

M.Sc. ZOOLOGY
SECOND SEMESTER (SPECIAL REPEAT)
MOLECULAR BIOLOGY AND BIOCHEMISTRY
MSZ-202

SET
A

[USE OMR SHEET FOR OBJECTIVE PART]

Duration: 3 hrs.

Full Marks: 70

(Objective)

Time: 30 mins.

Marks: 20

Choose the correct answer from the following:

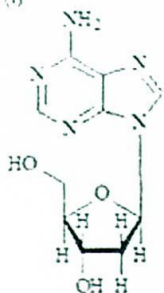
1 × 20 = 20

- All of the enzymes in TCA cycle are located in the mitochondrial matrix except:
 - Citrate synthetase
 - α -ketoglutarate
 - Succinate dehydrogenase
 - Fumerase
- Free glucose is formed during glycogenolysis from:
 - Glucose residues in 1,4 linkage to the main chain
 - Glucose residues in 1,6 linkage to the main chain
 - Glucose 1-phosphate hydrolysis
 - Glucose 1,6-diphosphate hydrolysis
- The breakdown of one molecule of a C16 fully saturated fatty acid by beta oxidation lead to the formation of:
 - 8FADH₂, 8NADH and 8 acetyl CoA molecules
 - 7FADH₂, 7NADH and 7 acetyl CoA molecules
 - 8FADH₂, 8NADH and 7 acetyl CoA molecules
 - 7FADH₂, 7NADH and 8 acetyl CoA molecules
- The prostaglandins are synthesised from:
 - Arachidonic acid
 - Oleic acid
 - Linoleic acid
 - None of the above
- Which of the following amino acid is optically inactive?
 - Glycine
 - Proline
 - Glutamine
 - Serine
- Which of the following coenzymes are mostly used for oxidative deamination of most of the amino acids?
 - Pyridoxal PO₄
 - FMN
 - FAD
 - Folic acid
- Which of the following are the cofactors for the enzyme, Hexokinase?
 - Cu²⁺
 - K⁺
 - Mg²⁺
 - Zn²⁺
- Which of the following enzyme is an example for the class-Lyases?
 - Transaminases
 - Dehydrogenases
 - Mutases
 - Aldolases

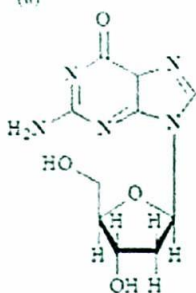
9. Which of the following statement about a plot of velocity versus substrate concentration for an enzyme that follows Michaelis-Menten kinetics is *false*?
- K_m is the substrate concentration at which $V = \frac{1}{2}V_{max}$
 - The shape of the curve is hyperbola
 - As substrate concentration increases, the initial velocity of the reaction V also decreases.
 - At very high substrate concentration, the velocity curve becomes a horizontal line that intersects the Y axis at K_m
10. Which of the following statements about reversible enzyme inhibition is *incorrect*?
- Non competitive inhibition occurs when a substrate and an inhibitor binding site is same
 - Competitive inhibition occurs when a substrate and an inhibitor compete for the same active site on the enzyme
 - Non competitive inhibition of an enzyme cannot be overcome by adding large amount of substrate
 - Competitive inhibitors are often similar in chemical structures to the substrate of the inhibitor enzyme
11. Which reaction in DNA replication is catalysed by DNA ligase?
- Addition of new nucleotides to the lagging strand
 - Addition of new nucleotides to the leading strand
 - Base pairing of the template and the newly formed DNA strand
 - Formation of a phosphodiester bond between the 3'-OH of one Okazaki fragment and the 5'-phosphate of the next on the lagging strand
12. What is the name of the DNA repair system in *E. coli* in which dual incisions are made in the damaged part of the double helix, and a 12-13 base segment is removed and replaced with new DNA?
- Mismatch repair
 - Base excision repair
 - Nucleotide excision repair
 - AP site repair
13. The enzyme photolyase is used in what method of repair?
- Base excision
 - Photo reactivation
 - Nucleotide excision
 - None of these
14. The main enzyme to polymerize leading strand of eukaryotic DNA is:
- DNA polymerase α
 - DNA polymerase β
 - DNA polymerase γ
 - DNA polymerase δ
15. In Nucleotide Excision repair mechanism which of the following protein first recognise DNA lesion?
- Uvr A
 - Uvr B
 - Uvr C
 - Uvr D

16. What type of structures are the compounds (i) - (iv)?

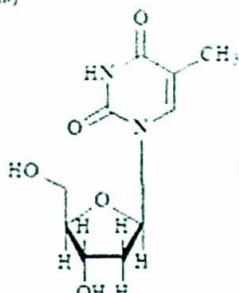
(i)



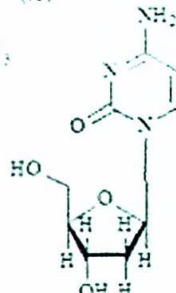
(ii)



(iii)



(iv)



- a. Nucleic acid
c. Nucleosides

- b. Nucleotides
d. Deoxyriboses

17. What role does messenger RNA play in the synthesis of proteins?

- a. It catalyses the process
b. It provides the genetic blueprint for the protein
c. It translates the genetic code to a specific amino acid
d. It modifies messenger RNA molecules prior to protein synthesis

18. On which of the following molecules would you find an anticodon?

- a. Messenger RNA
b. Ribosomal RNA
c. Transfer RNA
d. Small nuclear RNA

19. The glycolytic pathway requires which of the following as an allosteric regulatory enzyme?

- a. Glucokinase, phosphofructokinase and pyruvate kinase
b. Hexokinase, phosphofructokinase and pyruvate kinase
c. Hexokinase, glyceraldehydes 3-phosphate dehydrogenase and enolase
d. Phosphofructokinase, enolase and pyruvate kinase

20. If ^{32}P - labeled inorganic phosphate were introduced to RBCs undergoing glycolysis then which of the following glycolytic intermediate would be radiolabelled?

- a. Fructose 1,6-bisphosphate
b. 1,3 -bisphosphoglycerate
c. Glyceraldehyde 3-phosphate
d. Glucose 6-phosphate

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(Descriptive)

Time : 2 hr. 30 mins.

Marks : 50

[Answer question no.1 & any four (4) from the rest]

1. What is active site of an enzyme? Write down the salient features of active site. 10
2. How is transcription initiated in the prokaryotes? What is Rho dependent and Rho independent termination? Mention any two promoter sites of eukaryotes. 4+4+2=10
3. Why DNA replication is called Semi-discontinuous replication? Explain with proper illustration the mechanism of replication in both leading and lagging strand of a bacterial DNA. 2+8=10
4. What are coenzymes? Write briefly on the role of coenzymes in enzyme action. 10
5. Why is it important in mismatch repair that the cell distinguish the parental strands from newly synthesized strands? Contrast the mechanism of nucleotide excision repair with illustrations. 4+6=10
6. Describe in details, how hn RNA is processed for the final transcript. What is redundancy of genetic code? Draw the structure of t RNA and show its different binding sites. 6+2+2=10
7. Describe the five stages in the biosynthesis of cholesterol from Acetyl-CoA. Name the two main bile acids found in mammals and outline its synthesis from cholesterol in the liver. 5+1+4=10
8. Write short notes on: 5+5=10
 - a) TCA cycle
 - b) Glycogenolysis

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