



Post Graduate School
Indian Agricultural Research Institute, New Delhi
Examination for Admission to Ph.D. Programme 2011-2012

Discipline : Biochemistry

Discipline Code : 08

Roll No

Please Note:

- (i) This question paper contains 13 pages. Please check whether all the pages are printed in this set. Report discrepancy, if any, immediately to the invigilator.
- (ii) There shall be **NEGATIVE** marking for **WRONG** answers in the Multiple Choice type questions (No. 1 to 130) which carry one mark each. For every wrong answer 0.25 mark will be deducted.

PART – I (General Agriculture)

Multiple choice questions (No. 1 to 30). Choose the correct answer (a, b, c or d) and enter your choice in the circle (by shading with a pencil) on the OMR - answer sheet as per the instructions given on the answer sheet.

1. Which of the following crops have been approved for commercial cultivation in India?
 - a) Bt cotton and Bt brinjal
 - b) Bt cotton and Golden Rice
 - c) Bt maize and Bt cotton
 - d) Bt cotton only
2. This year (2010-11) the expected food grain production in India is
 - a) 212 million tonnes
 - b) 220 million tonnes
 - c) 235 million tonnes
 - d) 250 million tonnes
3. The genome of which of the following crops is still not completely sequenced?
 - a) Rice
 - b) Soybean
 - c) Sorghum
 - d) Wheat
4. According to the Approach Paper to the 12th Five Year Plan, the basic objective of the 12th Plan is
 - a) Inclusive growth
 - b) Sustainable growth
 - c) Faster, more inclusive and sustainable growth
 - d) Inclusive and sustainable growth
5. To address the problems of sustainable and holistic development of rainfed areas, including appropriate farming and livelihood system approaches, the Government of India has set up the
 - a) National Rainfed Area Authority
 - b) National Watershed Development Project for Rainfed Areas
 - c) National Mission on Rainfed Areas
 - d) Command Area Development and Water Management Authority
6. Which of the following sub-schemes are not covered under the Rashtriya Krishi Vikas Yojana?
 - a) Extending the Green Revolution to eastern India
 - b) Development of 60,000 pulses and oilseeds villages in identified watersheds
 - c) National Mission on Saffron
 - d) National Mission on Bamboo
7. The minimum support price for the common variety of paddy announced by the Government of India for the year 2010-11 was
 - a) ₹ 1030
 - b) ₹ 1000
 - c) ₹ 980
 - d) ₹ 950
8. According to the Human Development Report 2010 of the United Nations, India's rank in terms of the human development index is
 - a) 119
 - b) 134
 - c) 169
 - d) 182

9. Which of the following does not apply to SRI method of paddy cultivation?
- Reduced water application
 - Reduced plant density
 - Increased application of chemical fertilizers
 - Reduced age of seedlings
10. Which organic acid, often used as a preservative, occurs naturally in cranberries, prunes, cinnamon and cloves?
- Citric acid
 - Benzoic acid
 - Tartaric acid
 - Lactic acid
11. Cotton belongs to the family
- Cruciferae
 - Anacardiaceae
 - Malvaceae
 - Solanaceae
12. Photoperiodism is
- Bending of shoot towards source of light
 - Effect of light/dark durations on physiological processes
 - Movement of chloroplast in cell in response to light
 - Effect of light on chlorophyll synthesis
13. Ergot disease is caused by which pathogen on which host?
- Claviceps purpurea* on rye
 - Puccinia recondita* on wheat
 - Drechlera sorokiniana* on wheat
 - Albugo candida* on mustard
14. Rocks are the chief sources of parent materials over which soils are developed. Granite, an important rock, is classified as
- Igneous rock
 - Metamorphic rock
 - Sedimentary rock
 - Hybrid rock
15. Which one of the following is a *Kharif* crop?
- Pearl millet
 - Lentil
 - Mustard
 - Wheat
16. The coefficient of variation (C.V.) is calculated by the formula
- $(\text{Mean}/\text{S.D.}) \times 100$
 - $(\text{S.D.}/\text{Mean}) \times 100$
 - $\text{S.D.}/\text{Mean}$
 - $\text{Mean}/\text{S.D.}$
17. Which of the following is commonly referred to as muriate of potash?
- Potassium nitrate
 - Potassium chloride
 - Potassium sulphate
 - Potassium silicate
18. Inbred lines that have same genetic constitution but differ only at one locus are called
- Multi lines
 - Monohybrid
 - Isogenic lines
 - Pure lines
19. For applying 100 kg of nitrogen, how much urea would one use?
- 45 kg
 - 111 kg
 - 222 kg
 - 333 kg
20. The devastating impact of plant disease on human suffering and survival was first realized by epidemic of
- Brown spot of rice in Bengal
 - Late blight of potato in USA
 - Late blight of potato in Europe
 - Rust of wheat in India
21. The species of rice (*Oryza*) other than *O. sativa* that is cultivated is
- O. rufipogon*
 - O. longisteminata*
 - O. glaberrima*
 - O. nivara*
22. The enzyme responsible for the fixation of CO_2 in mesophyll cells of C-4 plants is
- Malic enzyme
 - Phosphoenol pyruvate carboxylase
 - Phosphoenol pyruvate carboxykinase
 - RuBP carboxylase
23. Which one of the following is a 'Vertisol'?
- Black cotton soil
 - Red sandy loam soil
 - Sandy loam sodic soil
 - Submontane (Tarai) soil
24. What is the most visible physical characteristic of cells in metaphase?
- Elongated chromosomes
 - Nucleus visible but chromosomes not
 - Fragile double stranded loose chromosomes
 - Condensed paired chromosomes on the cell plate

25. All weather phenomena like rain, fog and mist occur in
 a) Troposphere
 b) Mesosphere
 c) Ionosphere
 d) Ozonosphere
26. Which of the following elements is common to all proteins and nucleic acids?
 a) Sulphur
 b) Magnesium
 c) Nitrogen
 d) Phosphorous
27. Silt has intermediate characteristics between
 a) Sand and loam
 b) Clay and loam
 c) Loam and gravel
 d) Sand and clay
28. Certified seed is produced from
 a) Nucleus seed
 b) Breeder seed
 c) Foundation seed
 d) Truthful seed
29. Seedless banana is an
 a) Autotriploid
 b) Autotetraploid
 c) Allotriploid
 d) Allotetraploid
30. Which one of the following is used to test the goodness-of-fit of a distribution?
 a) Normal test
 b) t-test
 c) Chi-square test
 d) F-test
31. A potent competitive inhibitor of hexokinase is
 a) Mg^{2+} - ATP
 b) Uncomplexed ATP
 c) Mg^{2+}
 d) Glucose
32. The β -carboxyltransferase subunit of ACCase is encoded by
 a) Nuclear gene
 b) Chloroplastic gene
 c) Mitochondrial gene
 d) Both a) & b) of the above
33. Trypsin is used to cleave the polypeptide chain at
 a) Lys, Arg (C)
 b) Arg (C)
 c) Lys (C)
 d) Lys, Arg (N)
34. The highest negative charge density of any known biological macromolecules has been reported in
 a) DNA
 b) Hyaluron
 c) Chitin
 d) Heparin
35. Green fluorescent protein which is used as a marker is derived from
 a) *Aequorea victoria*
 b) *B. subtilis*
 c) *Thermus aquaticus*
 d) *Victoria regia*
36. The helix rise per base pair in case of Z-form of DNA is
 a) 1.4 Å
 b) 2.6 Å
 c) 3.4 Å
 d) 3.7 Å
37. The linkage of N-acetylglucosamine in chitin is
 a) $\alpha 1 \rightarrow 4$
 b) $\alpha 1 \rightarrow 6, \alpha 1 \rightarrow 4$
 c) $\beta 1 \rightarrow 4$
 d) $\beta 1 \rightarrow 4, \alpha 1 \rightarrow 6$
38. In case of photorespiration, NH_3 is released inside
 a) Mitochondria
 b) Chloroplast
 c) Peroxisomes
 d) None of the above
39. The number of substrate level phosphorylation taking place in case of glycolysis is
 a) 1
 b) 2
 c) 3
 d) 4
40. Glucose and galactose are
 a) Epimers
 b) Anomers
 c) Enantiomers
 d) Exomers

PART – II (Subject Paper)

Multiple choice questions (No. 31 to 130). Choose the correct answer (a, b, c or d) and enter your choice in the circle (by shading with a pencil) on the OMR - answer sheet as per the instructions given on the answer sheet.

41. Carnitine acyl transferase I, which helps in transport of fatty acids into mitochondria is present in
- Matrix
 - Cytosol
 - Inner mitochondrial membrane
 - Outer mitochondrial membrane
42. Glycine, found in all the proteins, rotates the plane of polarized light towards
- Right
 - Left
 - Either right or left
 - Neither right nor left
43. Ketone bodies are
- Acetoacetate
 - Acetone
 - β -hydroxybutyrate
 - All of the above
44. The last enzymatic step of urea cycle takes place in
- Mitochondria
 - Cytosol
 - Matrix
 - Nucleus
45. Tetrahydrofolate (H_4 Folate) synthesized in bacteria consists of
- Pterin
 - Glutamate moieties
 - p-aminobenzoate
 - All of the above
46. Additional enzymes required for the oxidation of PUFA, other than the enzyme of β -oxidation cycle are
- Enoyl CoA isomerase
 - 2,4 dienoyl CoA hydratase
 - 2,4 dienoyl CoA reductase
 - a) & c) of the above
47. Synthesis of each Triose phosphate from CO_2 requires _____ NADPH and _____ ATP.
- 5, 12
 - 6, 9
 - 6, 12
 - 9, 9
48. Chemiosmotic theory was given by
- Warburg
 - Mitchell
 - Calvin
 - Slack
49. Antimycin A blocks the transfer of electron from
- Cyt b \rightarrow Cyt C_1
 - Cyt $C_1 \rightarrow$ Cyt C
 - Cyt C \rightarrow Cyt aa_3
 - NADH \rightarrow Cyt b
50. Fatty acids are transported into the mitochondria bound to
- Thiokinase
 - Coenzymes A (CoA)
 - Carnitine
 - Acetyl CoA
51. The amino acids which are primarily found in bacteria are
- L- amino acid
 - D- amino acid
 - D/L amino acid
 - R- amino acid
52. The decarboxylation reaction in case of C_4 plants takes place inside
- Mesophyll cell
 - Bundle sheath cells
 - Plasma membrane
 - Both a) and b) of the above
53. Serotonin, a neurotransmitter is derived from amino acid
- Phenylalanine
 - Proline
 - Tryptophan
 - Valine
54. The wrapping of DNA around the histone core is
- Right handed helix
 - Left handed helix
 - No helix
 - Neutral
55. The antibody which is present in highest concentration in the serum is
- IgA
 - IgM
 - IgG
 - IgD
56. The structure analogue of PABA is
- Penicillin
 - Sulfanilamide
 - Both of the above
 - None of the above
57. The cellular location of eukaryotic RNA polymerase-III is
- Nucleolus
 - Nucleoplasm
 - Mitochondria
 - Golgi apparatus
58. The gross ATP required for adding 1 amino acid during protein biosynthesis is
- 1
 - 2
 - 3
 - 4

59. ABA is a
 a) Monoterpene
 b) Sesquiterpene
 c) Diterpene
 d) None of the above
60. The strong conclusion from Anfinsen's work on RNaseA was that
 a) 100% enzyme activity corresponds to the native conformation
 b) Urea can reversibly denature proteins *in vivo*
 c) The native conformation of a protein is adopted spontaneously
 d) Mercaptoethanol can reduce disulfide bonds *in vitro*
61. Number of electrons required to reduce one molecule of nitrite to ammonia is
 a) 2
 b) 4
 c) 6
 d) 8
62. The enzyme which is involved in both glycolysis as well as gluconeogenesis is
 a) Hexokinase
 b) Pyruvate carboxylase
 c) Aldolase
 d) Fructose-1-6-bisphosphatase
63. At lower concentration of ammonia, the pathway operative in plants for its assimilation is
 a) GDH
 b) GS
 c) GS/GOGAT
 d) GOGAT
64. Which of the following statements about nitrate reductase is wrong?
 a) It reduces nitrate to nitrite
 b) It is an inducible enzyme
 c) It is chloroplastic enzyme
 d) It is cytosolic enzyme
65. Which of the following gases act as signaling molecule in eukaryotes?
 a) Ethylene, nitrous oxide
 b) Ethylene, carbon dioxide
 c) Ethylene, nitric oxide
 d) Nitric oxide, oxygen
66. Uptake of nitrate is
 a) Carrier mediated
 b) Active process
 c) Follows Michaelis-Menten equation
 d) All of the above
67. Which of the following is not a dietary antioxidant?
 a) Vitamin C
 b) Lipolic acid
 c) Vitamin K
 d) Beta-carotene
68. Siroheme present in NiR has
 a) 2 COOH gr
 b) 4 COOH gr
 c) 6 COOH gr
 d) 8 COOH gr
69. The electron donor for nitrate reductase is
 a) NADH
 b) NADPH
 c) FADH
 d) a) & b) of the above
70. A nick in a DNA molecule can be detected by which of the following methods?
 a) Nested PCR
 b) Primer extension
 c) RT-PCR
 d) Karyotyping
71. Specificity constant of an enzyme is
 a) V_{max}/E_t
 b) K_M/V_{max}
 c) K_{cat}/K_M
 d) v/V_{max}
72. Most proteins bind SDS in the ratio of
 a) 0.5 g SDS/g protein
 b) 1.4 g SDS/g protein
 c) 2 g SDS/g protein
 d) 4 g SDS/g protein
73. The disease characterised by 3D's i.e. diarrhea, dermatitis and dementia is caused due to the deficiency of
 a) Vitamin B₁
 b) Vitamin B₁₂
 c) Vitamin B₂
 d) Niacin
74. ATCase enzyme has subunit composition of
 a) C₁₂R₁₂
 b) C₆R₆
 c) C₅R₅
 d) C₄R₄
75. Succinate dehydrogenase is competitively inhibited by
 a) Succinate
 b) Fumarate
 c) Malonate
 d) α -ketoglutarate

76. In case of ^{35}S radioactive isotope, the radiation type is
- γ
 - β
 - γ, β
 - α
77. In C_4 plants, the first stable carbon product formed is
- PEP
 - OAA
 - Malic acid
 - Acetic acid
78. Which of the following amino acids is destroyed when a polypeptide is hydrolyzed in 6 M HCl at 110°C ?
- Isoleucine
 - Serine
 - Cysteine
 - Tryptophan
79. The phosphorylated compound having highest standard free energy of hydrolysis is
- ADP
 - ATP
 - PEP
 - PPi
80. Chlorophyll lacking central magnesium ion is called
- Pheotin
 - Pheobin
 - Pheophytin
 - Phyophytin
81. What enzyme do cows have that allows them to digest cellulose?
- Beta-amylase
 - Beta-lactase
 - Alpha-amylase
 - Beta-hydroxy-beta-methylglutaryl coenzyme A reductase
82. The conversion of glucose-6-phosphate to glucose takes place inside
- Cytosol
 - ER
 - Mitochondria
 - All of the above
83. You get a primer sequence synthesized from a private company. According to the information supplied by the company, the amount of primer synthesized is 56.1 nanomoles. You need to prepare a stock solution of 100 micromolar. In how much volume of water/buffer, you will dissolve the given amount to get desired concentration?
- 5.61 milliliter
 - 5.61 microliter
 - 561 microliter
 - One microliter
84. The end product of glycolysis is
- CO_2 and H_2O
 - Pyruvic acid
 - Acetyl CoA
 - ATP and NADPH
85. Respiration and photosynthesis, both require
- Chlorophyll
 - Cytochromes
 - Sunlight
 - Carbohydrates
86. RFLP marker was first used for mapping in
- Tomato
 - Drosophila
 - Maize
 - Sweet pea
87. The chemical commonly used for somatic hybridization is
- SDS
 - PEG
 - CTAB
 - EtBr
88. In peptidoglycan, the glycosidic bond is
- $\alpha 1 \rightarrow 4$
 - $\beta 1 \rightarrow 4$
 - $\alpha 1 \rightarrow 6$
 - $\beta 1 \rightarrow 6$
89. An optically inactive amino acid is
- Pro
 - Ala
 - Val
 - Gly
90. Induction effect of heavy metals on the synthesis of PCs (phytochelatins) are in the following decreasing order
- $\text{Cd} > \text{Zn} > \text{Hg}$
 - $\text{Zn} > \text{Ag} > \text{Cu}$
 - $\text{Cd} > \text{Ag} > \text{Pb}$
 - More than one is correct
91. Sodium hydroxide present in its 100 ml of 1.0 N solution is
- 2 g
 - 4 g
 - 20 g
 - 40 g
92. Which vitamin is necessary for synthesis of FAD?
- Thiamine
 - Riboflavin
 - Niacin
 - B_6

93. Peptide bond in proteins is
- Planar, rigid and trans
 - Planar, rigid and cis
 - Planar, flexible and cis
 - Non-planar, flexible and trans
94. In proteins at β -turn, the amino acid commonly present is
- Aspartic acid
 - Glycine
 - Alanine
 - Phenylalanine
95. In competitive inhibitors of an enzyme
- K_m is constant and V_{max} changes
 - K_m changes and V_{max} changes
 - K_m is constant and V_{max} is constant
 - K_m changes and V_{max} is constant
96. Allosteric enzymes
- Obey Michaelis-Menten equation
 - Do not obey Michaelis-Menten equation
 - Obey Lineweaver-Burk equation
 - Do not obey Henderson-Hasselbalch equation
97. The glycosaminoglycan hyaluronan is a repeat of basic disaccharide unit constituting
- Galactose and N-acetyl glucose
 - Glucuronic acid and N-acetyl galactosamine
 - Galactonic and glucosamine
 - Glucuronic acid and N-acetyl glucosamine
98. In glycolysis, the only reaction providing $NADH+H^+$ is from the reaction
- Dihydroxyacetone phosphate to glyceraldehyde 3-phosphate
 - Glyceraldehyde-3-phosphate to 1,3-bisphosphoglycerate
 - 3-phosphoglycerate to 2-phosphoglycerate
 - 2-phosphoglycerate to phosphoenol pyruvate
99. Gluconeogenesis is energetically expensive, as each molecule of glucose formed from pyruvate requires high-energy phosphate groups, numbering
- 4
 - 5
 - 6
 - 7
100. Pyruvate dehydrogenase enzyme requires for its activity
- 2 coenzymes
 - 3 coenzymes
 - 4 coenzymes
 - 5 coenzymes
101. Complete oxidation of odd chain fatty acids requires an enzyme i.e. containing coenzyme- B_{12}
- Methylmalonyl-CoA epimerase
 - Methylmalonyl-CoA mutase
 - Methylmalonyl-CoA isomerase
 - Propionyl-CoA carboxylase
102. Shuttle system that indirectly convey cytosol NADH into mitochondria for oxidation is
- Malate-aspartate shuttle
 - Glycine-serine shuttle
 - Carnitine shuttle
 - Glutamate- α -ketoglutarate shuttle
103. What is the role of the Rho protein in termination of transcription?
- It acts as Helicase to break base pair between the template and transcript
 - It is a DNA binding protein that stalls movement of RNA polymerase
 - It is a nuclease that degrades 3'-end of RNA transcript
 - It is a subunit of ribosome that stops translocation
104. Which of the following is a definition of an isoaccepting t-RNA molecule?
- A single t-RNA molecule that can interact with different codons for the same amino acid
 - Different t-RNA molecules that are specific for the same amino acid
 - Different t-RNA molecules that recognize the same codon
 - A t-RNA molecule that can be aminoacylated with different amino acids
105. Which of the following nuclease activates is utilized by DNA polymerase to provide the proof reading ability during DNA synthesis?
- $5' \rightarrow 3'$ exonuclease
 - $3' \rightarrow 5'$ exonuclease
 - Restriction endonuclease
 - Double strand endonuclease
106. What are Okazaki fragments?
- Short segments of polynucleotide synthesized on leading strand of DNA
 - Short segments of polynucleotide synthesized on lagging strand of DNA
 - The primer synthesized on the lagging strand that are required for DNA synthesis
 - The Proteolytic fragments of DNA polymerase

107. Which of the following sequence modules is not a basal promoter element?
- CAAT box
 - GC box
 - TATA box
 - Octamer module
108. Heterochromatin is defined as
- Chromatin that is composed of heterogenous nucleotide sequences
 - Chromatin that contains heterogenous proteins
 - Chromatin that is relatively condensed and contains inactive genes
 - Chromatin that is relatively relaxed and contains active genes
109. The site of enzyme modification by phosphorylation is the amino acid
- Tyrosine
 - Cysteine
 - Lysine
 - Serine
110. Since the pK values for Aspartic acid are 2.0, 3.9 and 10.0, it follows that the isoelectric point (pI) is
- 3.0
 - 3.9
 - 5.9
 - 6.0
111. Given that $\Delta G^\circ = -2.3 RT \log K_{eq}$, determine the free energy of the following reaction:
- $$\underset{10 \text{ moles}}{A} + \underset{10 \text{ moles}}{B} \rightleftharpoons \underset{10 \text{ moles}}{C}$$
- 4.6 RT
 - 2.3 RT
 - +2.3 RT
 - +4.6 RT
112. Which of the following techniques for purification of proteins can be made specific for a given protein?
- Dialysis
 - Affinity chromatography
 - Gel filtration chromatography
 - Ion-exchange chromatography
113. The hydrolytic step leading to the release of a polypeptide chain from a ribosome is catalyzed by
- Stop codons
 - Peptidyl transferase
 - Release factors
 - Dissociation of ribosomes
114. Which of the following statements about interferon is true?
- It is virus specific
 - It is a bacterial product
 - It inhibits viral multiplication in all cells
 - It requires expression of cellular genes
115. Which one of the following single-stranded DNA molecules would be palindromic in the double stranded state?
- ATGCTACG
 - ATGCCGTA
 - GTCATGAC
 - GCTATGAC
116. Which of the following enzymes of the glycolytic pathway is particularly sensitive to inhibition by fluoride ions?
- Hexokinase
 - Aldolase
 - Pyruvate kinase
 - Enolase
117. An allosteric enzyme thought to be responsible for controlling the rate of the citric acid cycle is
- Pyruvate dehydrogenase
 - Aconitase
 - Isocitrate dehydrogenase
 - Malate dehydrogenase
118. Which one of the following reactions is least likely to occur?
- $AMP + PPI \rightarrow ATP$
 - $AMP + ATP \rightarrow 2ADP$
 - $CDP + ATP \rightarrow CTP + ADP$
 - $ADP + Pi \rightarrow ATP$
119. All the following are involved in calcium metabolism and functions except
- Thyroxine
 - Parathyroid hormone
 - Vitamin D
 - Calcitonin
120. The important reactive group of glutathione in its role as an antioxidant is
- Amino
 - Sulfhydryl
 - CoA
 - Carboxyl
121. A ring is absent in the chemical structure of which of the following vitamins or coenzymes?
- Niacin
 - Tetrahydrofolic acid
 - Pantothenic acid
 - Biotin

122. Which of the following vitamins is the precursor of CoA?
 a) Riboflavin
 b) Pantathenate
 c) Thiamine
 d) Pyridoxamine
123. Which of the following enzymes or enzyme systems is localized in the inner membrane of the mitochondrion?
 a) Acetyl CoA carboxylase
 b) Isocitrate dehydrogenase
 c) Fatty acid CoA oxidation enzyme
 d) Succinate dehydrogenase
124. A homogenate of liver cells is centrifuged at 1,00,000×g for 1 hour. Following this, the supernatant is separated from the pellet and the pellet is resuspended in physiological medium. Assuming inclusion of the appropriate substrates and cofactors all the following enzymes activities can be measured in the resuspended pellet except
 a) Glucose 6-phosphate dehydrogenase
 b) Glycogen synthetase
 c) Aconitase
 d) Acyl CoA hydratase
125. Cellulose is indigestible by humans because we lack the enzyme that hydrolyzes
 a) $\alpha(1-4)$ glycosidic bonds
 b) $\alpha(1-6)$ glycosidic bonds
 c) $\beta(1-4)$ glycosidic bonds
 d) Long chain polysaccharides
126. In C_3 plants, CO_2 is fixed into which of the following molecule?
 a) RuBP
 b) PEP
 c) Acetyl-CoA
 d) PGA
127. Ubiquitin is a protein required for
 a) Protein synthesis
 b) Protein degradation
 c) Amino acid degradation
 d) Glycoprotein degradation
128. Geiger-Muller Counter is used to measure
 a) Light intensity
 b) Conductivity
 c) Electric current
 d) Radioactivity
129. In sugarcane, the first acceptor of CO_2 is
 a) Pyruvate
 b) Ribulose-5-phosphate
 c) Phosphoenol pyruvate
 d) Ribulose-1,5-bisphosphate

130. Which of the following vectors is binary vector?
 a) pUC 18
 b) pBR 322
 c) pCambia 2301
 d) pMal-2x

Matching type questions (No. 131 to 140); all questions carry equal marks. Choose the correct answer (a, b, c, d or e) for each sub-question (i, ii, iii, iv and v) and enter your choice in the circle (by shading with a pencil) on the OMR - answer sheet as per the instructions given on the answer sheet.

131.
 i) NR
 ii) *nif* gene
 iii) NiR
 iv) GOGAT
 v) Nitrogenase 2
- a) Rhizobium
 b) Ammonia assimilation
 c) Vanadium
 d) Cigar shaped
 e) Chloroplatic enzyme

132.
 i) Cyt oxidase
 ii) Nitrogenase
 iii) Urease
 iv) Alcohol dehydrogenase
 v) Glutathione peroxidase
- a) Mo
 b) Ni
 c) Zn
 d) Se
 e) Cu

133.
 i) Starch
 ii) Sucrose
 iii) Mannose
 iv) Cellulose
 v) Trehalose
- a) $\alpha 1 \rightarrow 4$ & $\alpha 1 \rightarrow 6$
 b) $\alpha 1 \beta 2$
 c) $\alpha 1 \rightarrow 4$
 d) $\beta 1 \rightarrow 4$
 e) $\alpha 1 \rightarrow 1$

134.
 i) Hyaluronic acid
 ii) Insulin
 iii) Eugenole
 iv) Progesteron
 v) ATP
- a) Terpenoid
 b) Protein
 c) Carbohydrate
 d) Nucleotide
 e) Steroid

135.
 i) Okazaki fragments
 ii) Bam HI
 iii) Allolactose
 iv) EF-Tu
 v) Histones
- a) Protein synthesis
 b) Inducer
 c) DNA
 d) Lagging strand
 e) Restriction endonuclease

136.
 i) Chromatography
 ii) Electrophoresis
 iii) Myoglobin
 iv) Haemoglobin
 v) Ribozyme
- a) Cech
 b) Kendrew
 c) Tiselius
 d) Tswett
 e) Perutz

137.

- | | |
|----------------------------|-----------------------|
| i) Transformation | a) Protein |
| ii) Transforming particles | b) DNA |
| iii) ^{32}P | c) Meselson |
| iv) ^{35}S | d) McCarty and McLeod |
| v) ^{15}N | e) Griffith |

138.

- | | |
|--|------------------------------|
| i) Pyruvate kinase | a) TCA |
| ii) Citrate lyase | b) Fatty acid biosynthesis |
| iii) Glucose 6-phosphate dehydrogenase | c) Pentose phosphate pathway |
| iv) Acetyl CoA carboxylase | d) Glyoxylate cycle |
| v) Malate dehydrogenase | e) Glycolysis |

139.

- | | |
|-----------------------------|---------------------|
| i) Hexokinase | a) Ni^{++} |
| ii) Alcohol dehydrogenase | b) Se |
| iii) Glutathione peroxidase | c) K^{+} |
| iv) Pyruvate kinase | d) Mg^{++} |
| v) Urease | e) Zn^{++} |

140.

- | | |
|--------------------------------|----------------|
| i) Protein synthesis | a) Cyanide |
| ii) RNA synthesis | b) Aphidicolin |
| iii) Oxidative phosphorylation | c) Doxorubicin |
| iv) Replication | d) Puromycin |
| v) Topoisomerases | e) Actinomycin |

Short questions (No. 141 to 146); each question carries FIVE marks. Write answers, including computation / mathematical calculations if any, in the space provided for each question on the question paper itself.

141. Why should phenylketonurics avoid using aspartame, an artificial sweetener?

142. What is the [S] for the enzyme catalyzed reaction which has an initial velocity of 12.62 mole/Lit/min, maximum velocity of 21.85 mole/Lit/min and K_m of 3.88 mole/Lit?

143. Nucleotides play a variety of roles in the cell. Give example of nucleotide that acts in each of the following roles or processes:
- a) Allosteric effector, b) DNA sequencing, c) Activation of acetyl group, d) Second messenger, and e) Activation of carbohydrates

144. When chloroplasts of green plant are illuminated in the absence of ADP+Pi and the light is turned off and ADP+Pi added, ATP is synthesized for a short duration in the dark. How does this work?

145. How acetyl CoA generated in mitochondria is transported to cytosol for fatty acid biosynthesis?

△

146. List some of the desirable features of a plasmid cloning vector.