STELLA MARIS COLLEGE (AUTONOMOUS) CHENNAI 600 086
(For candidates admitted from the academic year 2023 – 2024)

M. Sc. DEGREE EXAMINATION, NOVEMBER 2023
BIOINFORMATICS
FIRST SEMESTER

COURSE : CORE
PAPER : BIOMOLECULES AND BIOCHEMISTRY
SUBJECT CODE : 23BI/PC/BM14
TIME : 3 HOURS MAX. MARKS: 100

Q. No.	SECTION A (20 x 1=20 marks) **All questions to be answered**	CO	KL
1	Which of the following makes water a liquid at room temperature? a) Noncovalent interactions b) Hydrogen bonds between water molecules c) Van der Waals forces of attraction d) Covalent bonding	CO1	K1
2	The stability of an α-helix is not affected by which of the following? a) Bulkiness b) Occurrence of alanine and glycine residues c) Electrostatic repulsion d) Interaction between R groups spaced three residues apart	CO1	K1
3	Which of the following catalyzes the reversible degradation of 2-phosphoglycerate to phosphoenolpyruvate? a) Trypsin b) Enolase c) Chymotrypsin d) Hexokinase	CO1	K1
4	Which of the following is an example of epimers? a) Mannose & Glucose b) Glucose & Ribose c) Galactose & Mannose d) Glucose & Galactose	CO1	K1
5	Which of the following is true about phosphodiester linkage? a) 3'-phosphate group of one nucleotide unit is joined to the 5'-hydroxyl group of the next nucleotide b) 3'-phosphate group of one nucleotide unit is joined to the 3'-hydroxyl group of the next nucleotide c) 5'-phosphate group of one nucleotide unit is joined to the 3'-hydroxyl group of the next nucleotide d) 5'-phosphate group of one nucleotide unit is joined to the 5'-hydroxyl group of the next nucleotide	CO1	K1
6	Arrangement of nucleotides in DNA can be seen using which of the following instruments? a) Electron microscope b) Light microscope c) X-Ray crystallography d) Ultracentrifuge	CO1	K1
7	Anabolism and catabolism are chemically linked in the form of _____ a) ASP b) ADP c) ATP d) Phosphodiester linkage	CO1	K1
8	How many steps are catalyzed by different enzymes in glycolysis and gluconeogenesis? a) 3 b) 4 c) 1 d) 2	CO1	K1

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9	Which of the following factors is not responsible for the denaturation of proteins? a) Heat b) Charge c) pH change d) Organic solvents	CO1	K1
10	Which of the following is responsible for specifying the 3D shape of a protein? a) The peptide bond b) The amino acid sequence c) Interaction with other polypeptides d) Interaction with molecular chaperons	CO1	K1
11	The transition zone for Raman spectra is _____ a) Between vibrational and rotational levels b) Between electronic levels c) Between magnetic levels of nuclei d) Between magnetic levels of unpaired electrons	CO2	K2
12	The criteria for electronic spin resonance is _____ a) Periodic change in polarisability b) Spin quantum number of nuclei > 0 c) Presence of unpaired electron in a molecule d) Presence of chromophore in a molecule	CO2	K2
13	IR spectroscopy is useful for determining certain aspects of the structure of organic compounds because _____ a) Most organic functional groups absorb in characteristic region of IR spectrum b) IR peak intensities are related to molecular mass c) All molecular bonds absorb IR radiation d) Each element absorbs at a characteristic wave length	CO2	K2
14	Which of the following is true about t_m? a) The higher the content of G ≡ C base pairs, the lower the t_m b) The higher the content of A = T base pairs, the higher the t_m c) It can be termed as renaturation temperature d) The higher the content of G ≡ C base pairs, the higher the t_m	CO2	K2
15	Which of the following membrane lipids have a direct glycosidic linkage between the head-group sugar and the backbone glycerol? a) Ether lipids b) Sphingolipids c) Glycolipids d) Phospholipids	CO2	K2
16	Polysaccharides are formed by _____ a) Glycosidic linkages b) Peptide linkage c) Phospho-diester linkage d) Vanderwaal forces	CO2	K2
17	What is the most critical property of an enzyme? a) Composition b) Thermal denaturation c) Specificity d) Solubility	CO2	K2
18	Proteins normally do not contain which element? a) C b) N c) S d) P	CO2	K2

19	It is possible to classify enzymes, vitamins, and hormones as a single category of biological chemicals because they all a) enhance oxidative metabolism b) are conjugated proteins c) are exclusively synthesized in the body of a living organism d) help in regulating metabolism	CO2	K2
20	Blocking of enzyme action by blocking its active site is called as a) Allosteric inhibition b) Feedback inhibition c) Competitive inhibition d) Non-competitive inhibition	CO2	K2
Q. No.	**SECTION B (10 x 2= 20 marks)** **(Answer any TEN questions)**	**CO**	**KL**
21	Define buffer.	CO3	K3
22	State Dalton's theory.	CO3	K3
23	Give an example for covalent bonds.	CO3	K3
24	What is meant by reducing sugars?	CO3	K3
25	Explain three types of RNA.	CO3	K3
26	How are nucleosides different from nucleotides?	CO3	K3
27	What is the function of ATP in cell metabolism?	CO4	K4
28	Classify lipids.	CO4	K4
29	Write the nomenclature of enzymes.	CO4	K4
30	What are cofactors?	CO4	K4
31	Explain xenobiotics.	CO4	K4
32	Write the principle of UV spectroscopy.	CO4	K4
Q. No.	**SECTION B (10 x 2= 20 marks)** **(Answer any TEN questions)**	**CO**	**KL**
33	What is a hydrogen bond?	CO3	K3
34	Write the properties of water.	CO3	K3
35	List any two functions of lipids.	CO3	K3
36	What is a glycosidic linkage?	CO3	K3
37	Explain Ramachandran plot	CO3	K3
38	Define enthalpy.	CO3	K3
39	Mention the role of enzymes in metabolism.	CO4	K4
40	Differentiate alpha-helix and beta-pleated sheet of proteins.	CO4	K4
41	State Chargaff's rule.	CO4	K4

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42	Write any two enzyme purification methods.	CO4	K4
43	What is detoxification?	CO4	K4
44	Enlist the different types of spectroscopy.	CO4	K4
Q. No.	**SECTION C (4 x 5=20 marks)** **(Answer FOUR questions with internal choice)**	**CO**	**KL**
45	a) Elaborate the different types of chemical bonds with examples. **OR** b) Illustrate the mechanism of TCA cycle.	CO5	K5
46	a) Explain briefly the four levels of protein structure. **OR** b) Write notes on types and functions of nucleic acids.	CO5	K5
47	a) Derive Michaelis –Menten equation. **OR** b) Enlist the application of enzymes in medicine and industry.	CO5	K5
48	a) Explain the xenobiotic degradation mechanisms. **OR** b) Give an account on principle and working of NMR.	CO5	K5
Q. No.	**SECTION C (2 x 10=20 marks)** **(Answer any TWO questions)**	**CO**	**KL**
49	Discuss the thermodynamic systems and explain the laws of thermodynamics.	CO5	K6
50	Write in detail on β oxidation of fatty acids.	CO5	K6
51	Describe the types of enzyme inhibition and regulation.	CO5	K6
52	Explain the working of mass spectrometry for protein and peptide analysis.	CO5	K6

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