{-23}$  kJ.

87. Amino acids that are unusually present in high amounts in collagen as compared with most proteins include which of the following ?

- A) Hydroxy proline                      B) Glycine  
C) Isoleucine                              D) Proline.



88. Match the following in **Column I** and **Column II** and select the answer from the codes given below :

| <b>Column I</b>          | <b>Column II</b>    |
|--------------------------|---------------------|
| a) Uncoupling agent      | 1. FAD <sup>+</sup> |
| b) Oxidases              | 2. Dicoumarol       |
| c) Aerobic dehydrogenase | 3. Vit K            |
| d) Coenzyme Q            | 4. Copper.          |

Codes :

|    | <b>a</b> | <b>b</b> | <b>c</b> | <b>d</b> |
|----|----------|----------|----------|----------|
| A) | 2        | 4        | 1        | 3        |
| B) | 2        | 4        | 3        | 1        |
| C) | 2        | 3        | 4        | 1        |
| D) | 3        | 2        | 1        | 4.       |

89. Substrate activation may result in

- A) accepting or donating protons by the enzyme
- B) temporary covalent bonds
- C) a change in enzyme conformation induced by substrate binding
- D) nucleophilic substitution.

90. If a person lives exclusively on a diet of milk, eggs and bread, he is likely to suffer from

- A) Scurvy
- B) Night blindness
- C) Rickets
- D) Beri-beri.

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91. Digestion is accomplished by a chemical process called
- A) Condensation                              B) Hydrolysis  
C) Deamination                              D) Transamination.
92. Why is the Lineweaver-Burk plot important in enzyme kinetics ?
- A) It reveals the presence of organic prosthetic groups in enzymes  
B) It is a single reciprocal plot  
C) It makes it easier to determine  $V_{max}$   
D) It illustrates enzyme specificity.
93. The correct ascending order according to their standard oxidation reduction potentials is
- A) Pyruvate, Fumarate, Acetate, Acetaldehyde  
B) Acetaldehyde, Acetate, Pyruvate, Fumarate  
C) Acetate, Acetaldehyde, Pyruvate, Fumarate  
D) Fumarate, Pyruvate, Acetaldehyde, Acetate.
94. Which one of the following amino acids could serve as the best buffer at pH 7 ?
- A) Arginine                                      B) Glutamic acid  
C) Histidine                                    D) Serine.
95. Which one of the following hydrocarbons produces an nmr spectrum with more than one peak ?
- A) Methane                                      B) Ethane  
C) Butane                                        D) None of these.



96. The process in which organic matter is decomposed to release simpler inorganic compounds, is
- |                   |                   |
|-------------------|-------------------|
| A) Ammonification | B) Mineralization |
| C) Immobilization | D) Nitrification. |
97. The size of C2xB cosmid is
- |           |            |
|-----------|------------|
| A) 5.8 kb | B) 6.8 kb  |
| C) 7.8 kb | D) 4.8 kb. |
98. Lymphocytes are activated by antigen in the
- |                 |                 |
|-----------------|-----------------|
| A) Blood stream | B) Bone marrow  |
| C) Liver        | D) Lymph nodes. |
99. Prolonged autoclaving of sugars leads to the formation of
- |                  |               |
|------------------|---------------|
| A) Hexitol       | B) Melanoidin |
| C) Ketone bodies | D) Dullitol.  |
100. The essential mineral for the formation of body protein is
- |            |               |
|------------|---------------|
| A) Sodium  | B) Iron       |
| C) Sulphur | D) Potassium. |
101. Which of the following variables is NOT a part of the Michaelis-Menten equation ?
- |                |                |
|----------------|----------------|
| A) $\Delta EG$ | B) $K_m$       |
| C) $[S]$       | D) $V_{max}$ . |
102. Arrangement of the inhibitors in the correct order of inhibition of respiratory chain is
- |   |
|---|
| A) $H_2S$ , CO, Antimycin A, Amobarbital  |
| B) Antimycin A, Amobarbital, $H_2S$ , CO  |
| C) Amobarbital, $H_2S$ , CO, Antimycin A  |
| D) Amobarbital, Antimycin A, $H_2S$ , CO. |

103. The ratio of  $\alpha$ -D-glucopyranose to  $\beta$ -D-glucopyranose at equilibrium is nearly
- A) 1 : 1    B) 1 : 1.5  
C) 1 : 2    D) 2 : 1.
104. Aqueous  $\text{KMnO}_4$  solutions are purple. A plot of absorbance against concentration is
- A) non-linear    B) an exponential curve  
C) linear with a negative gradient                          D) linear with a positive gradient.
105. The hormone that binds to the cell surface receptors is
- A) retinoic acid    B) tri-iodothyronine  
C) calcitonin    D) calcitriol.
106. In anaerobic glycolysis two enzymes are required for the production of ethanol and they are
- A) Pyruvate carboxylase and alcohol dehydrogenase  
B) Pyruvate carboxylase and lactate dehydrogenase  
C) Alcohol dehydrogenase and lactate dehydrogenase  
D) All of these.
107. Restriction enzymes used in genetic engineering are
- A) Type I restriction endonuclease                          B) Type II restriction endonuclease  
C) Type III restriction endonuclease                          D) Type IV restriction endonuclease.
108. An epitope is
- A) Antigen determining site                          B) Antibody  
C) T cell    D) B cell.



109. The enzymes which are used to isolate the protoplast are

- A) Amylase and invertase                      B) Cellulase and amylase  
C) Pectinase and amylase                      D) Cellulase and pectinase.

110. Vitamin which is destroyed on heating is

- A) Vitamin A                                      B) Vitamin C  
C) Vitamin D                                      D) Vitamin K.

111. The equation  $v = V_{\max} [S] / (K_m + [S])$  is part of which of the following plots ?

- A) Lineweaver-Burk                              B) Michaelis-Menten  
C) Eadie-Hofstee                                D) Both (A) and (B).

112. The connecting link between HMP shunt and lipid synthesis is

- A) Ribose    B) NADPH  
C) Sedoheptulose-7-phosphate              D) NADH.

113.  $\alpha$ -Glycosidic bond is found in

- A) Lactose    B) Maltose  
C) Sucrose    D) All of these.

114. Which statement is correct ?

- A) Wavelength is directly proportional to energy  
B) Wavelength is directly proportional to frequency  
C) Wave number is directly proportional to energy  
D) Wave number is directly proportional to wavelength.



115. The following are the general features of steroid hormones *except*,

- A) transported by proteins
- B) plasma half-life is short
- C) have intracellular receptor
- D) mediated by receptor-hormone complex.

116. In presence of ammonia Nessler's reagent gives

- A) dark green colour
- B) red colour
- C) deep yellow colour
- D) dark blue colour.

117. P1 vector system has a capacity for DNA fragment as large as

- A) 600 kb
- B) 300 kb
- C) 400 kb
- D) 100 kb.

118. Monoclonal antibodies are produced by

- A) Lymphocytes
- B) Myeloma cells
- C) Hybridoma
- D) Spleen cells.

119. The plant variant obtained from tissue culture is called

- A) Clone
- B) Somaclone
- C) Calliclone
- D) Protoclone.

120. A vitamin which is generally excreted in human urine is

- A) Vitamin C
- B) Vitamin K
- C) Vitamin D
- D) Vitamin A.



121. The enzyme used to break down fructose-1, 6-bisphosphate into two trioses is called

- A) phosphoglucoisomerase                      B) enolase  
C) aldolase    D) triose phosphate isomerase.

122. The hormone that lowers c AMP concentration in liver cell is

- A) Glucagon    B) Insulin  
C) Epinephrine    D) Thyroxine.

123. Match the following and select the answer form the codes given below :

- |            |   |                 |
|------------|---|-----------------|
| a) Glucose | — | 1. Milk sugar   |
| b) Lactose | — | 2. Invert sugar |
| c) Sucrose | — | 3. Malt sugar   |
| d) Maltose | — | 4. Blood sugar. |

Codes :

- |    | <b>a</b> | <b>b</b> | <b>c</b> | <b>d</b> |
|----|----------|----------|----------|----------|
| A) | 4        | 1        | 2        | 3        |
| B) | 4        | 3        | 1        | 2        |
| C) | 3        | 4        | 1        | 2        |
| D) | 4        | 3        | 2        | 1.       |

124. A shift to lower wave number for an absorption in a spectrum corresponds to

- A) a shift to lower frequency                      B) a shift to higher energy  
C) a loss of intensity                                      D) a shift to lower wavelength.

125. Who discovered cytokinin ?

- |                |                |
|----------------|----------------|
| A) J.P. Nitsch | B) C.O. Miller |
| C) G. Morel    | D) E. Ball.    |

126. B cell functions to

- A) proliferate and differentiate into plasma cells
- B) respond to antigen by making antibodies
- C) act as antigen processing cells
- D) all of these.

127. Lox P site is present in

- |                                |             |
|--------------------------------|-------------|
| A) phage P <sub>1</sub> vector | B) cosmid   |
| C) λ phage                     | D) plasmid. |

128. On microbial fermentation, single molecule of glucose is converted into ..... molecule(s) of pyruvic acid.

- |      |       |
|------|-------|
| A) 4 | B) 3  |
| C) 2 | D) 1. |

129. The hormone that inhibits adenylyl cyclase is

- |                         |                                 |
|-------------------------|---------------------------------|
| A) antidiuretic hormone | B) follicle stimulating hormone |
| C) somatostatin         | D) thyroid stimulating hormone. |

130. An absorption in an electronic spectrum is recorded at 17000 cm<sup>-1</sup>. What does this correspond to in nm ?

- |           |              |
|-----------|--------------|
| A) 59 nm  | B) 5900 nm   |
| C) 590 nm | D) 59000 nm. |



131. The epimeric pair from the following is

- A) Galactose and mannose                      B) Glucose and fructose  
C) Glucose and galactose                      D) Lactose and maltose.

132. Carbon skeleton of cysteine is provided by

- A) Serine    B) Methionine  
C) Glutamate                                        D) Alanine.

133. An enzyme synthesized in the laboratory is found to have little activity when compared to the enzyme extracted from a cell culture. Both enzymes were examined and have identical amino acid composition. What is the best explanation for the lack of activity of the synthesized enzyme ?

- A) The primary amino acid sequence was altered while the composition was not altered  
B) The van der Waals radius was altered during laboratory synthesis  
C) The synthesized enzyme was not folded correctly because molecular chaperones were not present  
D) The ATP required for self-assembly was present in the cell extract, but not in the laboratory synthesis.

134. Person who is habitual alcoholic is always short of vitamin

- A) C    B) A  
C) B<sub>5</sub>    D) D.

135. Who is regarded as the father of tissue culture ?

- A) P.R. White                                        B) Haberlandt  
C) C.O. Miller                                        D) Skoog.

136.  $F_C$  region mediates all of the following *except* binding to

- A) Host tissue
- B) Phagocytic cells
- C) Lysosomes
- D) Antigens.

137. In BAC vector pBAC 108L, foreign DNA inserted is identified by

- A) lac z gene
- B) colony hybridization
- C) Amp<sup>R</sup>
- D) Spi<sup>+</sup>

138. Which of the following procedures can be used to isolate a pure culture from a mixture ?

- A) Streak plating
- B) Dilution plating
- C) Enrichment culture
- D) All of these.

139. cAMP is the second messenger for the following hormones *except*,

- A) calcitonin
- B) acetyl choline
- C) glucagons
- D) parathormone.

140. The type of molecule that would show infrared absorption bands in the ranges  $1700 - 1750 \text{ cm}^{-1}$  and  $2500 - 3300 \text{ cm}^{-1}$  is

- A) Alcohol, - OH
- B) Carboxylic acid, - COOH
- C) Ester, - COO -
- D) Aldehyde, - CHO.

141. The predominant form of glucose in solution is

- A) Acyclic
- B) Glucofuranose
- C) Glucopyranose
- D) Hydrated acyclic.





142. The synthesis of urea occurs in

- A) Liver cytosol
- B) Liver mitochondrial matrix
- C) Kidney nephrons
- D) Kidney renal tubule.

143. Which of the following is true of  $\text{NAD}^+$  ?

- A) It is a co-enzyme
- B) It releases an adenosine to become NADH
- C)  $\text{NAD}^+$  serves as an electron source for biological oxidation
- D) It is derived from vitamin E.

144. Which of the following is first digested in stomach ?

- A) Carbohydrate
- B) Fat
- C) Proteins
- D) Nucleic acids.

145. Which chemical is commonly used in the production of synthetic seeds ?

- A) Calcium alginate
- B) Silica gel
- C) Alumina
- D) Agar-agar.

146. Monoclonal antibodies are routinely used in the following *except*.

- A) Typing of tissue
- B) Identification of tumour antigens
- C) Classification of leukemia
- D) Manipulation of immune response.



147. Maximum DNA insert possible with YACs is

- A) 2000 – 3000 kb                      B) 2000 – 4000 kb  
C) 200 – 2000 kb                      D) Less than 200 kb.

148. Soyabean oil, corn oil, lard oil, silicones are used in fermentation

- A) to increase yield                      B) as antifoaming agents  
C) as anticoagulants                      D) to maintain pH.

149. The following hormones having kinase (or) phosphatase cascade act as secondary messengers *except*.

- A) growth hormone                      B) luteinizing hormone  
C) prolactin                      D) somatomammotropin.

150. Emulsification of fats is brought about by

- A) Bile pigments                      B) Bile salts  
C) HCl                      D) All of these.

151. An enzyme that uses ATP to phosphorylate another molecule is called a

- A) dehydrogenase                      B) kinase  
C) phosphorylase                      D) nucleotidase.

152. The lipoprotein possessing the highest quantity of phospholipids is

- A) HDL                      B) LDL  
C) VLDL                      D) Chylomicrons.

153. The following monosaccharides formed the identical osazones *except*.

- A) Glucose and fructose                      B) Glucose and mannose  
C) Glucose and galactose                      D) Mannose and fructose.





154. In the mass spectrum of chloropropane the peak with the largest  $m/z$  value would be at a value of
- A) 79    B) 80  
C) 66    D) 78.
155. The pro-opiomelanocortin family consists of the following hormones *except*,
- A) hCG    B) ACTH  
C) LPH    D) MSH.
156. In what type of fermentation the substrate is added to the system all at once and taken through a limited run until product is harvested ?
- A) Batch fermentation                      B) Continuous fermentation  
C) Downstream fermentation              D) Scaling up.
157. A large number of promoters from *E. coli* contain consensus sequence at
- A) -10 and -35 region                      B) 3' region  
C) 5' region                                      D) -10 region only.
158. Affinity chromatography cannot be used to
- A) purify antibody by binding it to antigen  
B) purify antigen by binding it to antibody  
C) separate antibodies based on size  
D) separate IgM from IgG antibodies based on size antigens.
159. Which helps to promote bud formation ?
- A) Abscissic acid                              B) Gibberellin  
C) Ethylene                                      D) Salicylic acid.



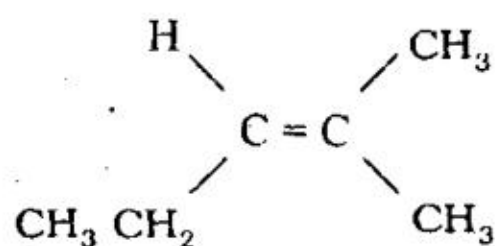
160. Maximum absorption of nutrients takes place in
- A) Ileum
  - B) Stomach
  - C) Colon
  - D) Rectum.
161. An enzyme that uses NADH to reduce another molecule is called a
- A) dehydrogenase
  - B) kinase
  - C) pseudo-oxidase
  - D) reductase.
162. An enzyme of purine metabolism associated with immunodeficiency disease is
- A) Adenosine deaminase
  - B) Xanthine oxidase
  - C) PRPP synthetase
  - D) HGPRT.
163. The membrane carbohydrate, lectin, that binds with  $\alpha$ -glucosyl and  $\alpha$ -mannosyl residues is
- A) Concavalin A
  - B) Chondroitin-4-sulphate
  - C) Chondroitin-6-sulphate
  - D) Hyaluronic acid.
164. Which of the following is not a use of mass spectrometry ?
- A) Calculating the isotopic abundant in elements
  - B) Calculating molecular mass of organic compounds
  - C) Confirming presence of O - H and C = O in inorganic compounds
  - D) Can measure masses and relative concentrations of atom and molecules.
165. Abnormalities in antidiuretic hormone secretion leads to
- A) bronze diabetes
  - B) diabetes mellitus type 1
  - C) diabetes mellitus type 2
  - D) diabetes insipidus.
166. What are the substances given off by yeasts during fermentation ?
- A) Alcohol
  - B) Carbon dioxide
  - C) Organic acids
  - D) All of these.







174. How many absorptions will the following compound have in its carbon NMR spectrum ?



- A) 3  
B) 4  
C) 5  
D) 6.
175. Antidiuretic hormone secretion is inhibited by
- A) acetyl choline  
B) nicotine  
C) epinephrine  
D) morphine.
176. During the chemical treatment of drinking water and waste water, which of the following microbes is least likely to be inactivated or killed ?
- A) Algae  
B) Bacterial endospore  
C) Fungal species  
D) Virus.
177. trc and tac promoters are induced by
- A) glucose  
B) ethanol  
C) lactose  
D) methanol.
178. Auto immune diseases are caused by
- A) A defect in cell mediated immune system  
B) A defect in thymus development  
C) An immune response against self antigens  
D) T cell deficiency.



179. An example for cryoprotectant is

- A) Glycerol  
B) Hexane  
C) Benzene  
D) Glyceraldehyde.

180. Which one of the following is an inborn metabolic error ?

- A) Hartnup disease  
B) Hers' disease  
C) Tyrosinemia  
D) Cystinosis.

181. In 1850's, which scientist concluded that fermentation of sugar to alcohol is catalyzed ?

- A) Edward Buchner  
B) Louis Pasteur  
C) Alfred Joseph  
D) Edward Jenner.

182. The nitrogen atoms in the purine ring are obtained from

- I. Glycine
- II. Glutamine
- III. Aspartate
- IV. Lysine.

Of these

- A) I alone is correct  
B) I and II are correct  
C) I, II and III are correct  
D) I, II, III and IV are correct.



183. Match the following select your answer from the codes given below :

- |              |   |  |
|--------------|---|--|
| a) Lactose   | — | 1. $\alpha(1 \rightarrow 2)$ Glucosyl fructose |
| b) Maltose   | — | 2. $\beta(1 \rightarrow 4)$ Galactosyl glucose |
| c) Sucrose   | — | 3. $\alpha(1 \rightarrow 1)$ Glucosyl glucose. |
| d) Trehalose | — | 4. $\alpha(1 \rightarrow 4)$ Glucosyl glucose  |

Codes :

- |    | <b>a</b> | <b>b</b> | <b>c</b> | <b>d</b> |
|----|----------|----------|----------|----------|
| A) | 4        | 1        | 2        | 3        |
| B) | 4        | 3        | 1        | 2        |
| C) | 3        | 4        | 1        | 2        |
| D) | 2        | 4        | 1        | 3.       |

184. Why is the oxygen-hydrogen absorption of  $\text{CH}_3\text{OH}$  gives such a broad band in the infrared ?

- A) Rotational energy levels broaden the absorption
- B) Hyperconjugation resonance broadens the absorption
- C) Resonance broadens the absorption
- D) Hydrogen bonding broadens the absorption.

185. Thyroid hormones are transported by

- A) thyroxine binding globulin
- B) thyroglobulin
- C) thyroperoxidase
- D) all of these.

x **1406**

**14001**

| Turn over



186. Addition of calcium hydroxide is necessary for lactic acid fermentation because of which of the following reasons ?
- A) Calcium hydroxide neutralizes acid
  - B) Calcium activates the enzyme lactase
  - C) Calcium increases the activity of the medium, necessary for lactobacillus growth
  - D) Lactic acid will degrade without calcium.
187. Human linkage analysis by restriction fragment length polymorphism takes advantage of which hybridization technique ?
- A) Immunoblotting
  - B) Northern blotting
  - C) Southern blotting
  - D) Western blotting.
188. Autoimmune disease mediated by hypersensitivity is
- A) Systemic lupus erythematosus
  - B) Thyroiditis
  - C) Myasthenia gravis
  - D) All of these.
189. A group of genetically identical individuals are called
- A) Culture
  - B) Inoculum
  - C) Clone
  - D) Somaclone.
190. Which of the following bonds would show the strongest absorption in the IR ?
- A) Carbon-hydrogen
  - B) Oxygen-hydrogen
  - C) Nitrogen-hydrogen
  - D) Sulphur-hydrogen.
191. Proteoglycans are
- A) characterized by their content of amino sugars and uronic acids
  - B) provided the ground or packing substances for connective tissues
  - C) having property of holding large quantities of water
  - D) having positive charges on their structure.





192. Precursor for the synthesis of putrescine and spermidine is

- I. Ornithine
- II. S-adenosylmethionine
- III. Citrulline
- IV. Arginine.

Of these

- A) I alone is correct
- B) I and II are correct
- C) I, II and III are correct
- D) I, II, III and IV are correct.

193. Which enzymes are said to follow Michaelis-Menten kinetics ?

- A) Enzymes which show parabolic dependence of rate of reaction and substrate
- B) Enzymes which show circular dependence of rate of reaction and substrate
- C) Enzymes which show hyperbolic dependence of rate of reaction and substrate
- D) None of these.

194. Which of the following metabolic diseases occurs only in males ?

- A) Fabry's disease
- B) Gaucher's disease
- C) Lesch-Nyhan disease
- D) Hunter's disease.

195. Nucleases are enzymes that can degrade

- A) DNA
- B) Protein
- C) RNA
- D) DNA/RNA.

196. Multiple sclerosis is an autoimmune disease of
- A) Lymphatic system                      B) Central nervous system.  
C) Digestive system                      D) Respiratory system.
197. Which two amino acids are most commonly found in  $\beta$  turns in proteins ?
- A) Glycine and proline                      B) Arginine and lysine  
C) Leucine and valine                      D) Trp and tyr.
198. Which one of the following is added during water or sewage treatment to promote flocculation ?
- A) Sludge                                      B) PHA  
C) BOD                                      D) Alum.
199. The following are true with insulin A chain *except*,
- A) it contains 21 amino acids  
B) it contains 30 amino acids  
C) it contains one intrachain disulphide bridge  
D) it connects with B chain by two interchain disulphide bridges.
200. Thyrotoxicosis is
- A) otherwise called goitre  
B) excessive production of thyroid hormone  
C) less production of thyroid hormone  
D) none of these.



( SPACE FOR ROUGH WORK )



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**BCSA2**

**42**

**( SPACE FOR ROUGH WORK )**

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