DPP - Daily Practice Problems

Name : _____ Date : _____

Start Time : _____ End Time : _____

CHEMISTRY 56

SYLLABUS : Biomolecules -I : Carbohydrates, Amino acids, Proteins and Enzymes

Max. Marks : 120 **Time : 60 min.**

GENERAL INSTRUCTIONS

- The Daily Practice Problem Sheet contains 30 MCQ's. For each question only one option is correct. Darken the correct circle/ bubble in the Response Grid provided on each page.
- You have to evaluate your Response Grids yourself with the help of solution booklet.
- Each correct answer will get you 4 marks and 1 mark shall be deduced for each incorrect answer. No mark will be given/ deducted if no bubble is filled. Keep a timer in front of you and stop immediately at the end of 60 min.
- The sheet follows a particular syllabus. Do not attempt the sheet before you have completed your preparation for that syllabus. Refer syllabus sheet in the starting of the book for the syllabus of all the DPP sheets.
- After completing the sheet check your answers with the solution booklet and complete the Result Grid. Finally spend time to analyse your performance and revise the areas which emerge out as weak in your evaluation.

DIRECTIONS (Q.1-Q.21) : There are 21 multiple choice questions. Each question has 4 choices (a), (b), (c) and (d), out of which ONLY ONE choice is correct.

Q.1 Gun cotton is .
(a) Nitrosucrose
(b) Nitrocellulose
(c) Nitroglucose
(d) Nitropicrin

Q.2 Amide group is present in.
(a) Lipids (b) Carbohydrates
(c) Amino acids (d) Proteins

Q.3 A certain compound gives negative test with ninhydrin and positive test with Benedict's solution. The compound is
(a) A protein (b) A monosaccharide
(c) A lipid (d) An amino acid

Q.4 Glucose when heated with CH_3OH in presence of dry HCl gas gives α- and β-methyl glucosides because it contains
(a) An aldehyde group (b) A - CH_2OH group
(c) A ring structure (d) Five hydroxyl groups

Q.5 Sugar can be tested in urine by
(a) Molisch test (b) Dunstan's test
(c) Benedict's test (d) Legal's test

RESPONSE GRID	1. ⓐⓑⓒⓓ	2. ⓐⓑⓒⓓ	3. ⓐⓑⓒⓓ	4. ⓐⓑⓒⓓ	5. ⓐⓑⓒⓓ

Space for Rough Work

Q.6 The reagent which forms crystalline osazone derivative when reacted with glucose, is

(a) Fehlingsolution (b) Phenylhydrazine

(c) Benedict solution (d) Hydroxylamine

Q.7 To become a carbohydrate a compound must contain at least

(a) 2 carbons (b) 3 carbons

(c) 4 carbons (d) 6 carbons

Q.8 The intermediate compound formed in the conversion of starch to glucose is

(a) Lactose (b) Sucrose

(c) Maltose (d) Fructose

Q.9 The number of atoms in D-fructofuranose is

(a) 5 (b) 6

(c) 4 (d) 7

Q.10 Which of the following does not show any reducing test of aldehyde?

(a) Sucrose (b) Fructose

(c) Maltose (d) Lactose

Q.11 The charring of sugar, when treated with conc. H_2SO_4. is due to

(a) Oxidation (b) Reduction

(c) Dehydration (d) Hydrolysis

Q.12 If an aqueous solution of glucose is allowed to freeze then crystal of which will be separated out first ?

(a) Glucose

(b) Water

(c) Both of these

(d) None of these

Q.13 The proteins with a prosthetic group are called

(a) Pseudo proteins (b) Complex proteins

(c) Conjugated proteins (d) Polypeptides

Q.14 The prosthetic group of haemoglobin is

(a) Porphin (b) Haem

(c) Globin (d) Globulin

Q.15 Proteins when heated with conc. HNO_3 give a yellow colour. This is

(a) Oxidising test (b) Xanthoprotic test

(c) Hoppe's test (d) Acid-base test

Q.16 Which one of the following is an amino acid ?

(a) CH_3CONH_2 (b) $CH_3CONHCH_3$

(c) CH_3NHCHO (d) $NH_2CH_2.COOH$

Q.17 Which of the following reacts with haemoglobin in the blood to form carboxyhaemoglobin ?

(a) CO (b) CO_2

(c) HCOOH (d) H_2CO_3

Q.18 For $-\overset{\overset{O}{\|}}{C}-\overset{\cdot\cdot}{N}H-$ (peptide bond)

Which statement is incorrect about peptide bond?

(a) C — N bond length in proteins is longer than usual bond length of the C — N bond

(b) Spectroscopic analysis shows planar structure of the $-\overset{\overset{O}{\|}}{C}-NH-$ group

(c) C — N bond length in proteins is smaller than usual bond length of the C—N bond

(d) None of the above

Q.19 Which compound can exist in a dipolar (zwitter ion) state ?

(a) $C_6H_5CH_2CH(N{=}CH_2)COOH$

(b) $(CH_3)_2CH.CH(NH_2)COOH$

(c) $C_6H_5CONHCH_2COOH$

(d) $HOOC.CH_2CH_2COCOOH$

Q.20 A nanopeptide contains ..... peptide linkages

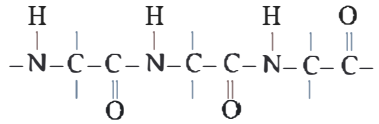
(a) 10 (b) 8

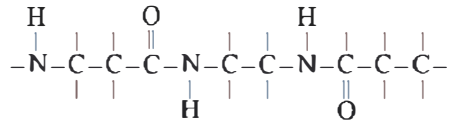
(c) 9 (d) 18

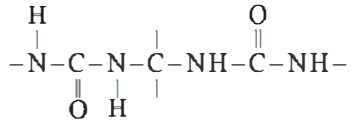
RESPONSE GRID					
	6. ⓐⓑⓒⓓ	7. ⓐⓑⓒⓓ	8. ⓐⓑⓒⓓ	9. ⓐⓑⓒⓓ	10. ⓐⓑⓒⓓ
	11. ⓐⓑⓒⓓ	12. ⓐⓑⓒⓓ	13. ⓐⓑⓒⓓ	14. ⓐⓑⓒⓓ	15. ⓐⓑⓒⓓ
	16. ⓐⓑⓒⓓ	17. ⓐⓑⓒⓓ	18. ⓐⓑⓒⓓ	19. ⓐⓑⓒⓓ	20. ⓐⓑⓒⓓ

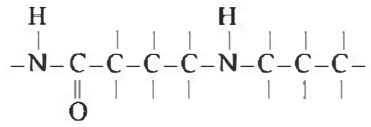
Space for Rough Work

Q.21 Which one of the following structures represents peptide chain ?

(a) 

(b) 

(c) 

(d) 

DIRECTIONS (Q.22-Q.24) : In the following questions, more than one of the answers given are correct. Select the correct answers and mark it according to the following codes:

Codes :

(a) 1, 2 and 3 are correct **(b)** 1 and 2 are correct

(c) 2 and 4 are correct **(d)** 1 and 3 are correct

Q.22 Which of the following statements about ribose is correct?

(1) It is a polyhydroxy compound.

(2) It is an aldehyde sugar.

(3) It exhibits optical activity.

(4) It has six carbon atoms.

Q.23 Which of the following statements are correct?

(1) Enzymes are organic catalysts.

(2) Enzymes have a large turnover number.

(3) Enzyme action is specific.

(4) Enzymes always require a coenzyme in their catalytic action.

Q.24 Which of the following statements are incorrect?

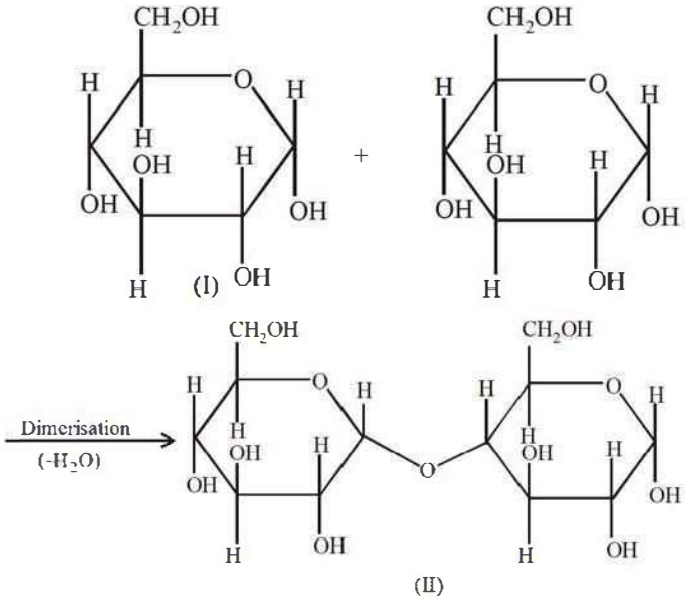
(1) Starches are polymers of α – glucose molecules with β – 1, 4 – linkages and some β – 1,6 – cross-linkages.

(2) Proteins are polyamides of β –aminoacids.

(3) The structural information about the biosynthesis of proteins is contained in a class of compounds called nucleic acids, e.g. RNA and DNA

(4) Cellulose are linear polymers of β – glucose molecules with β –1,4 – linkages.

DIRECTIONS (Q.25-Q.27) : Read the passage given below and answer the questions that follows :



Q.25 What is true about compound (I) ?

(a) It has an acetal structure

(b) It has tertiary hydroxy group

(c) It has a hemiacetal structure

(d) It's degree of unsaturation is two

Q.26 Compound (II) is/has –

(a) a polysaccharide

(b) an oligosaccharide

(c) a monosaccharide

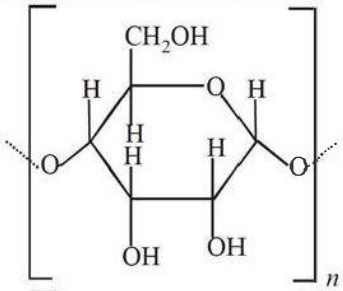
(d) hydrogen deficiency index of three

RESPONSE GRID	21. ⓐⓑⓒⓓ 22. ⓐⓑⓒⓓ 23. ⓐⓑⓒⓓ 24. ⓐⓑⓒⓓ 25. ⓐⓑⓒⓓ 26. ⓐⓑⓒⓓ

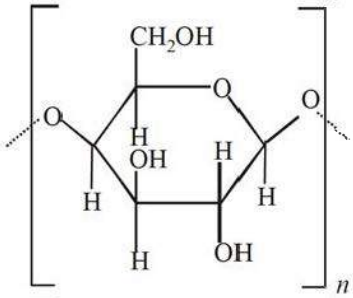
Space for Rough Work

Q.27 Assuming that polymerisation of (I) takes place in manner similar to its dimerisation, then the structure of polymer (III) can be correctly represented as –

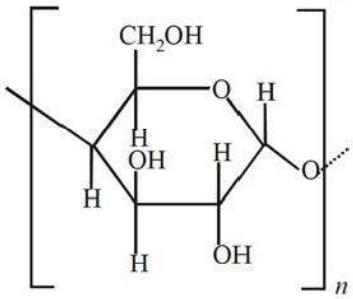
(a)



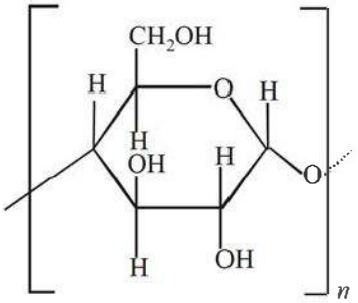
(b)



(c)



(d)



DIRECTIONS (Q. 28-Q.30) : Each of these questions contains two statements: Statement-1 (Assertion) and Statement-2 (Reason). Each of these questions has four alternative choices, only one of which is the correct answer. You have to select the correct choice.

(a) Statement-1 is True, Statement-2 is True; Statement-2 is a correct explanation for Statement-1.
(b) Statement-1 is True, Statement-2 is True; Statement-2 is NOT a correct explanation for Statement-1.
(c) Statement-1 is False, Statement-2 is True.
(d) Statement-1 is True, Statement-2 is False.

Q.28 Statement-1 : All Amino acids exist as Zwitter ions.
Statement-2 : Amino acids have both $-NH_2$ and $-COOH$ groups.

Q.29 Statement-1 : The specific rotation of a freshly prepared solution of α-glucose decreases from + 112° to + 52.7° while that of β-glucose increases from +19° to + 52.7°
Statement-2 : The change in specific rotation of an optically active compound with time to an equilibrium value is called mutarotation.

Q.30 Statement-1 : Solubility of proteins is minimum at the isoelectric point.
Statement-2 : At isoelectric point, protein molecule behaves as a zwitter ion.

RESPONSE GRID	27.ⓐⓑⓒⓓ	28.ⓐⓑⓒⓓ	29.ⓐⓑⓒⓓ	30.ⓐⓑⓒⓓ

DAILY PRACTICE PROBLEM SHEET 56 - CHEMISTRY			
Total Questions	30	Total Marks	120
Attempted		Correct	
Incorrect		Net Score	
Cut-off Score	44	Qualifying Score	64
Success Gap = Net Score – Qualifying Score			
Net Score = (Correct × 4) – (Incorrect × 1)			

Space for Rough Work

DAILY PRACTICE PROBLEMS

CHEMISTRY SOLUTIONS

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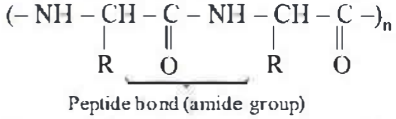
1. **(b)** Gun cotton is a nitrocellulose or cellulose trinitrate which is used in explosives and as a binder for solid rocket propellant.

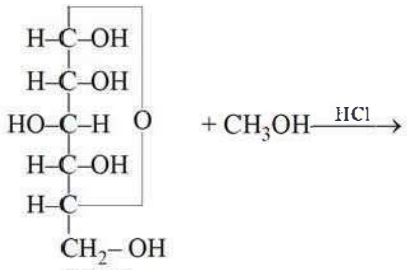
2. **(d)** Amide group is present in proteins



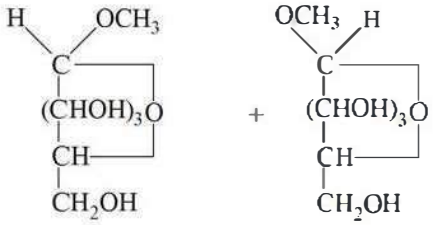
Peptide bond (amide group)

3. **(b)** Protein gives blue-violet colour with ninhydrin (2, 2-dihydroxyindane-1, 3-diene).
Carbohydrates give brown red ppt. with Benedict's solution (Alk. $CuSO_4$ + Citrate ions).

4. **(c)** A ring structure



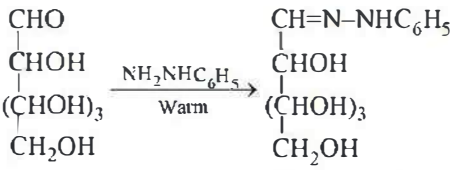
Glucose



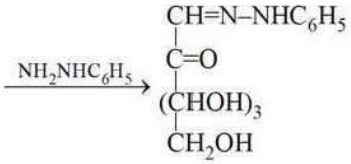
α-Methyl glucoside β-Methyl glucoside

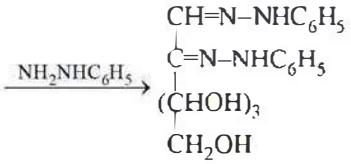
5. **(c)** Glucose + Benedict's solution → Red colour (Cu_2O)

6. **(b)**



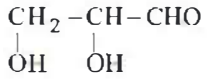
Glucose phenylhydrazone





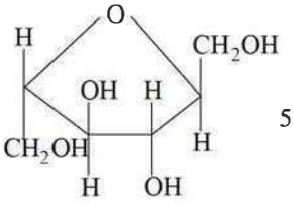
Glucosazone

7. **(b)** 3 carbons e.g. glyceraldehyde



8. **(c)** Starch $\xrightarrow{\text{Diastase}}$ Maltose $\xrightarrow{\text{Maltase}}$ Glucose.

9. **(a)**

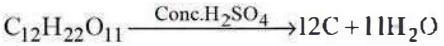


5 atoms in the ring.

D-Fructofuranose

10. **(a)** In sucrose the two monosaccharide units are joined by α-1, 2- glycosidic bond. Thus sucrose does not have hemiacetal carbon. Therefore it is non-reducing sugar.

11. **(c)** Charring of sugar, when it is treated with sulphuric acid (H_2SO_4) is due to dehydration. In this reaction water is removed from sugar.



12. **(b)** Freezing point is the temperature at which liquid and the solid forms of the same substance are in equilibrium and hence have the same vapour pressure. Due to lower vapour pressure of the solution, solid form of a solution separates out at a lower temperature. The decrease is called depression in freezing point.
When solute is the solid, it is solvent that freezes. Hence in the given question water will be separated out first.

13. **(c)** Simple protein + non-protein material → Conjugated protein
(Prosthetic group or co-factor)

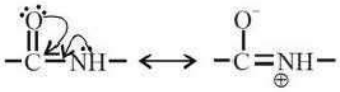
14. **(b)**

15. **(b)** Protein + conc. HNO_3 → Yellow colour
[This test is given by a protein which consists of α-amino acids containing a benzene ring such as tyrosine, phenylalanine etc. The yellow colour is due to nitration of benzene ring.]

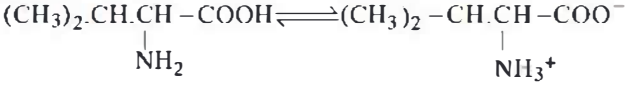
16. **(d)** NH_2-CH_2-COOH is glycose.

17. **(a)** $Hb + CO \rightarrow HbCO$
Carboxyhaemoglobin is 20 times more stable than oxyhaemoglobin

18. **(a)** Due to resonance C — N bond in protein acquires double bond character and is smaller than usual C — N bond.

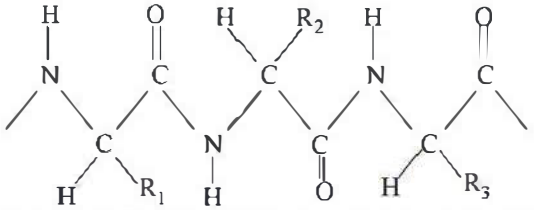


19. **(b)**



20. **(b)** The peptide bond is formed between two amino acids by the elimination of a water molecule. A dipeptide contains one peptide linkage. A tripeptide contains two peptide linkages. Similarly, a nanopeptide contains 8 peptide linkages.

21. **(a)** In peptide linkage i.e. –CONH– group, the carboxyl group of one amino acid molecule forms an amide by combination with the amino group of the next amino acid molecule with the liberation of water molecule.

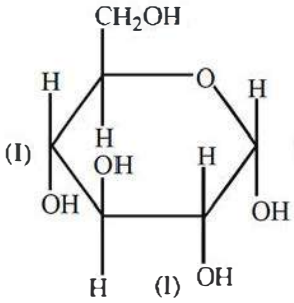


22. **(a)** Statements (1), (2) and (3) are correct regarding ribose.

23. **(a)** Enzymes are biological catalysts which are also known as organic catalysts as they catalyse number of biological processes which involve organic molecules. Enzymes are globular proteins and their action is specific. Some of the enzymes require a cofactor (a non-protein component attached in some enzymes) for their catalytic action. As coenzyme is one of the types of cofactors, so coenzyme is not always required in the catalytic action of enzymes. So, statement (4) is the only incorrect statement among the given choices.

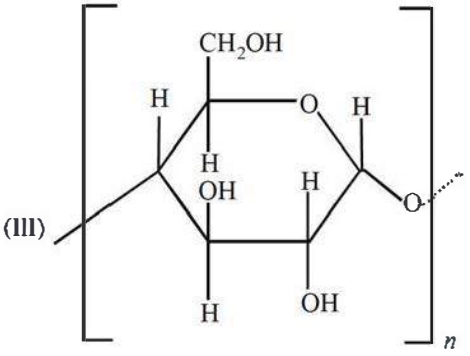
24. **(a)** Statement (4) is the only correct statement among the following choices.

For 25-27.



(I) It has a hemiacetal structure.

(II) Oligosaccharide



25. **(c)** **26.** **(b)** **27.** **(d)**

28. **(a)** All amino acids possess amino as well as carboxylic group, $-NH_2$ group is basic while –COOH group is acidic. Therefore, they behave as zwitter ion (dipolar ion).

29. **(b)** Glucose exists in two forms, i.e., α-D-glucose with a specific rotation of +112° and β-D-glucose with a specific rotation of +19°. However, when either of the two forms is dissolved in water and allowed to stand, it gets converted into the same equilibrium mixture of both the α- and β- forms with a small amount of open chain form. As a result of this equilibrium, the specific rotation of a freshly prepared solution of α-glucose decreases from +112° to+ 52.7° while that of β-glucose increases from +19° to + 52.7°

30. **(c)** Solubility of protein is maximum at the isoelectric point.