STELLA MARIS COLLEGE (AUTONOMOUS) CHENNAI-86 (For candidates admitted during the academic year 2023–24)

B.Sc. DEGREE EXAMINATION, NOVEMBER 2024 BRANCH V(a) – PLANT BIOLOGY & PLANT BIOTECHNOLOGY BRANCH VI(a) – ADVANCED ZOOLOGY & BIOTECHNOLOGY THIRD SEMESTER

COURSE : ALLIED CORE

PAPER : FUNDAMENTALS OF CHEMISTRY - I

SUBJECT CODE : 23CH/AC/FB33

TIME : 3 HOURS MAX.MARKS :100

Q. No.	SECTION A $(15 \times 1 = 15 \text{ marks})$	CO	KL		
	Choose the correct answer:				
1.	Which of these statements is incorrect?	1	1		
	Living Organisms				
	a) are composed of lifeless molecules				
	b) use energy from the environment				
	c) show no capacity to grow and reproduce				
	d) have chemical molecules that are dynamic				
2.					
	a) colourless b) molecular weight is 18.015 g/mol				
	c) expands upon freezing d) boiling point is 10°C				
3.	Which of these is an agranulocyte?	1	1		
	a) neutrophils b) basophils c) eosinophils d) monocytes				
4.	Hydrogen bonds are relatively compared to covalent	1	1		
	bonds				
	a) weak b) strongest c) stronger d) strong				
5.	The standard state of an element is its natural state at pressure	1	1		
	and temperature				
	a) 10 atm, 25°C b) 1 atm, 25°C				
	c) 10 atm, 100°C d) 1 atm, 100°C	_			
6.	The energy currency of the cell is	1	1		
	a) glucose b) acetyl CoA c) acetone d) ATP	_			
7.	is an acid-base indicator.	1	1		
	a) phenolphthalein b) ferroin c) diphenylamine d) Friochrome Black T				
	c) diphenylamine d) Eriochrome Black T				
8.	Which among these is not a monosaccharide?	1	1		
•	a) glyceraldehyde b) lactose c) galactose d) ribose				
9.	The cause of metabolic acidosis is due to	1	1		
	a) the decrease in the bicarbonate fraction of plasma				
	b) The increase in the bicarbonate fraction of plasma				
	c) The increase in the carbonic acid fraction of plasma				
10	d) The decrease in the carbonic acid fraction of plasma	1	1		
10.	Salivary amylase breaks down into maltose	1	1		
1.1	a) monosaccharides b) disaccharides c) polysaccharides d) all	1	1		
11.					
	a) gluconeogenesis b) glycogenesis				
	c) glycogenolysis d) glycolysis				

12.	The class of enzymes to which dehydrogenase belongs is		1
	a) ligases b) hydrolases c) oxidoreductases d) lyases		
13.	When $V = \frac{1}{2} V$ max, Km is equal to the concentration of		1
	a) inhibitor b) enzyme c) substrate d) coenzyme		
14.	A cytochrome is transporting protein that contains a	1	1
	haem prosthetic group		
	a) an electron b) two electrons		
	c) hydrogen ion d) an electron and hydrogen ion		
15.	The value of HbA1c to classify as normal or in the prediabetic range		1
	should be below		
	a) 5.7% b) 6.5% c) 7.0% d) 4.5%		

Q. No.	SECTION B	$(15 \times 1 = 15 \text{ marks})$	CO	KL
	Answer in a line or two;			
16.	What is Ionic product of water?		2	2
17.	Define Endergonic reactions.		2	2
18.	What should be the ratio of conce	ntration of bicarbonate to carbonic	2	2
	acid to maintain the pH of blood?			
19.	Define coenzymes.		2	2
20.	What is the type of bonding between	een glucose molecules in amylose?	2	2
	Fill in the Blanks:			
21.	ATP is triphosphate.		2	2
22.	Carbohydrates which on hydrolysis give 2-10 molecules of		2	2
	monosaccharide are called			
23.	Coenzyme A functions as a carrier of groups in		2	2
	oxidative decarboxylation.			
24.	Phenolphthalein turns in acidic solution.		2	2
25.	The electrolyte which is the chief extra cellular cation is		2	2
	Match the following:			
26.	Phosphoenol pyruvate to	a)Homopolysaccharide	2	2
	pyruvate			
27.	Cellulose	b) Disorderliness of a system	2	2
28.	Fischer's lock and key	c) Substrate level phosphorylation	2	2
29.	Entropy	d) Intermolecular fit	2	2
30.	Hemophilia A	e) Oxidative phosphorylation	2	2
		f) Clotting factor VIII		
		g) System's heat energy		

Q. No.	SECTION C		KL
	Answer any six questions $(6 \times 5 = 30 \text{ marks})$		
31.	Construct the metabolic pathway of glycogenesis.	3	3
32.	Predict the effect of temperature and substrate concentration on	3	3
	enzyme action.		
33.	Relate acidosis and alkalosis to imbalance of the pH of blood.	3	3
34.	Apply the role of insulin and glucagon in the maintenance of blood	3	3
	glucose level.		

35.	Classify the composition of blood.	3	3
36.	For the reaction $CO(g) + H_2O(g) \rightarrow CO_2(g) + H_2(g)$ $\Delta H^0 = -41.2 \text{ kJ and } \Delta S^0 = -135 \text{ J/K}$	3	3
	 a) Calculate ΔG° at 298K b) Predict whether the reaction is spontaneous. ii) Calculate the pH of lime juice having [H+] concentration of 		
	0.0035M. (2)		
37.	Illustrate and explain the Fischer's lock and key model and	3	3
	Koshland's induced fit model of enzyme action.		

Q. No.	SECTION D		KL
	Answer any four questions $(4 \times 5 = 20 \text{ marks})$		
38.	Distinguish between	4	4
	a) Hemophilia and sickle cell anemia. (2)		
	b) Glucose and sucrose (3)		
39.	Differentiate between	4	4
	a) entropy and enthalpy		
	b) spontaneous and non- spontaneous reactions. (2+3)		
40.	Examine the TCA cycle and infer the total number of ATP's gained by	4	4
	the complete oxidation of one mole of acetyl CoA.		
41.	Analyse the role of buffers and electrolytes in the body.	4	4
42.	Classify the enzymes based on the type of reactions they catalyse with	4	4
	an example each.		

Q. No.	SECTION E $(2 \times 10 = 20 \text{ ma})$	rks)	CO	KL
43. a	i) Explain the buffering action of bicarbonate buffer system.		5	5
	ii) Interpret the molecular logic of life.	(5+5)		
	(OR)		5	5
43.b	Explain the mechanism of blood coagulation.	(10)		
44. a	i) Deduce the structure of phenolphthalein in the acidic and basic medium. ii) Highlight the importance of the clinical significance of RB platelet count iii) Explain the digesion of di and poly saccharides in the body (OR)	(4)	5	5
44.b	Explain the biochemical reactions of the metabolic pat glycolysis and justify the net gain of eight ATPs for the aerobic oxidation of one mole of glucose to pyruvate.	•	5	5