

REFERENCES

1. U Satyanaran, U Chakrapani (STNRN): Biochemistry (5th Updated Edition), Elsevier Health Sciences, New Delhi, ₹ 1535/-
2. DM Vasudevan, Sreekumari S, Kannan Vaidyanathan (VSDN): Textbook of Biochemistry (For Medical Students), (9th Edition), Jaypee Brothers Medical Publishers (P) Ltd, New Delhi, ₹ 1550/-

Curriculum



SECTION 1: CHEMICAL CONSTITUENT OF LIFE

CHAPTER 1: BIOMOLECULES AND THE CELL

Short Essays

1. Draw a neat labeled diagram of a cell with the subcellular organelles. Explain the functions of each (any four organelles).	5	12	J21(RS4), D12(RS3), J19(RS3)
2. Mitochondrial structure and important functions.	6	14	D05
3. Lysosomes.	7	14	J07

Short Answers

1. Mitochondria.	6	14	J12(RS3)
2. Endoplasmic reticulum.	6	13	J10(RS2)
3. Give metabolic function of endoplasmic reticulum and mitochondria.	6	15	J07(RS2)
4. Lysosomes (metabolic functions, markers and clinical significance).	7	14	D10(RS2), D19(RS3), D16
5. Name subcellular organelles. Which are metabolic functions of cytosols?	8	15	J05(RS2)

Multiple Choice Questions

1. Which of the following subcellular organelle is involved in protein sorting?	7	13	J21(RS4)
a. Lysosome			
b. Golgi apparatus			
c. Peroxisomes			
d. Ribosomes			

CHAPTER 2: CARBOHYDRATES

Short Essays

1. Function of carbohydrates.	9	88	D08(RS2)
2. Classify carbohydrates with two examples for each class and subclass.	9	86	J19(RS3)
3. Monosaccharides.	10	86	D19(RS3)
4. Epimerization.	12	88	J11
5. Invert sugar.	19	92	J98
6. Polysaccharides.	20	93	J00
7. Describe the structure and biomedical importance of homopolysaccharides.	21	93	J02

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	STNRN	VSDN	
8. What are mucopolysaccharides (glycosaminoglycans)? Give their biomedical importance with examples (name the functions and composition of four mucopolysaccharides).	23	95	D15(RS3), J16(RS3), J04, J12
9. What are mucopolysaccharides?	23	95	F21(RS4)
a. Name the mucopolysaccharide present in the glomerular basement membrane. What is its significance?			
b. Explain the biochemical basis of heparin as anticoagulant.			
c. Write the composition and importance of chondroitin sulfate.			
d. Which mucopolysaccharide maintains the transparency of cornea?			
10. Chondroitin sulfate.	25	95	J99, D04
Short Answers			
1. Benedict's test and its importance.	—	89	J12
2. Compare and contrast starch and glycogen.	—	—	D15(RS3), J00
3. Epimerism and anomerism.	12	88	J14(RS3)
4. What are epimers? Give examples (name two epimers of alpha D-glucose).	12	88	D07
5. Mutarotation.	14	88	D06(RS2), J06
6. Detection of reducing sugar in urine.	16	89	J02
7. Glycosidic linkage.	18	—	J09
8. What is the clinical importance of glycosides?	18	90	D06
9. Invert sugar.	19	92	D14, D15
10. Milk sugar.	20	92	D00
11. Mention four homopolysaccharides.	21	93	D09
12. Amylose and amylopectins.	21	93	D00
13. Animal homopolysaccharide.	22	94	J98
14. Glycosaminoglycans.	23	95	J06(RS2), J08, J14
15. Heteropolysaccharides.	23	95	D98, D11
16. Give the composition of hyaluronic acid.	24	95	J13
17. Name mucopolysaccharides. Mention their functions.	25	95	J05(RS2)
18. Write the composition of any two heteropolysaccharides.	25	95	D12

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	STNRN	VSDN	
19. Name the mucopolysaccharide with anticoagulant activity. Write its composition and its mechanism of action.	25	95	J21(RS4)
Multiple Choice Questions			
1. All are an example of monosaccharide, except:	11	87	J21(RS4)
a. Glucose			
b. Galactose			
c. Trehalose			
d. Mannose			
CHAPTER 3: LIPIDS			
Long Essay			
1. Define lipids. Classify lipids with an example for each. Mention the functions of the lipids.	29	100	D12(RS3)
Short Essays			
1. Classify of lipid with examples. What are essential fatty acids? Mention one function of each.	29, 32	100, 255	D11
2. Compound lipids.	29	104	D98
3. What are essential fatty acids? what are the functions of essential fatty acids?	32	255	D16(RS3)
4. Phospholipids—define, classify with examples, significance (functions), composition and functions of any two.	35	104	D09(RS2), D01, D03, J04, J08, D10, J12
Short Answers			
1. Unsaturated fatty acid (two examples).	30	102	D05, J09
2. Essential fatty acids and their importance.	32	255	D05(RS2), D15(RS3), J99, J00, D07, D08, D12, J14, J15
3. Triglycerides.	33	103	J98
4. Rancidity.	34	104	J08(RS2), J06
5. Lipid peroxidation—clinical importance.	34	255	D07(RS2)
6. Phospholipids (name any two with their composition and functions).	35	104	D13(RS3), D06, J10, D12
7. Lecithin.	37	105	J99
8. Sphingolipids.	37	107	D19(RS3)
9. Name the components of sphingomyelin.	37	108	D13
10. What are the components of ceramide? Name a phospholipid which contains ceramide.	37	108	J07

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	STNRN	VSDN	
11. Surfactant—composition and function.	38	106	J02, J15
12. Deficiency of lung surfactant causes respiratory distress syndrome.	38	106	F21(RS4)
a. What is the composition of lung surfactant?			
b. What is the biochemical basis for respiratory distress syndrome?			
c. What is the significance of L/S ratio.			
13. Gangliosides.	38	108	J98

Multiple Choice Questions

- _____ is the nitrogen containing phospholipid.
 - Phosphatidylcholine
 - Phosphatidylinositol
 - Phosphatidylglycerol
 - Diphosphatidylglycerol

CHAPTER 4: PROTEINS AND AMINO ACIDS**Long Essay**

- Classify amino acid based on their structure giving examples. 46 28 J14(RS3)

Short Essays

- Classify amino acids based on their nutritional significance giving examples. What are non protein amino acids? Give one example. 50 30 J21(RS4)
- Essential amino acids. 50 30 D09(RS2)
- Describe the decarboxylation reactions of amino acids with four examples. Give its significance. 53 33 J11(RS2), J17(RS3)
- Structural organization of proteins. 55 35 J09, D12
- Explain the structure and function relationship of protein with an example. 55 39 F21(RS4)
- Define primary, secondary, tertiary and quaternary structure of protein. What are the noncovalent forces which preserve the secondary structure? 55 35 D11(RS3)
- Secondary structure of proteins. 59 37 J08(RS2), J07
- Give the salient features of α -helical structure and quaternary structure of proteins. 59 37 D13

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	STNRN	VSDN	
9. Describe the bonds that contribute to (stabilize) protein structure.	61	35	J98, D03
10. Classify proteins based on their function giving an example for each class.	67	43	J13(RS3)
11. Biologically active peptides (biological importance of peptides).	68	44	J08, D16
12. Glutathione.	68	44	D99
Short Answers			
1. Name two hydroxy amino acids.	49	28	J07
2. Nutritional classification of amino acids.	50	30	J10(RS2)
3. Essential amino acids and their importance (functions).	50	30	J11(RS2), D98, J09, J03, J06, D09, D10, D03, J08
4. Mention two/four nonprotein amino acids and their significance.	54	29	D03, J08
5. Peptide bond.	56	35	J10
6. Secondary structure of proteins.	59	37	D13(RS3), D10
7. Tertiary and quaternary structure of proteins.	61	38	D14(RS3)
8. Give brief account on quaternary structure of proteins.	61	39	J05(RS2)
9. Bonds stabilizing protein structure.	61	35	J15(RS3)
10. What is isoelectric pH? What is the application of isoelectric pH? State properties of a protein at its isoelectric pH.	64	31, 42	D19(RS3), J07, D07, J13
11. Name two agents used to precipitate proteins.	64	42	J07
12. What is biuret reaction? What is its application?	65	45	J99, D01
13. Denaturation of proteins and factors causing denaturation.	65	42	J10(RS2), J15(RS3), D16(RS3), J99, J08, J11, D12
14. What is heat coagulation test? What is its clinical application?	66	42	J03
15. Functional classification of proteins.	67	43	D07(RS2)
16. What is complete protein?	68	44	D09(RS2)
17. Biologically active peptides and their functions.	68	44	J06(RS2), D06
18. Glutathione and its significance (role in erythrocytes).	68	44	D12(RS3), D16(RS3), D12

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Multiple Choice Questions

1. The protein part present in nucleoprotein — 44 J21(RS4)
is:
a. Globin
b. Opsin
c. **Histones**
d. Apoferritin

CHAPTER 5: NUCLEIC ACIDS AND NUCLEOTIDES**Long Essay**

1. Draw neat diagram of Watson Crick 77 593 J15(RS3)
model of DNA, explain its characteristics
and the bonds that play a role in the
stability of DNA structure.

Short Essays

1. Structure and function of DNA. 76 593 D01, J08
2. RNA—types, salient features and 81 607 J13(RS3)
functions.
3. Structure and functions of mRNA. 81 608 J11(RS2)
4. Name the RNA which carries amino acids 83 613 J21(RS4)
to the site of protein biosynthesis. With
illustration explain the structure.
5. Structure and functions of tRNA. Mention 83 613 D13(RS3),
the unusual bases present in it. J18(RS3), J01,
D06, D12

Short Answers

1. Compare and contrast between — — F21(RS4)
nucleosides and nucleotides.
2. Distinguish between RNA and DNA. — 593 D05(RS2),
D19(RS3), J06,
J12
3. Cyclic nucleotides. — 578 J06(RS2), J11
4. Mention the functions of DNA. 72 594 J02
5. Which are biologically important nucleo- 73 — J05(RS2), D05
tides? Mention their functions.
6. Name four adenosine derivatives. 75 — D01
7. Salient features of Chargaff's rule. 77 593 D10, D15
8. Salient features of Watson-Crick model 77 593 D11
of DNA.

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STNRN VSDN

9. Base pairing rule and Wobble hypothesis. 78 593, 615 J13(RS3)
10. Base pairing rule and its importance. 78 593 D07(RS2), J14
11. Different types of RNA with their function. 81 607 J19(RS3)
12. Messenger RNA (mRNA)—structure and 81 608 J98, J05, J08
functions.
13. Ribosomal RNA. 83 614 J15(RS3)
14. Structure of tRNA. 83 613 N20(RS3)
15. Draw a neat labeled diagram of tRNA. 83 613 F21(RS4),
D14(RS3)
16. Types of RNA and their function. 84 607 J07(RS2), D00,
J09
17. What is the role of tRNA? 84 613 D09

CHAPTER 6: ENZYMES**Long Essays**

1. What are enzymes? Classify enzymes 87, 90, 53, 62, J13(RS3), J14
with one example each. Explain any four 98 70
factors that affect enzyme activity. Add a
note on enzyme specificity.
2. Classify enzymes giving an example with 88 54 D15(RS3)
the reaction catalyzed.
3. Explain the influence of various factors 90 62 D06(RS2),
on enzyme activity. D16(RS3)
4. Define the enzyme inhibition. Explain 94 65 D16
the features of competitive and non
-competitive inhibition. Mention the
therapeutic importance of competitive
inhibition.
5. Define isoenzymes. Mention the principles 112 72 D07(RS2)
used for separation of isoenzymes.
Write about the clinical importance of
isoenzymes.

Short Essays

1. Define and classify enzymes (IUB 88 54 J21(RS4),
classification) with one example for
each class indicating the reaction
catalyzed. J18(RS3), J02,
D09, J11, J12
2. Factors affecting enzyme action 90 62 D06, D10
(reaction).

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	STNRN	VSDN	
3. K_m value (Michaelis-Menten constant) of an enzyme and its significance with a suitable example.	90	64	D10(RS2), J12(RS3), J08
4. Explain the effect of temperature and substrate concentration on enzyme activity with a graph.	90	64	F21(RS4)
5. Temperature and pH as factors affecting velocity of enzyme catalyzed reactions, with examples.	91	65	J19(RS3), J10
6. Describe the various type of enzyme inhibition giving suitable examples.	94	65	D18(RS3)
7. Explain competitive and noncompetitive inhibition with examples. Mention significance of competitive inhibition.	94	65	J07(RS2), N20(RS3)
8. Competitive inhibition—features, examples, importance in medicine (clinical use).	94	65	D08(RS2), J99, D02, D04, D07, D14
9. Noncompetitive enzyme inhibition.	96	66	J10(RS2)
10. Explain enzyme specificities with examples.	98	70	J12(RS3), J15
11. Coenzyme and their role in metabolism with four examples.	99	55	J07, J09
12. Describe the regulation of enzyme activity.	103	65	J04, J05
13. Allosteric enzymes.	103	68	J14(RS3), D99
14. Explain the mechanism of action of allosteric enzymes? Name the allosteric inhibitor and allosteric activator for phosphofructokinase and acetyl CoA—carboxylase.	103	68	D11(RS3)
15. Proenzymes.	105	65	D98
16. Therapeutic uses of enzymes.	108	76	J05(RS2)
17. Diagnostic importance of enzymes (enzymes in clinical diagnosis)—diagnostic enzymology.	110	76	J11(RS2), J08, D08, D12, D13
18. How does estimation of enzymes in serum help in clinical diagnosis (clinical significance of serum enzyme estimation)? Illustrate with five examples.	110	76	J01
19. Name five enzymes of diagnostic significance. Give the normal serum level and one clinical condition associated with their increase.	110	76	D01

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	STNRN	VSDN	
20. Isoenzymes and their clinical importance citing three examples.	112	72	D05(RS2), J16(RS3), J17(RS3), D17(RS3), D16
21. What are isoenzymes? Discuss the isoenzyme forms of LDH.	112	72	D15
22. What are isoenzymes? Name the isoenzymes forms of LDH and CK. What is their clinical significance?	112	72	J03
23. What are isoenzymes? Write the isoenzymes of CPK with tissue distribution. Which isoenzyme is cardiac specific and write its pattern of rise in patients with myocardial infarction.	112, 115	72, 239	F21(RS4)
24. What are isoenzymes? Explain the enzyme profile in myocardial infarction.	112, 115	72, 76	D11
25. Clinical importance of enzymes in assessment of cardiac disease and liver function.	115	76	D13(RS3)
26. Name three enzymes commonly estimated in myocardial infarction. Give its importance and limitations.	115	76	D14(RS3)
27. Diagnostic enzymes used in the assessment of different liver functions.	115	74	D15(RS3)
Short Answers			
1. Classify enzymes with suitable examples.	88	54	J01, D04, J06
2. Lyases.	89	55	J98
3. K_m value of enzymes and its significance.	90	64	D05(RS2), J01, D04, D08, J11, J13
4. Explain the relationship between K_m and affinity.	91	64	D16(RS3)
5. Explain how change in temp alters the enzyme activity.	91	65	J00
6. Explain how change in pH alters the enzyme activity.	92	65	D00
7. Competitive inhibition of enzyme activity (give two examples).	94	65	J16(RS3), D05

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	STNRN	VSDN	
8. Methanol poisoning can be alleviated by ethanol, justify.	94	—	J06(RS2)
9. Mention the actions and uses of two competitive enzyme inhibitors.	95	66	J03, D03
10. Define absolute specificity of enzyme. Give two examples.	98	70	D02
11. Coenzymes (mention three with their functions).	99	55	D13(RS3), D19(RS3)
12. What is meant by lock and key mechanism of enzymes?	101	59	D09
13. Define allosteric enzyme with an example and name modulators for the enzyme.	103	68	D06, D12
14. Define zymogens (proenzymes). Give two examples.	105	65	D09(RS2), J00, D02, J03, J04, D08, D10
15. What are ribozymes? Mention one use of ribozymes.	108	612	D09
16. Give three/two examples of enzymes having therapeutic use and indicate their specific applications.	108	76	D12(RS3), D02
17. Enzymes of diagnostic importance.	110	76	J13(RS3), J09, D14
18. Serum amylase and its diagnostic significance.	111	76	J10(RS2), J99
19. Mention the significance of serum amylase and alkaline phosphatase estimation.	111	74, 76	J05
20. Diagnostic significance of serum alkaline phosphatase.	111	74	D15
21. Write the diagnostic significance of each of the following enzymes: a. Lipase b. Alanine amino transferase c. Creatine kinase	111	76, 74, 239	J21(RS4)
22. Define isoenzymes. Give one example.	112	72	D05, J06, J08
23. Name the isoenzymes of LDH. Mention their significance.	112	72	D03
24. CPK isoenzymes and its clinical significance.	114	239	J99, J07, J15

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	STNRN	VSDN	
25. Explain troponin as a marker for myocardial infarction.	115	74	D05(RS2)
26. Explain enzyme profile in myocardial infarction.	115	76	J07(RS2)
27. Write the type of inhibitions seen in the following: a. Inhibition of vitamin K by dicoumarol— an anticoagulant b. Inhibition of cyclo-oxygenase by aspirin c. Inhibition of placental alkaline phosphatase by phenylalanine	a. 95 b. 97 c. —	a. 66 b. 68 c. —	F21(RS4)

Multiple Choice Questions

- 5'-Nucleotidase is more specific for:
a. Myocardial infarction
b. Prostate cancer
c. **Obstructive liver disease**
d. Wilson's disease
- Serum acid phosphatase enzyme is increased in:
a. Hepatic disease
b. Myocardial infarction
c. Muscle disease
d. **Prostate cancer**

CHAPTER 7: VITAMINS

Long Essays

- Give an account on chemistry, sources, absorption, daily requirement, biochemical functions, manifestations of deficiency and toxic effects of vitamin A. 122 488 D09(RS2), D98, D03, J06
- Answer the following:
a. Which vitamin is called sunshine vitamin?
b. What is its active form?
c. How it is formed?
d. Write the biochemical functions and deficiency manifestations of this vitamin. 127 493 J21(RS4)
- How provitamin D is converted to its active form? Give an account of chemistry, sources, daily requirement, biochemical functions and deficiency manifestations of vitamin D. 127 493 J03

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	STNRN	VSDN	
4. Discuss the chemistry, source, requirement, metabolic functions and deficiency manifestations of vitamin C (ascorbic acid) in the human body.	135	519	D05(RS2), D99
5. What are the sources, functions, deficiency manifestations and daily recommended allowance of thiamine?	138	502	D17(RS3), D09
6. Name the coenzyme forms of vitamin involved in amino acid metabolism. Discuss the biochemical functions and deficiency manifestations of this vitamin.	146	507	J06(RS2)
7. Discuss RDA, Functions and deficiency manifestations of folic acid. How is it interlinked to vitamin B ₁₂ ?	154, 160	515	D16(RS3)

Short Essays

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|--|-----|-----|---|
| 1. Name a provitamin form of vitamin A. Add a note on sources, biochemical functions, daily requirement, causes and features of deficiency of vitamin A. | 122 | 488 | J09(RS2), J10(RS2), D11(RS3), J12(RS3), J18(RS3), N20(RS3), D02, J05, J09 |
| 2. A 10-year-old boy had difficulty in vision at night. However, his vision was quite normal during daytime except when he entered a dimly lit room. On investigation, his plasma retinol levels were found to be low: | 126 | 491 | F21(RS4) |
| a. Suggest the probable diagnosis. Which nutrient deficiency causes this disease? | | | |
| b. Enumerate any four functions of the nutrient. | | | |
| c. Explain Wald's visual cycle. | | | |
| 3. Wald's visual cycle. | 124 | 489 | J08 |
| 4. Active form of vitamin D and its biochemical role. | 127 | 493 | D08 |
| 5. Vitamin D metabolism. Add a brief note hepatic osteodystrophy. | 127 | 493 | D05 |
| 6. Synthesis of calcitriol in the body and its uses. | 127 | 493 | J00 |
| 7. Biochemical functions and causes and features of deficiency of vitamin D. | 128 | 494 | J07(RS2), J11(RS2), J04 |

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	STNRN	VSDN	
8. Vitamin E.	131	496	J99, D04
9. Sources, daily requirements, functions and deficiency manifestation of vitamin C.	135	519	D07(RS2), J08(RS2), D18(RS3), D07, D11
10. Explain the following aspects of thiamine: (a) Coenzyme form, (b) Biochemical function and (c) Deficiency.	138	502	J05(RS2), D01, D14
11. Mention the functions of thiamine pyrophosphate (TTP) citing the reactions in which it is involved.	138	502	J14
12. Explain the following aspects of riboflavin: (a) Coenzyme forms, (b) Biochemical functions.	140	503	D02
13. Give the biochemical functions of niacin with examples and manifestation of its deficiency.	143	506	J13(RS3)
14. Name the coenzyme form of vitamin B ₆ (pyridoxine). Describe the biochemical reactions involving it/biochemical functions of pyridoxine (pyridoxal phosphate co-decarboxylase).	146	507	D10(RS2), D98, J02, D14
15. Give the coenzyme role of pantothenic acid and its importance.	152	509	J15(RS3)
16. Chemistry, sources, daily requirement, coenzyme forms and functions of folic acid.	153	512	D06(RS2), J04
17. Hyperhomocysteinemia.	156	513	J07
18. Coenzymes of cobalamin and its functions.	156	515	J19(RS3)
19. Coenzyme form of vitamin B ₁₂ and its biochemical functions.	157	515	D15(RS3)

Short Answers

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|--|-----|----------|-----------------------------------|
| 1. Hypervitaminosis. | — | 492, 497 | J09 |
| 2. FIGLU excretion test. | — | 513 | J13(RS3), D15 |
| 3. Provitamins. | — | 488 | J17(RS3), D00 |
| 4. Vitamin A—functions (antioxidant role), RDA, deficiency manifestations. | 124 | 489 | D08(RS2), J01, D04, D10, J11, D16 |
| 5. Visual cycle. | 124 | 489 | J00 |
| 6. Mention causes and clinical features of hypervitaminosis A. | 126 | 492 | J14 |

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	STNRN	VSDN	
7. Vitamin D—biochemical functions, deficiency symptoms.	128	494	D00
8. Vitamin E—functions/antioxidant role.	131	496	J06(RS2), J15, D15
9. Vitamin K—biochemical role and requirement.	133	498	J12(RS3), D15(RS3), J02, J05, J10, J14
10. Vitamin C—functions (role in iron absorption), deficiency manifestations (scurvy).	136	519	D10(RS2), J19(RS3), J09, J12
11. Thiamine—sources, daily requirements, role, deficiency manifestations.	138	502	D99, D05, J06, D10, J11
12. TPP as a coenzyme in two metabolic reaction of the body.	138	502	J00
13. Types and causes of beri-beri.	139	503	J12(RS3), J11(RS2), D11
14. What is the coenzymic form of niacin and give one reaction where it is utilized?	143	506	D06
15. Niacin—coenzymic forms and deficiency manifestations (pellagra).	143	506	J17(RS3), J00, D14, D15
16. Pellagra.	144	507	N20(RS3)
17. What is the coenzyme form of pyridoxine? Write two pyridoxine dependent reactions.	146	507	F21(RS4)
18. Functions of pyridoxal phosphate.	146	508	J07(RS2)
19. Which vitamin deficiency is likely to develop in patients on isoniazid, an antitubercular drug? What is the coenzyme form of this vitamin? Write one biochemical reaction dependent on this nutrient.	149	509	J21(RS4)
20. How is histamine formed? What is the role of histamine?	147	317	J10
21. Biotin.	150	511	D00
22. Name the anti-egg white injury factor, its source and coenzyme function.	150	511	J01, D04
23. Describe two carboxylation reactions.	150	511	J05, J08
24. Functions of folic acid.	154	512	J00
25. Explain the role of folic acid in DNA synthesis.	154	513	D16

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	STNRN	VSDN	
26. FIGLU.	155	513	J14(RS3), D98, D00
27. Name two folate antagonists and their therapeutic use.	156	514	D02
28. What are the coenzymic forms of cobalamin?	156	515	D05
29. Name the biochemical functions of vitamin B ₁₂ .	157	516	D01
30. Vitamin B ₁₂ deficiency—causes and biochemical explanations	159	516	D19(RS3)
31. What are antivitamins? Give two examples (vitamin antagonists).	162	511, 514	J03, D08
32. Mention the functions of vitamin E and vitamin K.	132, 134	497, 498	J04
33. Cause of scurvy and beri-beri.	137, 139	503, 520	J13(RS3)
34. Write coenzyme forms of niacin and riboflavin.	143, 140	503, 506	D00
35. Coenzyme form of niacin and folic acid.	143, 154	506, 512	D08
36. Coenzymic form of vitamin B ₁₂ and folic acid.	156, 154	512, 515	D11
37. What is the daily requirement of thiamine, niacin and pyridoxine?	138, 144, 149	502, 506, 507	J09(RS2)

SECTION 2: PHYSIOLOGICAL BIOCHEMISTRY

CHAPTER 8: DIGESTION AND ABSORPTION

Long Essay

1. Write in detail about the digestion and absorption of lipids? Write about causes of fatty stools.

174 198 J98

Short Essays

1. Give an account of digestion of carbohydrates from GIT.
2. Explain the mechanism involved in the absorption of glucose. Describe the causes and features of lactose intolerance.
3. Lactose intolerance.

168 128 D13

170 129 J99, J02, D04

171 128 D05

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	STNRN	VSDN
4. Write in brief about the digestion and absorption of proteins.	171	265
5. Digestion and absorption of lipids.	174	198
6. Enzymes involved in the digestion of lipids (lipases).	174	198
7. Name the different types of lipases involved in lipid metabolism. Mention their sites of action, function and activation.	174	199
Short Answers		
1. Name the enzymes involved in carbohydrate digestion.	168	129
2. Digestion and absorption of disaccharides.	168	129
3. Describe the absorption of glucose.	169	129
4. Lactose intolerance—causes and features.	171	128
5. Give an example of proteolytic enzyme and its specificity.	171	266
6. Name the two endopeptidases with their specifications.	171	266
7. Role of hydrochloric acid in protein digestion.	172	266
8. How is pepsinogen activated? What is the function of pepsin?	172	266
9. Pepsinogen activation and action of trypsin.	172	266
10. Describe the role of bile salts in lipid metabolism.	174	198
11. What is steatorrhea? Mention the causes.	177	201

CHAPTER 9: PLASMA PROTEINS

Long Essay

1. What are plasma proteins? Write a note on their separation and functions. 182 425 D08

Short Essays

1. How plasma proteins are separated? Explain the significance of M band. What is A/G ratio? What is its clinical significance? 182 425 J04
2. What is electrophoresis? Name five plasma proteins and their functions. 182 425 D11

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	STNRN	VSDN
3. Name and explain the functions of plasma proteins with clinical significance.	183	426
4. What is normal serum protein level? Mention three important functions of albumin.	183	426
5. Enumerate the functions of albumin. Mention the causes of hypoalbuminemia and consequences of hypoalbuminemia.	183	427
6. List conditions when albumin/globulin (A/G) ratio is altered.	183	428
7. Transport proteins of blood.	184	429
8. A 40-year-old male came with the complaints of difficulty in breathing, shortness of breath and tightness of chest. History revealed that he is chronic smoker for the past 15 years. Chest X-ray and CT scan showed changes suggestive of emphysema.	185	431
a. Deficiency of which plasma protein causes this condition.		J09(RS2)
b. Explain the biochemical basis of emphysema in smokers.		J21(RS4)
c. Name any two serine proteases.		
9. Acute phase proteins.	186	430
10. Immunoglobulins—enumerate, structure and functions.	187	693
Short Answers		
1. What is the normal level of plasma proteins? Name a disease which features hypoalbuminemia.	—	426, 428 D05
2. Negative acute phase reactants.	—	431 D15
3. Describe how plasma protein are separated in the clinical laboratory.	182	425
4. What is electrophoresis? Enumerate major classes of proteins separated on electrophoresis.	182	425
5. Mention the normal albumin/globulin (A/G) ratio. Give two disorders associated with altered A/G ratio.	183	428
6. Serum albumin—functions.	183	427
7. Normal values of serum proteins and its fractions.	184	426

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	STNRN	VSDN	
8. Plasma proteins—enumerate and functions of plasma proteins.	184	426	J16(RS3), J06, D10, D12
9. Hypoalbuminemia.	185	428	D17(RS3)
10. Ceruloplasmin.	186	430	J99, D00, J09, J15
11. Acute phase proteins.	186	430	D18(RS3)
12. Immunoglobulins—enumerate, structure and functions. Outline the structure of immunoglobulins.	187	693	D10(RS2), D12(RS3), J18(RS3), D07, J08, D10
13. Immunoglobulin G (IgG).	188	693	J98
14. Immunoglobulin A (IgA) and immunoglobulin M (IgM).	188	694	J11(RS2)
15. Structure of immunoglobulin M.	189	694	J14
16. Bence-Jones proteins—significance and detection.	190	695	D05(RS2), J06(RS2), D11(RS3), D01, D08
17. Anticoagulants.	192	—	J08(RS2)

CHAPTER 10: HEMOGLOBIN AND PORPHYRIA

Long Essays

1. Explain in detail the reactions of heme synthesis? Name the regulatory enzyme of this pathway. How is it regulated? 208 361 J21(RS4)
2. Outline heme synthesis. Write a note on its function and abnormal hemoglobin. 208 361, 378 J09
3. Describe the synthesis and breakdown of hemoglobin. Write a note on hemoglobinopathies. 208, 201, 213 361, 378 D13(RS3)

Short Essays

1. Name five heme proteins and their functions. — 360 D08(RS2)
2. What is methemoglobin? How it is formed? Mention the causes for methemoglobinemia. How it is detected? 201 377 J16(RS3), D99
3. Name the different types of hemoglobin variants indicating their defects/hemoglobinopathies (abnormal hemoglobins). 201 378 D19(RS3), D05(RS2)
4. Sickle cell hemoglobin. 201 379 J98

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	STNRN	VSDN	
5. Discuss the manifestations, molecular basis and laboratory diagnosis of sickle cell disease. What is the biological advantage of sickle cell trait? 202	379	J01	
6. A 8-year-old girl from endemic malaria area who had splenomegaly was investigated for routine hematology, which revealed low hemoglobin of 7 g%. Peripheral smear revealed crescent shaped RBCs. She had no history of malaria attack.	204	380	F21(RS4)
a. What could be the molecular defect of hemoglobin in the above case.			
b. Name the biochemical investigations which can be done to confirm the diagnosis.			
c. Reason out why these patients show resistance to malaria.			
7. Heme synthesis (regulation).	208	361	J17(RS3), J18(RS3), N20(RS3), D00, D11
8. Porphyrias—causes and general features.	210	364	J17(RS3), J18(RS3), N20(RS3), D00, D11
9. What are porphyrias? How are they classified? Name the enzymatic defect and biochemical findings in any one/four of the porphyrias.	210	364	J15(RS3), J00, J03
10. What is porphyria? Mention the defect, signs and symptoms of acute intermittent porphyria.	210	364	D09(RS2), D11(RS3)
11. Congenital erythropoietic porphyria.	212	365	J99, D04
12. Catabolism (degradation) of heme (hemoglobin) in the body adding a note on clinical significance.	213	367	F21(RS4), D07(RS2), D14(RS3), D98, J00, D01, D08
13. Bile pigments (bilirubin)—describe the metabolism (formation, transport and detoxification). Write the normal values of serum bilirubin. Name the abnormalities associated with bilirubin metabolism.	213	367	J07(RS2), J09(RS2), J14(RS3), J16(RS3), J99, D04, J14, D14

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	STNRN	VSDN	
14. Jaundice.	215	370	D12
15. Hemolytic jaundice.	215	370	D99
16. Unconjugated hyperbilirubinemia.	215	370	D08(RS2)
17. Hepatocellular jaundice.	215	371	D09
18. Interpret the following Liver function tests report: (a) Total bilirubin: 7.7 mg/dL; (b) Direct bilirubin: 3.6 mg/dL; (c) Alkaline phosphatase: 265 IU/L; (d) Ehrlich's test: Negative; (e) Stool sample: Clay color. a. What is the probable diagnosis? b. Mention the possible causes for the above condition. c. Substantiate with reasons for increase in conjugated fraction of bilirubin.	215	371	F21(RS4)
Short Answers			
1. What is Dubin-Johnson disease?	—	370	J01, D04
2. What is the effect of pH and pCO ₂ on the oxygen dissociation curve?	198	374	D09
3. Hemoglobin as buffering agent.	198	374	D15(RS3)
4. 2,3-bisphosphoglycerate.	199	375	J06(RS2)
5. Carboxy hemoglobin.	201	377	J08(RS2), J99
6. Methemoglobin.	201	377	J10(RS2)
7. Name the hemoglobinopathies (abnormal hemoglobins).	201	378	D07, D09
8. Sick cell hemoglobin—biochemical defects, alteration in function.	201	379	J06, J07, D13
9. Sick cell anemia—causes, molecular defect and consequences.	202	379	D07(RS2), J11(RS2), D08, D12
10. Biochemical defect in thalassemia.	205	381	J13(RS3)
11. Name the levels at which heme synthesis is regulated.	210	363	D02, D07
12. What porphyrias? Name one disorder indicating the underlying cause.	210	364	J04
13. Explain any two types of porphyrias.	210	364	D10
14. Acute intermittent porphyria.	210	364	J14(RS3), J18(RS3), D99, D13

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	STNRN	VSDN	
15. Name two porphyrias and the enzyme defect in them.	211	364	J08
16. Degradation of heme.	213	367	J05(RS2), D06(RS2), J04
17. How is bilirubin conjugated (made water soluble).	214	368	J06(RS2)
18. Fate of bilirubin.	215	368	D15
19. Name two causes of unconjugated hyperbilirubinemia.	215	370	J07
20. Normal level of total bilirubin in serum. What is conjugated bilirubin?	215	369	D99, D06
21. Define jaundice. Mention one cause for different types of jaundice.	215	370	D03
22. Obstructive jaundice and its diagnosis (biochemical findings—serum and urine).	215	371	J21(RS4), D13(RS3), J02, D08
23. Physiological jaundice.	216	370	J11
24. Name two congenital hyperbilirubinemias and defect in each of them.	216	370	D01
25. What is Crigler-Najjar syndrome? Name the enzymatic defect.	216	370	D02, D05
26. Give enzyme defect in the following conditions. a. Drug-induced hemolytic anemia. b. Crigler-Najjar syndrome.	a. — b. 216	a. — b. 370	J09(RS2) J14(RS3)
27. Gilberts syndrome.	216	370	J14(RS3)

Multiple Choice Questions

- The enzyme defect in acute intermittent porphyria:
a. **PBG-deaminase**
b. UPG-cosynthase
c. Ferrochelataase
d. UPG-decarboxylase

CHAPTER 11: BIOLOGICAL OXIDATION**Long Essays**

- Describe the components of electron transport chain. Write a note on uncouplers and inhibitors. 223, 230 346, 352 D08
- Discuss in detail oxidative phosphorylation and enumerate its inhibitors. 226 350, 352 J10(RS2)

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STNRN VSDN

Short Essays

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|---|-----|-----|--|
| 1. Write the different components of electron transport chain. Draw a neatly labeled diagram of the complexes of the electron transport chain. Mention four inhibitors of ETC/ Name any two site-specific inhibitors of each complex. | 224 | 346 | J21(RS4),
J14(RS3), D16 |
| 2. Describe the single electron carrier components of respiratory chain. Indicate the sites of ATP formation during electron transport. Name two inhibitors of electron transport. | 224 | 346 | J07(RS2),
D07(RS2), D02,
J03, D03, J08,
J10, J13 |
| 3. What are cytochromes? Indicate their location and functions. | 226 | 349 | D99 |
| 4. What is oxidative phosphorylation? Explain its mechanism (chemiosmotic theory). Mention inhibitors and uncouplers of oxidative phosphorylation. | 226 | 350 | F21(RS4),
J05(RS2),
J06(RS2),
D19(RS3), D98,
J01, J04, J06,
D06, J14, D14,
D15 |
| 5. What is P:O ratio? Which are inhibitors of electron transport chain? | 227 | 350 | D05(RS2) |
| 6. What are uncouplers? Mention the uncouplers of oxidative phosphorylation. | 231 | 350 | J16(RS3), J15 |
| 7. Shuttle systems to transport extra-mitochondrial reducing equivalents. | 232 | 347 | D05 |
| 8. Classify the enzymes of biological oxidation. Give one example for each. | 234 | 343 | D01 |

Short Answers

- | | | | |
|---|-----|-----|-----------------------|
| 1. Differentiate between uncoupler and inhibitors. | — | — | D16 |
| 2. Expand ATP. What is its free energy of hydrolysis? | 219 | 345 | D11 |
| 3. High energy (phosphate) compounds. | 220 | 345 | J13(RS3), J02,
D16 |
| 4. Components of electron transport chain. | 224 | 346 | J17(RS3), D11 |

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STNRN VSDN

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|---|-----|-----|---|
| 5. Diagrammatic representation of mitochondrial electron transport chain and location of ATP formation sites. | 225 | 347 | D09(RS2) |
| 6. Cytochromes. | 226 | 349 | D11(RS3) |
| 7. Oxidative phosphorylation—mechanism (chemiosmotic theory), inhibitors, uncouplers (with two examples). | 226 | 350 | D06(RS2),
J08(RS2),
J11(RS2),
J15(RS3),
D17(RS3),
D18(RS3), J98,
J03, J05, D12,
D13, D16 |
| 8. P:O ratio. | 227 | 350 | J09, D09, J11 |
| 9. Name the inhibitors of cytochrome oxidase. | 230 | 353 | D06 |
| 10. Site specific inhibitors of electron transport chain with one example for each site. | 230 | 353 | D16(RS3),
J19(RS3) |
| 11. Ionophores. | 231 | 20 | D12(RS3) |
| 12. Mitochondrial shuttle systems. | 232 | 347 | J13(RS3) |
| 13. Describe malate—ascorbate shuttle. What is its significance? | 233 | 347 | J01, D04 |

Multiple Choice Questions

- | | | | |
|--|-----|-----|----------|
| 1. _____ is known to act as a physiological uncoupler. | 231 | 353 | J21(RS4) |
| a. Valinomycin | | | |
| b. Thyroxine | | | |
| c. Carboxine | | | |
| d. Oligomycin | | | |

SECTION 3: METABOLISM

■ CHAPTER 12: INTRODUCTION TO METABOLISM

None

■ CHAPTER 13: METABOLISM OF CARBOHYDRATES

Long Essays

- | | | | |
|--|-----|-----|----------|
| 1. Describe the reactions of glycolysis indicating the enzymes. Add a note on net yield of ATP under aerobic and anaerobic conditions. | 244 | 130 | D17(RS3) |
|--|-----|-----|----------|

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	STNRN	VSDN
2. Give a detailed account on glycolysis. Explain the energetics and regulation of this pathway. What is the significance of Rapoport-Luebering cycle?	244, 251	130, 137 J98, J08, D12
3. Describe the process of aerobic glycolysis. What is substrate level phosphorylation? What is the effect of insulin and cortisol on blood glucose level?	244, 648	130, 337, 163 D11
4. Why TCA cycle is called as common metabolic pathway? Describe in detail the tricarboxylic acid cycle (Kreb's citric acid cycle), energy production and its significance. How is it regulated? What is its amphibolic role? Explain how carbohydrates, lipids and amino acids enter this cycle.	253	334 J08(RS2), D13(RS2), J04, J10, D14
5. Describe in detail the major catabolic pathway for acetyl CoA in aerobic organisms. How does it play a pivotal role in metabolism?	253	334 D05
6. What is gluconeogenesis? Write in detail about gluconeogenesis in humans from its predominant precursor (conversion of lactate to glucose) and mention its significance. Write about glucose alanine cycle.	258	139, 142 D11(RS3), D98, D00, J03
7. Discuss the formation of glucose from noncarbohydrate substances.	258	139 J15
8. What is gluconeogenesis? Trace the pathway of gluconeogenesis starting from alanine. Mention the key enzymes and how they are regulated.	258, 261	139 J09(RS2), D19(RS3)
9. Discuss about the metabolism of glycogen.	263	143 J99
10. What is the biomedical importance of muscle and liver glycogen? Describe the process of glycogen synthesis with its regulation. Name two glycogen storage diseases.	263	143, 147 D06, J11
11. Define glycogenesis and glycogenolysis. Write the reactions of glycogenesis and glycogenolysis in liver. How are these two pathways reciprocally regulated?	263	143, 147 J07(RS2)

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	STNRN	VSDN
12. Describe the reactions of pentose phosphate pathway (hexose monophosphate shunt). Why is it called multifunctional? Mention the significance of this pathway.	269	147 J02, J09, D10, D15
Short Essays		
1. What is the difference between oxidative and substrate level phosphorylation? Give two examples of substrate level phosphorylation with complete reaction.	—	337 D10(RS2), J13(RS3), D14(RS3), J99, D04
2. How is glycogen digested and absorbed? Describe glycogenolysis in the liver.	168, 265	128, 143 J15(RS3)
3. Glucose transporters.	243	129 D06
4. Regulation of glycolysis.	249	135 J07
5. Discuss the Embden-Mayerhof pathway that occurs in RBC. Add a note on its energetics.	251	137 J14(RS3)
6. 2,3-biphosphoglycerate pathway in erythrocytes (Rapoport-Luebering cycle).	251	137 J10(RS2), D10(RS2), D06
7. Fate of pyruvate.	251	138 D06
8. Pyruvate oxidation.	251	138 J99, D04
9. Pyruvate dehydrogenase complex—enzymes and co-enzymes components, mechanism of action and biomedical importance.	252	138 D07(RS2), J12
10. Citric acid (TCA) cycle—reactions, energy releasing steps, energetic, amphibolic role.	253	334 J09(RS2), D11(RS3), J12(RS3), J18(RS3), N20(RS3), J06, J13
11. Define anaplerosis. Describe any four anaplerotic reactions of citric acid cycle intermediates.	257	339 J21(RS4)
12. Gluconeogenesis—(key) reactions (from lactate/alanine), key enzymes, significance.	258	139 D05(RS2), J06(RS2), J13(RS3), D16(RS3), D02, D05, D08, D09, D16
13. What is fate of lactate produced in the muscle? Explain the reactions.	261	141 J01

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	STNRN	VSDN	
14. Cori's cycle.	261	137	J12(RS3), J14
15. Glucose alanine cycle.	261	142	J08
16. Synthesis of glycogen (glycogenesis)—reactions and its significance.	263	144	J08(RS2), D07, J12, D13
17. Glycogenolysis—reactions, regulation.	265	143	J10(RS2), J11(RS2), J16(RS3), D18(RS3), J02, D02, J05
18. Glycogen storage disease.	269	147	D06(RS2), J17(RS3), J00, J03, J06, J14
19. A 5-year-old girl was brought to the hospital with enlarged abdomen. History revealed that her childhood development was comparatively slow, frequently hungry, lethargic and irritable. Clinical examination showed enlarged liver. Biochemical investigations of blood sample revealed reduced fasting blood glucose levels and elevated levels of serum lactate, triglyceride and uric acid. a. Suggest the probable diagnosis. b. Name the enzyme defect. c. What is the biochemical basis for fasting hypoglycemia, lactic acidosis and hyperuricemia in this condition.	269	147	F21(RS4)
20. Hexose monophosphate shunt—reactions (oxidative phase), significance.	269	147	D13(RS3), J17(RS3), D18(RS3), D06
21. Uronic acid pathway.	275	152	J13
22. How is galactose metabolized? Add a note on galactosemia.	277	187	N20(RS3), D00, D07
23. Metabolism of fructose.	278	186	J00
24. Fructose intolerance.	280	187	D98
Short Answers			
1. Explain substrate level phosphorylation with two examples.	—	337	D01, D02, D07, J11, J12
2. Give the significance of uronic acid pathway.	—	152	J09(RS2)
3. Aldolase B.	—	186	D00

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	STNRN	VSDN	
4. What are the major differences between hexokinase and glucokinase?	245	134	J05
5. Glucokinase.	245	134	D99
6. Energetics in aerobic and anaerobic pathway of EM pathway (glucose oxidation).	248	134	D99, J09
7. Regulation of glycolysis at the phospho-fructokinase step.	249	135	J18(RS3)
8. What is the end product of aerobic glycolysis? Illustrate the fate of this compound.	251	138	J21(RS4)
9. Write short note on Rapoport-Luebering cycle.	251	137	J16(RS3), D17(RS3), D12
10. Conversion of pyruvate to acetyl CoA.	251	138	J06
11. Pyruvate dehydrogenase complex.	252	138	J14(RS3), D18(RS3)
12. Amphibolic role of citric acid cycle.	257	339	D10
13. Anapleurotic reactions of citric acid cycle for three intermediates.	257	339	J19(RS3), J00, D00, J03
14. Any three enzymes unique (key) to gluconeogenesis.	259	139	J11(RS2), J13
15. Cori's cycle.	261	137	J11
16. Describe glucose alanine cycle. Mention its significance.	261	142	J01, D01, D04
17. Glycogen storage disorders.	269	147	J13(RS3)
18. Von Gierke's disease.	269	147	D17(RS3), D99
19. Muscle phosphorylase deficiency.	271	148	D98
20. Mention significance of HMP shunt pathway.	272	151	D05(RS2), J08(RS2), J08, J12
21. Glucose-6-phosphate dehydrogenase deficiency.	275	147	D07(RS2)
22. Uridine diphosphate glucose—glucuronic acid.	276	152	J15(RS3)
23. Galactosemia—enzyme defect, clinical features and biochemical findings.	278	188	D16(RS3), J18(RS3), D99, D02, J05, D12, D16

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	STNRN	VSDN	
24. What is the sorbitol pathway? Write the significance of sorbitol pathway.	279	152	J21(RS4)
25. Aldolase B deficiency.	280	187	J98
26. Name the enzyme defective in galactosemia and hereditary fructose intolerance.	278, 280	187, 188	J02, D06

Multiple Choice Questions

1. Glucose transporter 4 is the major glucose transporter in:
- RBC
 - Neurons
 - Adipose tissue**
 - Intestine

CHAPTER 14: METABOLISM OF LIPIDS**Long Essays**

1. What is carnitine and its role in oxidation of fatty acids? Enumerate the steps of beta oxidation of saturated fatty acids (palmitic acid). Write a note on energetic of palmitic acid. Explain the regulation of acetyl CoA in our body. 288 202 D08(RS2), J15(RS3), J01, D02, D04, J05, J06, D07, D10, D13, J15
2. A 25-years-old patient known cases of type 1 diabetes, was brought to casualty in comatose state. History revealed that he was not taking insulin regularly. Biochemical analysis of blood and urine showed the following findings: (a) Blood sugar—510 mg/dL; (b) Urine for Rothera's test and Benedict's test—positive; (c) Blood gas analysis report showed pH—7.2; (d) Bicarbonate—12 mEq/L. 295 214 J21(RS4)
- Suggest your probable diagnosis.
 - Name the compounds which give Rothera's test positive.
 - Explain the principle of Rothera's test.
 - Explain the steps of synthesis, utilization of these compounds.
3. Describe the formation (ketogenesis), utilization (ketolysis) and clinical significance of ketone bodies (ketosis). 295 213 J11(RS2), J18(RS3), J11

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	STNRN	VSDN	
4. What is ketosis? What are the causes? What are ketone bodies? Enumerate the steps of formation and utilization of ketone bodies? 295	213, 214	J00	
5. Name the ketone bodies. Give two conditions characterized by excessive production of ketone bodies. Explain the metabolic derangements and consequences of ketosis. 295	213, 214	J05(RS2)	
6. Describe in detail the de novo synthesis of fatty acids. Add a note on short- and long-term mechanisms that regulate lipogenesis. 298	206	J07	
7. Give an account of cholesterol biosynthesis with its regulation. Add a note on atherosclerosis. 311	221, 236	J16(RS3)	
8. What are lipoproteins? How are they classified? How are chylomicrons metabolized? 319	224	D09	
9. Classify plasma lipoproteins, explain their composition, transport and functions. 319	224	J13(RS3)	
10. Define lipoproteins. Mention the different lipoproteins involved in transport of lipids. Explain metabolism of dietary lipids under the following headings: (a) Assembly of dietary lipids; (b) Transport; (c) Utilization in peripheral tissues; (d) Metabolic rate. 319	224	F21(RS4)	

Short Essays

1. List various types of fatty acid oxidation. Write about activation of fatty acids for oxidation. 288 201 D07(RS2), J07
2. Describe the beta oxidation of fatty acids. Add a note on energetics of palmitic acid oxidation. 288 201 D05(RS2), D14(RS3), D16(RS3), D19(RS3) D05, J09
3. Explain how odd chain fatty acids are oxidized. 293 205 J14
4. Metabolic activity and abnormality in peroxisomes. 293 — D05

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	STNRN	VSDN
5. Ketone bodies—enumerate, formation (ketogenesis), utilization (ketolysis), clinical significance (ketosis).	295	213 J06(RS2), D09(RS2), N20(RS3), D00, D06, J09, D12, D14
6. Ketosis.	296	214 J08
7. Outline the de novo synthesis of fatty acid. What are the advantages of having a multifunctional enzyme complex?	298	206 D13(RS3)
8. Fatty acid synthase complex.	299	206 J11(RS2), D06, J09
9. Mention the defect and clinical features of four lipid storage disorder.	310	261 D16
10. Name the ring structure present in cholesterol. Write the key regulatory step in the synthesis of cholesterol. Name four compounds derived from cholesterol.	39, 313, 220, 315	D17(RS3)
11. Outline the steps for synthesis of cholesterol. Discuss the rate limiting step and regulation of synthesis of cholesterol.	311	221 D11(RS3), J18 (RS3)
12. How is HMG CoA formed? What is its importance?	311	222 D13
13. Catabolic products of cholesterol. Describe the biomedical importance of three derivatives of cholesterol.	315	224 J09(RS2), D10(RS2), J98, J03
14. How are bile acid synthesized? Mention two functions of bile acids.	315	231 J15(RS3), D10
15. Lipoproteins—enumerate, composition and functions.	319	224 J05(RS2), J14(RS3), J02, D02, D03, J06, J10
16. Chylomicrons (metabolism).	319	227 J10(RS2)
17. Give an account of metabolism of LDL.	321	227 D13
18. Metabolism of high-density lipoprotein and its significance.	322	229 N20(RS3)
19. Fatty liver (causes) and lipotropic factors.	324	211 D06(RS2), J07(RS2), D08(RS2), D14(RS3), J19(RS3), D07, D08, J13, D15

Short Answers

1. Enumerate the consequences of obesity. — 557 J11

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	STNRN	VSDN
2. What is the significance of brown adipose tissue?	—	211 J04
3. What is carnitine? Mention its biochemical role of carnitine in β -oxidation (carnitine cycle).	289	202 J06(RS2), J02, J12, J13, D13, D14
4. Explain how long chain fatty acid are transported into the mitochondria.	289	202 J21(RS4)
5. Energetics in the oxidation of one molecule of palmitic acid to carbon dioxide and water.	291	203 J18(RS3)
6. Methyl malonyl aciduria.	293	204 D98
7. Give enzyme defect in the methyl malonyl aciduria and homocystinuria.	293, 364	204, 293 D16
8. Mention how propionyl CoA is formed during fatty acid oxidation.	293	205 J00
9. Refsum's disease.	294	205 J08(RS2)
10. Ketone bodies.	295	213 D08
11. Name the ketone bodies. Mention two causes of ketosis.	295	213 D02, J03, J04
12. Ketosis.	296	214 J17(RS3)
13. Niemann-Pick disease.	309	260 J10(RS2)
14. Name two lipid storage disorders and indicate the corresponding enzyme defect.	310	260 D07
15. Name four substances synthesized from cholesterol.	315	224 D06
16. Name bile acids. How are they formed?	315	231 J10
17. Bile salts—enumerate, functions (role in digestion).	315	231 J99, J05, D08, D09, D11, J12
18. Reverse cholesterol transport.	316	230 J15(RS3), D05
19. What is normal serum level of cholesterol? Name its four biological functions.	316	224 J07(RS2)
20. What is the normal level of serum cholesterol? Name one bile acid formed from cholesterol.	316	224 J07
21. Plasma lipoproteins—enumerate, functions.	319	224 J17(RS3), D98, J08, D12
22. HDL cholesterol.	319	229 D99, J12
23. What are functions of apolipoproteins?	319	226 J09(RS2)

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	STNRN	VSDN	
24. Name the cholesterol rich lipoproteins.	320	225	D06
25. Justify the role of HDL as scavenger of cholesterol.	322	230	D00
26. Fatty liver—causes.	324	211	J00, D03, J06, J12, J14
27. Lipotropic factors.	326	212	J98, J13, D14
28. Mention two inborn errors of lipid metabolism and indicate the enzyme defect.	306, 309	260	D03
29. Name the biochemical defect in:	306, 309	260	J03
a. Niemann-Pick disease.			
b. Gauchers's disease.			

Multiple Choice Questions

- The site of action of hormone sensitive lipase is in:
 - Small intestine
 - Capillary walls
 - Mouth
 - Adipocytes**
- Which one of the lipoprotein fraction is elevated in hyperlipoproteinemia type IIA?
 - VLDL
 - LDL**
 - HDL
 - Chylomicrons

CHAPTER 15: METABOLISM OF AMINO ACIDS**Long Essays**

- Describe how ammonia is formed (sources of ammonia) in the body? Add a note on its transportation. Describe how ammonia is detoxified in the body and name two inborn errors associated with this process.

336	269,	D18(RS3), D01,
	271, 275	J05, D06, J12,
		D16
- Describe in detail the steps of urea cycle. How is it linked to TCA cycle? What is the reference range for serum urea? Write the causes of uremia.

338	272, 276	D11(RS3)
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- Describe the urea cycle. What is the normal blood urea level? Name two conditions in which blood urea level increases.

338	272, 276	D02
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	STNRN	VSDN	
4. Describe the metabolism, metabolic defects and special products formed from glycine giving their biomedical importance. Why is glycine nutritionally nonessential?	343	282	D05(RS2), J02, J04, D07
5. How is creatinine synthesized? Discuss about creatinine clearance and its clinical significance.	345	283	J99
6. Name the aromatic amino acids. What are biologically important compounds derived from tyrosine? Describe the metabolism of phenylalanine and tyrosine. Outline the synthesis of different products obtained from phenylalanine. Discuss the inborn errors associated with metabolism (tyrosinemia/alkaptonuria).	347	306	D10(RS2), J12(RS3), J17(RS3), N20(RS3), D99, J01, D04, J07, J08, J10
7. A 5-year-old boy was brought to a pediatrician with history of mousy odor of urine and delay in achieving cognitive functions. On examination, the boy's skin and hair was fair in color with hypopigmentation. - What is the probable diagnosis? - Name the enzyme defect in the above disorder. - Write the pathway for catabolism of the above amino acid. - Mention the reason for the cause of mousy odor in urine. - What biochemical tests are done to confirm the diagnosis?	352	310	F21(RS4)
8. A 6-year-old child was brought to the OPD with complaints of mental retardation, delayed development milestones, hyperactive and seizures. The child had light colored hair, skin and unpleasant mousy body odor. Serum phenylalanine was 35 mg/dL (normal 1–2 mg/dL). Ferric chloride test showed transient blue-green color in urine. - Suggest the probable diagnosis. - Mention the enzyme defect and write the reaction catalysed by their enzyme.	352	310	J21(RS4)

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STNRN VSDN

- c. Write the biochemical basis for the following clinical findings:
 i. Neurological manifestations
 ii. Light colored hair and skin
 iii. Mousy body odor
 d. Describe the steps for synthesis of any two biological important compounds derived from tyrosine.
9. Name the sulfur-containing amino acids. 360 288 D05, D12
 Describe in detail the metabolism of essential sulfur-containing amino acid and add a note on the special products synthesized from it. Add a note on inborn errors associated with its pathway.
10. What is the active form of methionine? 361 288 J00
 How it is formed? What are its function? Enumerate the steps of methionine metabolism. Write the disorders associated with its metabolism.

Short Essays

1. What are nitrogen producing substances in the body? Explain how they are excreted from the body. — — D17(RS3)
2. What are transamination reactions? 333 270 J13(RS3), D16(RS3), J06, J11, D15
 Giving two examples discuss the importance of these reactions.
3. Describe transamination. Mention 333 270 J05
 the clinical significance of serum transaminases.
4. Name the coenzyme forms of vitamin B₆. 333 270 J01
 Write the mechanism of transamination.
5. How ammonia is detoxified in the body? 337 271 J06(RS2), J09
6. Urea cycle (urea formation in liver)— 338 272 D06(RS2), J07(RS2), D00, D03, D10, D12, D14
 steps, regulations, disorders.
7. How is urea synthesized in the body? Give 338 272 D13(RS3)
 the reactions. What is the significance of urea cycle?
8. Disorders associated with urea cycle 341 275 D15
9. How is glycine synthesized in the body? 343 282 D06(RS2), D17(RS3), J98, D09, D15
 Name the products synthesized from glycine (biomedical importance/metabolic role/fate of glycine).

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STNRN VSDN

10. Compounds synthesized from glycine 344 283 J12
 and enumerate the steps of synthesis of creatine.
11. Pathway for synthesis of creatine, 345 283 J18(RS3)
 phosphocreatine and creatinine. Clinical significance of creatinine kinase.
12. How creatine phosphate is synthesized? 345 283 D01
 Mention the significance of estimation of urinary creatinine.
13. How is creatine synthesized? Add a note 345 283 D11
 on creatinine clearance test with respect to its reference range and significance.
14. Biochemical importance of phenylalanine. 346 307 J15
15. Is tyrosine an essential amino acid? 346 306 D12(RS3)
 Justify. Write the reactions of three important biological products formed from tyrosine.
16. List the important products formed 349 307 D07(RS2)
 from tyrosine and write the metabolic pathways leading to the formation of any two of them.
17. Name and explain the steps of formation 349 307 J14
 of three important compounds formed from tyrosine.
18. Mention the catecholamines. How are 349 308 D16(RS3), D03
 they formed?
19. Outline the synthesis of epinephrine and 349 308 J15(RS3)
 give its functions.
20. What is phenylketonuria (PKU)? What 352 310 D09(RS2), D10
 are the alternate metabolic pathways for the accumulated phenylalanine? How is it diagnosed biochemically?
21. Discuss phenylketonuria under (i) 352 310 D15(RS3)
 enzyme defect, (ii) Manifestation, (iii) Diagnostic test.
22. Describe tryptophan metabolism. 355 313 J16(RS3)
23. Serotonin 357 313 J08(RS2), D98, D99
24. Describe the fate and functions of 361 288 D13(RS3)
 methionine.
25. Explain how S-adenosyl methionine 361 288 J15
 is formed. Give examples of five transmethylation reactions.

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	STNRN	VSDN	
26. S-adenosyl methionine—formation, functions.	361	288	D00, D09
27. Metabolic functions of methionine.	361	289	D05, D13
28. Transmethylation reactions with examples.	362	289	J09(RS2), J10(RS2), J12(RS3), J12
29. Describe the conversion of methionine to cysteine. Add a note on homocystinuria.	362	288	J15(RS3)
30. Metabolic functions of cysteine.	363	290	J05(RS2)
31. Disorders of sulfur-containing amino acids.	363	292	D08(RS2)
32. Cystinuria and homocystinurias.	363	292	J11
33. Describe one carbon metabolism. What is its significance?	365	277	D15(RS3), D07
34. Maple syrup urine disease.	367	300	J09(RS2)
35. Write about aminoaciduria.	376	318	J07
36. Name the biochemical defect in the following disorders of amino acid metabolism.	377	318	D01
a. Phenylketonuria.			
b. Alkaptonuria.			
c. Maple syrup urine disease.			
d. Albinism.			
e. Homocystinuria.			
37. Name the enzyme defective in:	340	260, 318	D05
a. Alkaptonuria.	341		
b. Niemann-Pick disease.	341		
c. Albinism.	342		
d. Gaucher's disease.	342		

Short Answers

1. Significance of non-protein nitrogenous substances.	—	414	J07(RS2)
2. Transamination reaction and clinical importance.	333	270	J09(RS2), D13(RS3)
3. Formation of ammonia and its toxicity in brain.	336	269	D09(RS2)
4. Formation of glutamine and its importance.	337	294	D12

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	STNRN	VSDN	
5. Carbomoyl phosphate synthetase deficiency.	342	275	J98
6. What is the normal level of non-protein nitrogen (NPN) substances in the blood?	342	414	J08
7. Specialized/biologically important compounds formed from glycine.	344	283	D18(RS3), D19(RS3), D03, J13, D14
8. How is creatinine synthesized?	345	283	J15, D16
9. Name the amino acid used for the synthesis of creatinine.	345	283	J07
10. Biologically important compounds derived from tyrosine.	349	307	D08(RS2), J11, D11
11. Melanin synthesis.	349	307	D15
12. Phenylketonuria.	352	310	D00
13. Indicate the biochemical defect in phenylketonuria.	352	310	J14
14. Alkaptonuria.	353	311	D14(RS3), J12, D15
15. Albinism.	354	312	J13
16. Derivatives of tryptophan.	355	313	J12(RS3), D05, D16
17. Serotonin—formation, functions of serotonin.	357	313	D12(RS3), J00, D00
18. Melatonin.	359	315	D15(RS3)
19. Hartnup's disease.	360	315	J12(RS3), J17(RS3), D14
20. Name the sulfur-containing amino acids. List two disorders of their metabolism.	360	288	D02
21. S-adenosyl methionine (active methionine)—formation.	361	288	D98, D11
22. Three transmethylation reactions of S-adenosyl methionine.	362	289	J18(RS3)
23. Homocysteine.	363	293	J09
24. Functions of cysteine.	363	290	D15
25. Enumerate the metabolic disorders associated with cysteine metabolism indicating the defect.	363	292	J02
26. Write the composition of:	a) 363	288	D13
a. 3-phosphoadenosine-5-phosphosulfate (PAPS)	b) 361		
b. S-adenosyl methionine (SAM).			

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	STNRN	VSDN	
27. What is meant by inborn error of metabolism? What is homocystinuria?	364	293	D11
28. Maple syrup urine disease.	367	300	J00
29. Name the deficient enzyme in:	368	297	J13
a. Hyperargininemia	352		
b. Phenyl ketonuria.			
30. How GABA is formed? What is its function?	371	310	J03
31. Name the amino acids which form succinyl CoA.	375	294	D06
32. Name two metabolic disorders of amino acids metabolism and indicate the enzyme defect.	377	339	D07
33. Mention the enzyme defects in phenylketonuria and homocystinuria.	377	319	J05
34. Name the enzyme defect in:	377	319	D14
a. Phenylketonuria			
b. Alkaptonuria.			
35. Name the biochemical defect in:	377	319	J03
a. Phenylketonuria			
b. Maple syrup urine disease.			
36. Polyamines and their clinical significance.	378	299	F21(RS4), D15(RS3)

Multiple Choice Questions

- | | | | |
|---|-----|-----|----------|
| 1. The following compounds are biosynthesized by glycine, <i>except</i> : | 343 | 283 | J21(RS4) |
| a. Creatinine | | | |
| b. Heme | | | |
| c. Melatonin | | | |
| d. Purine nucleotide | | | |
| 2. Appearance black color urine is seen in: | 353 | 312 | J21(RS4) |
| a. Porphyria | | | |
| b. Alkaptonuria | | | |
| c. Jaundice | | | |
| d. Urinary tract infection | | | |

CHAPTER 16: INTEGRATION OF METABOLISM**Short Essays**

- | | | | |
|---|-----|-----|----------|
| 1. Explain the metabolic adaptations occurring in the liver and adipose tissue in a well-fed state. | 384 | 117 | F21(RS4) |
|---|-----|-----|----------|

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	STNRN	VSDN	
2. Discuss the biochemical/metabolic changes during starvation.	385	117	J14(RS3), J03, J13, D14

Short Answers

1. Sources and fate of acetyl CoA.	—	335	D01, J12
2. Biochemical changes in starvation.	385	117	J16(RS3)

CHAPTER 17: METABOLISM OF NUCLEOTIDES**Long Essays**

- | | | | |
|--|---------|---------------|----------|
| 1. What are nucleotides? Explain the catabolism of purine nucleotides. Write briefly on the metabolic disorders associated with purine metabolism. | 72, 395 | 575, 582, 583 | J07(RS2) |
| 2. What are sources of C and N atoms of purine? Describe the biosynthesis of purine and add a note on its regulation. | 389 | 578 | J13(RS3) |
| 3. Enumerate the reactions of purine degradation and add a note on gout. | 395 | 582, 583 | J13 |
| 4. How is uric acid formed from purine and add a note on hyperuricemia. | 395 | 582, 583 | J18(RS3) |
| 5. Describe the synthesis of pyrimidine and its regulation. | 399 | 585 | D12(RS3) |

Short Essays

- | | | | |
|---|--------------|---------------|--|
| 1. What are nucleotides? What are the sources of C and N atoms of purine nucleotide? Mention the metabolic disorders associated with purine metabolism. | 72, 389, 399 | 575, 581, 583 | J14(RS3) |
| 2. Briefly outline the steps of de novo synthesis of purine. | 391 | 578 | D11(RS3), J12(RS3) |
| 3. Purine salvage pathways. | 393 | 582 | D06(RS2), J15(RS3), D08, J11, D13, D14 |
| 4. Salvage pathway. | 393, 402 | 582 | J12(RS3), D05(RS2) |
| 5. Catabolism (degradation) of purines, nucleotides and related disorders (causes of hyperuricemia). | 395 | 582 | D06(RS2), D09(RS2), D10(RS2), D13(RS3), D19(RS3), D09, J11 |
| 6. Explain the disorders associated with purine synthesis and breakdown. | 395 | 583 | F21(RS4) |

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	STNRN	VSDN	
7. Synthesis of uric acid.	395	582	J98
8. How is uric acid formed in the body? What is gout? What is the treatment? Explain the basis for the treatment.	395	582	D15(RS3)
9. Hyperuricemia—causes, features and drugs to lower plasma uric acid levels	395	583	J04, J10
10. What is gout? Give its biochemical basis, clinical manifestations and line of treatment.	395	583	D12(RS3), D16(RS3), D99, D00, D07, D11
11. Lesch-Nyhan syndrome and orotic aciduria.	399, 402	584, 587	J05(RS2), D08(RS2)
12. A 4-year-old child was brought to the hospital with the following complaints developmental failure, aggressive behavior, joint pain, compulsive urge to bite his lips and fingers. Mother revealed a family history of similar illness among family members.	399	584	J21(RS4)
a. Suggest the probable diagnosis.			
b. Name an appropriate biochemical parameter to diagnose this condition and state its reference range in males and females.			
c. Name the enzyme deficiency and the reaction catalyzed by the enzyme.			
13. Degradation of pyrimidines.	402	588	J08(RS2)
Short Answers			
1. Indicate sources of various (carbon and nitrogen) atoms of purine ring by a diagrammatic representation.	389	578	J21(RS4), D09(RS2), D03, D07
2. Describe two reactions of salvage pathway of purine nucleotide synthesis.	393	582	J05
3. What is the function of thioredoxin?	394	587	D09
4. Hypoxanthine.	395	582	D98
5. Mention any two causes of hyperuricemia.	395	583	J06
6. Gout—causes.	395	583	J05(RS2), D01
7. What is the normal serum uric acid level? Name two pathological conditions associated with hyperuricemia.	395	583	D02
8. Allopurinol.	398	583	J98
9. Lesch-Nyhan syndrome—causes, features.	399	584	J10(RS2), D14(RS3), D03, J08, J15

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	STNRN	VSDN	
10. Mention the sources of carbon and nitrogen atoms of pyrimidine bases.	400	585	F21(RS4), D13
11. Deficiency features of orotic aciduria. Explain the biochemical basis of manifestations (causes).	402	587	J11(RS2), D19(RS3), J07, J10, D16

CHAPTER 18: MINERAL METABOLISM

Long Essays

1. Describe in detail the sources, daily requirement, absorption, distribution, functions, normal level and factors regulating blood calcium level. Discuss about any clinical condition with abnormal blood calcium level (tetany).	406	527	D06(RS2), J09(RS2), D00, D01, J12, D14
2. A 12-year-old girl presented with stiffness and tingling of hands and feet, carpopedal spasm. On examination, Trousseau's sign was positive, Chvostek sign was positive. On laboratory evaluation, serum calcium was significantly reduced.	411	532	F21(RS4)
a. Interpret the findings and suggest the probable diagnosis.			
b. Mention the reference range and dietary sources of the nutrient.			
c. Explain the role of hormones in regulating the blood levels of this nutrient.			
d. Mention any six biochemical functions of this nutrient.			
3. Explain the metabolism of iron under the following headings. (a) Absorption and transport, (b) Biochemical functions, (c) Hemosiderosis.	416	536	D13

Short Essays

1. List any three trace elements with their biological function.	407	527	J17(RS3)
2. Calcium—sources, daily requirements, factors affecting absorption, biochemical role (functions) and deficiency signs of calcium.	406	527	J12(RS3), J98, D99, D03, J09, D11
3. Intestinal absorption of calcium.	408	528	J15
4. Calcium homeostasis (regulation of blood calcium level)—by vitamin D, PTH and calcitonin.	409	529	D09(RS2), J00, J02, D07, D13

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	STNRN	VSDN	
5. Write briefly about the role of parathyroid hormone in the regulations of serum calcium level.	409	530	J06
6. Renal rickets.	411	—	J98
7. Give an account of phosphorus metabolism.	412	534	J13(RS3)
8. What are the major biochemical functions of sodium and potassium? Mention their normal serum levels.	413, 414	460, 461	D12(RS3), D03
9. What is the normal range of serum potassium and write about hypokalemia.	414	461	D10(RS2)
10. Iron—source, daily requirement, absorption, factors affecting iron absorption, transports, storage and physiological role of iron.	416	536	J07(RS2), D12(RS3), D16(RS3), D98, D99, D02, J04, J07, J10, J13, D15
11. A 13-year-old girl complains of excessive tiredness, poor appetite and tingling sensation in the limbs. On examination she was pale. Laboratory report revealed Hb—7 g/dL, TIBC is increased, serum transfer in saturation is reduced and peripheral smear showed microcytic hypochromic anemia. a. Suggest the probable diagnosis. b. Describe the absorption and transport of this nutrient.	418	539	J21(RS4)
12. What are the causes and consequences of iron toxicity?	419	540	D16
13. What is Wilson's disease? State the cause and treatment policy.	420	541	D17(RS3)
14. Functions of iodine.	420	542	J11(RS2)
15. Functions of selenium.	423	543	J10 (RS2)
Short Answers			
1. List routinely measured serum electrolytes. Mention their reference range.	—	783	F21(RS4)
2. What is renal tubular acidosis? Mention two biochemical findings in this condition.	—	—	J02
3. Trace elements.	405	527	D06(RS2), D08(RS2)
4. Functions of calcium.	406	528	J11, D16

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	STNRN	VSDN	
5. What is the normal serum calcium level? Explain its regulation.	409	529	D05(RS2), J05
6. List the hormones in plasma calcium regulation.	409	529	D06
7. Calcitriol.	409	529	J98
8. Write short note on rickets.	411	—	J13
9. Functions of magnesium.	412	464	J09
10. Hyponatremia (causes).	414	460	J98
11. Write the normal biological reference value for serum potassium. Mention any two causes of hyperkalemia.	414	463	J21(RS4)
12. Describe the functions of potassium.	414	461	J05
13. Iron—absorption, transport and storage. Add a note on hemochromatosis.	417	537	D10(RS2), D19(RS3), D00, D10
14. Ferritin.	418	538	D08
15. What is hemosiderosis? How it is caused?	419	540	
16. Causes of hemochromatosis.	419	540	J01, D04
17. Functions of copper.	419	541	J12(RS3), N20(RS3), D09
18. Copper-containing protein and its clinical significance.	419	541	J98
19. Four enzymes with copper as integral component.	419	541	D12(RS3), J02, D08
20. Menke's disease.	420	541	J12(RS3)
21. Wilson's disease.	420	541	J00
22. Importance of iodine.	420	542	J14(RS3)
23. Iodine metabolism.	421	681	D07(RS2)
24. Biological role of zinc in the body.	421	542	J06(RS2), D98, J99, J08, J10, J12, J14
25. Name a zinc-containing enzyme and its catalytic role.	421	542	D05
26. Fluorosis.	423	543	J08(RS2)
27. Functions of fluoride in dental health.	423	542	J07
28. Metabolic role of selenium.	423	543	J18(RS3), D99, D08, J15
29. Mention the functions of (a) Iodine, (b) Zinc.	420, 421	542	D01

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STNRN VSDN

30. Describe the functions of iodine and 420, 423 542 J05
fluorine.
31. Functions (metabolic roles) of zinc and 421, 423 542, 543 J05(RS2), J01,
selenium. D04

Multiple Choice Questions

1. _____ is the marker of bone — 533 J21(RS4)
formation.
- Telopeptides
 - Tartrate resistant acid phosphatase
 - Osteocalcin**
 - Pyridinium cross-links derived from collagen

SECTION 4: CLINICAL BIOCHEMISTRY AND NUTRITION**CHAPTER 19: HORMONES****Short Essays**

1. General mechanism of action of steroid 430 671 J08(RS2)
hormones.
2. Give a diagrammatic representation of 432 671 D12(RS3)
mechanism of steroid hormone action.
3. Significance of aldosterone. 444 679 J99, D04

Short Answers

1. Thyroid function tests—routine and anti- — 682 D11(RS3)
thyroid peroxidase antibody (TPO).
2. What is second messenger? Give an 430 667 D11
example.
3. Mechanism of action of steroid hormones. 430 671 D14(RS3)
4. Give a diagrammatic representation of 432 671 J05
action of a steroid hormone.
5. Cyclic AMP—functions. 432 667 D03
6. Reference range of TSH and its signi- 442 675 D11
ficance.
7. Clinical interpretation of estimation of 442 675 D09(RS2)
thyroid stimulating hormone (TSH) in
blood.
8. Laboratory diagnosis for hypothyroidism. 443 682 J16(RS3)

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STNRN VSDN

CHAPTER 20: ORGAN FUNCTION TEST**Short Essays**

1. Liver function tests—classify, describe 454 397 D08(RS2),
tests based on secretory/metabolic and
excretory functions. J14(RS3),
D19(RS3), J98,
J01, D03, J06,
J10, D10, J11
2. Vander Bergh's reaction (principle) and 456 398 D00, J13, J15
its clinical significance.
3. Serum enzymes estimated to assess the 456 399 D98
liver function.
4. Hippuric acid test. 460 — D15
5. Describe renal function tests. Explain the 460 410 F21(RS4), J02,
principle and application of creatinine
clearance. J05
6. Explain the tests done to assess the 461 420 J21(RS4)
renal tubular functions? What is urine
osmolality? Write its reference range.
7. Clearance tests. 462 414 J06(RS2), J15
8. Define renal clearance. Name clearance 462 414 D05(RS2)
tests used to assess kidney function.
Explain any one of the clearance tests
and mention its significance.
9. Creatinine clearance test. 462 415 D08
10. Standard urea clearance test. 463 417 J12(RS3)
11. Concentration dilution test. 463 420 D15

Short Answers

1. Test for urobilinogen. — 399 J99
2. Enumerate three/four functions of the 455 396 D11(RS3), D07
liver and tests with reference ranges to
assess them.
3. Describe Vander Bergh's reaction. 456 398 J18(RS3),
Mention its significance. D18(RS3), J99,
J04, D14
4. Write short note on enzyme assays for 456 399 D16(RS3), D13
liver function/Marker enzymes of liver
function test.
5. Enumerate renal function tests. 460 410 J11(RS2), D03
6. Tests to assess renal tubular function. 461 420 J17(RS3)
7. Tests of renal distal tubular function. — 420 J16(RS3)

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	STNRN	VSDN	
8. What is meant by renal clearance? How is creatinine clearance calculated?	462	414	D14(RS3)
9. Clearance tests.	462	414	D06(RS2), N20(RS3)
10. Creatinine clearance test.	462	415	J09(RS2), J13(RS3), D14
11. Alkaline tide.	465	404	D98

CHAPTER 21: WATER, ELECTROLYTE AND ACID-BASE BALANCE

Long Essays

1. What is the normal pH of blood? Explain the mechanism of how it is regulated. 475 440 J12(RS3)
2. What is the normal range of blood pH? What is the importance of maintaining acid-base balance in the body? Write in detail how kidney helps in maintaining acid-base balance. Add a note on metabolic acidosis 475, 483 440, 441, D07(RS2), 446 N20(RS3)

Short Essays

1. Discuss the regulation of water by rennin-angiotensin system. — 457 D17(RS3)
2. Define pH and buffer. Mention the buffer systems present in plasma, erythrocytes and urine. 476 439 J02
3. What are buffers? Name the buffer system of body fluids. Discuss any one/two buffer system of the body. 476 439 D05(RS2), J13(RS3)
4. What are buffers? Explain the plasma buffers in maintaining acid-base balance. 476 439 J16(RS3), D18(RS3)
5. Blood buffers and their role in acid-base balance. 476 439 J06(RS2), D99, J06
6. Extracellular buffers. 476 439 J10(RS2)
7. Bicarbonate buffer system of blood. 476 439 J09(RS2)
8. What is Henderson-Hasselbach equation? Describe the buffer systems in blood and urine. 477 438 J05
9. Write the Henderson-Hasselbach equation and its significance in bicarbonate buffer system. 477 438 J14(RS3)
10. Use of phosphate buffer in maintaining acid-base balance. 477 440 D10

Contd...

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	STNRN	VSDN	
11. Renal regulation and respiratory regulation of body pH.	477	441	D00, D01, D03
12. Role of lungs in pH maintenance (respiratory regulation of pH).	477	441	D08
13. Erythrocytes in acid-base balance.	478	441	J18(RS3)
14. Chloride shift.	478	—	J08(RS2)
15. Renal regulation of acid-base balance (give the key reactions of renal mechanism in acid-base balance).	478	441	D06(RS2), D09(RS2), D11(RS3), D12(RS3), J15(RS3), J09, J12, J14, D14
16. Name the urinary buffers. Explain their role in excreting excess acid from the body. Mention the other renal mechanisms of pH homeostasis.	478	443	J21(RS4)
17. What is anion gap? Explain normal anion gap acidosis and high anion gap acidosis with examples.	482	446	J05(RS2), D10(RS2), D09
18. Write the formula to calculate anion gap. Mention its reference range. Discuss the clinical use of anion gap in classifying metabolic acidosis with two examples for each type.	482	446	J21(RS4)
19. What is metabolic alkalosis? Mention four causes of metabolic alkalosis. Explain the compensatory mechanism.	483	448	F21(RS4)
20. How does metabolic alkalosis differ from respiratory alkalosis. Explain the cause and compensatory mechanism involved?	483	448, 449	J00
21. Metabolic acidosis—primary defect, causes, biochemical findings.	483	446	J08(RS2), J19(RS3), D19(RS3), J98, J11
22. Explain metabolic and respiratory acidosis.	483	446, 449	J07(RS2)
23. What are the causes of respiratory acidosis? List the primary abnormalities of respiratory acidosis.	483	449	D14(RS3), J01
24. Respiratory alkalosis.	484	449	D15(RS3)
25. Hormonal regulation of fluid and electrolyte.	470, 473	457	D11(RS3), D16
26. What are buffers? Explain the role of the kidneys in homeostasis of pH of blood.	476, 478	439, 441	D11

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	STNRN	VSDN
Short Answers		
1. Hormones that regulate water balance.	470	457 J15(RS3)
2. Name the serum electrolytes and give their normal values.	472	456 D01
3. Define buffers. Name the blood buffer system.	476	439 J00, J01, D04, J08, D14
4. What are buffers? Write the importance of bicarbonate buffer system?	476	439 D13, J15
5. Name the most effective physiological buffer in the plasma. Explain the role of carbonic anhydrase in acid-base homeostasis.	476	439 F21(RS4)
6. List the major kidney mechanism for regulation of pH of extracellular fluid.	478	441 D09
7. Carbonic anhydrase.	478	443 D99, D15
8. Discuss the role of carbonic anhydrase in the acid-base regulation.	478	443 D17(RS3)
9. Chloride bicarbonate shift.	478	— D98
10. Reclamation of bicarbonate by kidneys.	479	442 J01, D04
11. Titrable acidity.	479	443 J99, D99
12. Give an account of anion gap.	482	446 J14
13. What is anion gap? Mention two causes for increased anion gap?	482	446 J03
14. Define anion gap. What happens to anion gap in acidosis resulting from renal failure?	482	446 J07
15. Metabolic acidosis—causes and features	483	446 J04
16. Respiratory acidosis—define, causes, compensation.	483	449 J10, D13
17. Alkalosis.	483	448 D16(RS3)
18. Explain why acidosis causes hyperkalemia? How it is corrected?	484	447 J03

CHAPTER 22: TISSUE PROTEINS AND BODY FLUIDS

Short Answers

1. Name any four proteins of the extracellular matrix. Write the post-translational modification of collagen and its importance.	487	720	J21(RS4)
2. Explain the structure of collagen.	488	721	F21(RS4)
3. Amino acids in collagen.	488	721	D99
4. Discuss the nutritional role of milk and dairy products.	495	465	D17(RS3)

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STNRN VSDN

Multiple Choice Questions

- | | | | |
|---|-----|-----|----------|
| 1. Ehlers-Danlos syndrome is due to the defective formation of: | 489 | 723 | J21(RS4) |
| a. Type I collagen | | | |
| b. Type II collagen | | | |
| c. Type III collagen | | | |
| d. Type IV collagen | | | |

CHAPTER 23: NUTRITION

Short Essays

- | | | | |
|--|-----|-----|---|
| 1. What is calorific value? Calculate the energy requirement of a 50-year-old moderate worker. | 501 | 549 | F21(RS4) |
| 2. Basal metabolic rate (BMR)—definition, determination, normal value, factors affecting. | 502 | 550 | J06(RS2), D07(RS2), J09(RS2), D13(RS3), J18(RS3), D18(RS3), J19(RS3), J08, J09, J12 |
| 3. What are dietary fibers? List any four and write their functions. What is meant by dietary fiber? What are the sources of dietary fibers? Discuss the importance of it in nutrition. Outline the functions of proteins. | 507 | 552 | J21(RS4), D14(RS3), J15(RS3) |
| 4. Nitrogen balance—factors affecting. | 509 | 554 | J05(RS2), J11(RS2) |
| 5. Define biological value of protein. What do you mean by complementary proteins? Give examples. What is the requirement of protein in diet? | 511 | 554 | J17(RS3), J14 |
| 6. What is a balanced diet? Discuss the components of a balanced diet. | 513 | — | J15(RS3), D13 |
| 7. Protein-energy malnutrition. | 514 | 555 | J10(RS2), D11(RS3), D08 |
| 8. Describe the causes and features of kwashiorkor and marasmus. | 515 | 556 | J05 |
| 9. Name the protein-energy malnutrition disorders. Write important differences between them. | 516 | 556 | D19(RS3) |

Short Answers

- | | | | |
|--|-----|-----|-----|
| 1. Calorific value—definition, calorific value of protein and fat. | 501 | 549 | D02 |
|--|-----|-----|-----|

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	STNRN	VSDN	
2. Respiratory quotient (RQ)—definition, RQ values of carbohydrate, lipids and proteins, factor affecting, conditions associated with lowering RQ.	501	549	J10(RS2), D01, J04, J05, D05, D10, D14, D15
3. Basal metabolic rate (BMR)—definition, factors affecting, causes of increased BMR.	502	550	J02, J04, D09, J10
4. Specific dynamic action (SDA) and basal metabolic rate (BMR).	502	550	D12(RS3)
5. Specific dynamic action of food stuff.	503	551	J12(RS3), J15(RS3), J16(RS3), D07, D12, J15
6. Calculate energy requirement per day of a student of 20 years.	504	551	J13
7. Dietary fiber—sources, examples, beneficial effects (role in health and disease).	507	552	D07(RS2), D08(RS2), J10(RS2), D10(RS2), D18(RS3), J00, J01, J02, D04, D10, J13
8. Define nitrogen balance. Give one example each for conditions with positive and negative nitrogen balance.	509	554	J21(RS4), D10, D11
9. Positive nitrogen balance.	510	554	D10
10. Biological value of protein.	511	554	J15
11. Limiting amino acid.	512	555	J08(RS2)
12. Mutual supplementation of cereals and pulses is beneficial. Justify.	512	559	F21(RS4)
13. Balanced diet.	513	—	J16(RS3), J98, D99, D13
14. Nutritional deficiency disorders in India.	514	555	D07
15. Protein-energy malnutrition (biochemical changes).	514	555	J07(RS2), D10(RS2), D16(RS3), N20(RS3), J13
16. Kwashiorkor—biochemical findings.	515	556	D02, D15
17. Marasmus.	515	556	D98, J06
18. Nutritional deficiency anemias.	515	539	D05(RS2)
19. List two differences between marasmus and kwashiorkor.	516	556	D01

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STNRN VSDN

SECTION 5: MOLECULAR BIOLOGY AND BIOTECHNOLOGY

CHAPTER 24: DNA—REPLICATION, RECOMBINATION AND REPAIR

Long Essays

1. Discuss the structure and replication of DNA. 76, 524 593, 596 J10(RS2)
2. Describe the synthesis of DNA. Write a note on replication of DNA. 524 596 D15(RS3)
3. Define replication. Describe in detail the process of replication in eukaryotes. Mention its inhibitors. 527 596 D14(RS3), J16(RS3)
4. Write about DNA replication and repair. 524, 535 596, 601 J13

Short Essays

1. What is meant by exonucleases and endonucleases? Write the importance of each. — — J01
2. What is replication? Describe the steps of replication. 524 596 D00, D02, D07
3. Describe the replication of DNA. 527 596 J05
4. Replication of lagging strand. 528 599 D07(RS2)
5. Mutations. 534 630 J05(RS2), N20(RS3)
6. Point mutation—define and effects. 534 — D17(RS3)
7. Base excision DNA repair mechanism. 536 602 J10

Short Answers

1. Name bacterial DNA polymerases. Mention its significance. — 598 D05(RS2)
2. Replication of DNA—any three salient features. 524 596 J21(RS4), D98, J09
3. What is meant by semiconservative mechanism of replication? 524 596 J10
4. Okazaki fragments. 525 599 J17(RS3), D18(RS3), J15, D16
5. Cell cycle. 530 600 J17(RS3)
6. Telomerase are involved in aging process. Justify and give its clinical significance. 532 733 J21(RS4)
7. What is mutation? List two examples. 534 630 J02, D14
8. Mutagens. 534 632 J17(RS3)
9. Point mutation with two examples. 534 — J15(RS3), D15(RS3), J12

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	STNRN	VSDN	
10. Silent mutation.	534	631	J15
11. Missense mutation—list the effects.	535	631	J10, D15
12. What is nucleotide excision repair?	536	602	J07
13. Causes for xeroderma pigmentosa.	536	603	D12(RS3)

Multiple Choice Questions

- | | | | |
|--|-----|-----|----------|
| 1. Helicase enzyme in DNA replication: | 525 | 598 | J21(RS4) |
| a. Unwinds the DNA | | | |
| b. Releases the supercoils | | | |
| c. Breaks the strands | | | |
| d. Seals the strands | | | |

CHAPTER 25: TRANSCRIPTION AND TRANSLATION**Long Essays**

- | | | | |
|--|---------------|---------------|-----------------------------------|
| 1. Explain the steps of initiation, elongation and termination of transcription (in prokaryotes). How is it regulated? Name the inhibitors of transcription. Add a note on post-transcriptional modification of RNA. | 543, 544, 545 | 608, 613, 611 | F21(RS4), D19(RS3), J14 |
| 2. Define translation (protein biosynthesis). Describe the steps of translation. Name four inhibitors and their action. | 546, 549, 555 | 616, 620 | J14(RS3), J17(RS3) |
| 3. Write in detail the process of translation in eukaryotes. Add a note on post translational modifications and its inhibitors. | 549, 557 | 616, 619 | D18(RS3), J19(RS3) |
| 4. What is genetic code? Describe the process of eukaryotic translation. | 546 | 615, 616 | J11(RS2) |
| 5. What is lac-operon? Explain the steps of activation, initiation, elongation and termination of protein biosynthesis and its regulation. | 550, 562 | 615, 636 | J05(RS2), D08(RS2), D10(RS2), D11 |

Short Essays

- | | | | |
|---|-----|-----|--|
| 1. Transcription (factors required). | 540 | 608 | D06(RS2), D01, J06 |
| 2. Post-transcriptional modifications of mRNA. | 544 | 611 | D09(RS2), D16(RS3), J10, D12 |
| 3. Genetic code—definition (Codon), salient features, initiating and terminating codon. | 546 | 615 | D06(RS2), J08(RS2), J17(RS3), D17(RS3), D03, J15 |

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	STNRN	VSDN	
4. Write part played by ribosomes in proteins biosynthesis.	549	614	J00
5. Post-translational modification.	557	619	D15
Short Answers			
1. RNA polymerase.	543	609	D16(RS3), D15
2. Name the post-transcriptional modifications of m-RNA.	544	611	D06
3. Name two inhibitors of RNA synthesis.	545	613	D05
4. Reverse transcriptase and its significance.	546	612	J01, J03, D04, J06
5. Codon and its characteristics. Name the chain initiating codon and chain terminating codons.	546	615	J99, D99, J05, D07
6. Genetic code—characteristic features.	546	615	F21(RS4), D09(RS2), D10(RS2), D19(RS3)
7. Write short note on codon and 'Wobble hypothesis'.	546, 548	615	D13
8. Degeneracy of codon.	547	615	J01, D04, D09
9. Wobble phenomenon.	548	615	J15
10. Which are inhibitors of protein biosynthesis?	555	620	J07(RS2)
11. Post-translational modifications with examples.	557	619	J13(RS3), D07

CHAPTER 26: REGULATION OF GENE EXPRESSION**Short Essays**

- | | | | |
|---|-----|-----|-------------------------|
| 1. Describe with an example regulation of gene expression. | 561 | 635 | D13(RS3) |
| 2. Explain Lac operon concept with a diagrammatic representation. | 562 | 636 | J21(RS4), D17(RS3), J11 |

Short Answer

- | | | | |
|--------------------|-----|-----|----------|
| 1. Operon concept. | 562 | 636 | D11(RS3) |
|--------------------|-----|-----|----------|

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STNRN VSDN

CHAPTER 27: RECOMBINANT DNA TECHNOLOGY

Long Essay

1. Discuss in detail recombinant DNA technology and its clinical application. 571 643 J08(RS2)

Short Essays

1. Recombinant DNA technology and its applications. 571 643 D08(RS2), J16(RS3), D16(RS3), J17(RS3), J03, J04, D08, D10, D15
2. What is the difference between endonuclease and restriction endonuclease? Give two examples for endonuclease. — 644 D15(RS3)
3. What is a restriction endonuclease? Give any two examples with their biomedical importance. Explain their role in recombinant DNA technology. 572 644 J13(RS3), J16(RS3)
4. What is plasmid? What is its application in recombinant DNA technology? — 644 J07(RS2), J10
5. Explain the principle, requirements, steps of polymerase chain reaction and its application. 579 658 F21(RS4), D14(RS3), D18(RS3), J19(RS3), N20(RS3), J15, D16

Short Answers

1. What is the difference between endonuclease and restriction endonuclease? Give two examples of restriction endonuclease. — 644 D08(RS2)
2. What are molecular scissors? Mention its applications. 572 644 F21(RS4)
3. What are restriction enzymes? List three features of restriction enzymes. — 644 D14(RS3)
4. What is a chimeric (recombinant) DNA molecule? Give the applications of recombinant technology. 572 645 D09(RS2), D11(RS3), D05, D11, D12
5. What are restriction endonucleases? Give two examples. 572 644 D03

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STNRN VSDN

6. What is a vector? What are the commonly used vectors in recombinant DNA technology? 574 644 J18(RS3), J07
7. What is Southern blot technique? Write two applications of this technique. 576 654 J14(RS3)
8. What are DNA probes? Mention the types of DNA probes. Write their applications. 578 654 J21(RS4), D17(RS3)
9. What is polymerase chain reaction (PCR)? Mention application of PCR. 579 658 J05(RS2), J06(RS2), J09(RS2), J14(RS3), J04
10. What is restriction fragment length polymorphism? Give one clinical application for the same. 583 657 J07

Multiple Choice Questions

1. Western blot technique is used for the: 577 655 J21(RS4)
- Detection of specific DNA segment
 - Detection of specific gene expression
 - Identification of a specific protein
 - Location of a gene on a specific chromosome

SECTION 6: CURRENT TOPICS

CHAPTER 28: HUMAN GENOME PROJECT

None

CHAPTER 29: GENE THERAPY

Short Essay

1. Gene therapy—its application in medicine. 602 648 D07(RS2), D13(RS3), D09, D12

Short Answer

1. What is gene therapy? Name vectors used for gene therapy. 602 648 D05(RS2), D18(RS3)

Multiple Choice Questions

1. Which of the following has not been treated by gene therapy? 603 650 J21(RS4)
- Hemophilia
 - Severe combined immunodeficiency
 - Cystic fibrosis
 - Glucose-6-phosphatase deficiency

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STNRN VSDN

CHAPTER 30: BIOINFORMATICS

None

CHAPTER 31: METABOLISM OF XENOBIOTICS (DETOXIFICATION)

Short Essays

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|---|-----|-----|--------------------|
| 1. What are xenobiotics? Give an account of phase two detoxification reactions. | 613 | 478 | D18(RS3) |
| 2. What is biotransformation? Discuss the different phases of biotransformation with an example. | 613 | 478 | J14(RS3) |
| 3. Detoxification with examples of reactions involved. | 613 | 478 | D05(RS2), J05, J13 |
| 4. Define detoxification. Give any four reactions of phase II detoxification. | 613 | 478 | J17(RS3) |
| 5. What is detoxification? Explain the role of oxidation and conjugation reactions in the liver for detoxification. | 613 | 478 | D11 |
| 6. Detoxification by oxidation. | 614 | 479 | J11(RS2) |
| 7. Detoxification by conjugation with examples. | 615 | 480 | D19(RS3), D10 |

Short Answers

- | | | | |
|--|-----|-----|--------------------|
| 1. How is paracetamol detoxified? | — | — | J08 |
| 2. What are xenobiotics? What is the role of Glutathione in detoxification. | 613 | 478 | D10(RS2) |
| 3. What is biotransformation? Give two examples. | 613 | 478 | D02 |
| 4. Detoxification. | 613 | 478 | D17(RS3), J11 |
| 5. What is detoxification? Give two examples of conjugation phase reactions? | 613 | 478 | J21(RS4) |
| 6. Explain any one detoxification mechanism with an example. | 614 | 479 | D12 |
| 7. Write the process of phase I detoxification with one example. | 614 | 479 | F21(RS4), D14(RS3) |
| 8. Give two examples of detoxification by oxidation and reduction. | 614 | 479 | D09(RS2) |
| 9. Detoxification of alcohol. | 614 | 479 | J09(RS2) |
| 10. Role of cytochrome P450 in detoxification reaction. | 615 | 478 | D08(RS2), D14 |
| 11. How is aspirin detoxified? | 615 | 480 | D07 |
| 12. Phase two reactions of detoxification. | 615 | 480 | J19(RS3) |

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STNRN VSDN

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|--|-----|-----|-------------------------|
| 13. Conjugation as detoxification mechanism with two examples. | 615 | 480 | J06(RS2), J07(RS2), D98 |
|--|-----|-----|-------------------------|

CHAPTER 32: PROSTAGLANDINS AND RELATED COMPOUNDS

Short Essays

- | | | | |
|---|-----|-----|--------------------|
| 1. What are eicosanoids? Mention their biomedical importance. | 618 | 256 | J02 |
| 2. Products from arachidonic acid and their function. | 618 | 256 | D19(RS3) |
| 3. Prostaglandins—classification and biological action. | 620 | 256 | J09(RS2), D98, J07 |

Short Answers

- | | | | |
|--|-----|-----|------------------------------|
| 1. Eicosanoids—names/functions. | 618 | 256 | D14(RS3), J08, D16 |
| 2. What are prostaglandins? Mention their biological functions. | 618 | 256 | D06(RS2), D13(RS3), D01, D10 |
| 3. What is arachidonic acid? Mention two uses of arachidonic acid. | 619 | 255 | J10 |

CHAPTER 33: BIOLOGICAL MEMBRANES AND TRANSPORT

Short Essays

- | | | | |
|--|-----|----|-----------------------------------|
| 1. Cell membrane—fluid mosaic model (with a neat labeled diagram). | 623 | 15 | F21(RS4), D09(RS2), D17(RS3), J14 |
| 2. Different transport mechanisms across the cell membrane. | 624 | 18 | J18(RS3), D09, J11 |
| 3. Facilitated diffusion. | 625 | 18 | D10 |
| 4. Define active transport. Explain the different types of active transport with suitable examples. | 626 | 21 | D18(RS3), J15 |
| 5. Sodium-potassium pump. | 626 | 21 | J10 |
| 6. Classify transport mechanisms across cell membranes. Define uniport, symport and antiport. Give an example of each. | 627 | 22 | D11(RS3) |

Short Answers

- | | | | |
|---|---|----|---------------|
| 1. Cell membrane—functions. | — | 15 | D07(RS2), J09 |
| 2. Describe secondary active transport. Mention one disorder of secondary active transport. | — | 21 | J05 |

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	STNRN	VSDN
3. Write four structural features of cell membrane.	623	15 J13
4. Transport across cell membrane.	624	18 D15(RS3)
5. Define the term active and passive transport.	625	18 J13
6. Active transport across membranes.	626	21 J11(RS2), N20(RS3), D06
7. What is uniport and symport transport system? Give an example.	627	22 D11
8. Endocytosis.	628	23 D08, J11

■ CHAPTER 34: FREE RADICALS AND ANTIOXIDANTS

Short Essays

1. Classify antioxidants giving two examples for each class. 632 476 J21(RS4), J08(RS2), J99, D04
2. Explain the role of antioxidants in protection against reactive oxygen species (ROS). 632 476 F21(RS4)
3. Antioxidant vitamins. 632 476 D06

Short Answers

1. Free radicals—definition, generation, functions. 629 471 J05(RS2), J12(RS3), D10
2. Reactive oxygen species (ROS)—enumerate, formation, characteristics. 630 471 D08(RS2), D10(RS2)
3. Free radicals and disease. 631 474 J11(RS2)
4. Significance of free radicals and antioxidants. 631 474 N20(RS3)
5. Free radical scavenging systems. 632 472 D18(RS3)
6. Antioxidants with examples. 632 476 D06(RS2), D11(RS3), D12(RS3), J15(RS3), D98, D03
7. What are antioxidants? Name chain breaking and preventive antioxidants. 632 476 J07(RS2)
8. Nonenzymatic antioxidants. 632 476 J16(RS3)
9. Mention the dietary antioxidants. 632 476 J14

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STNRN VSDN

■ CHAPTER 35: ENVIRONMENTAL BIOCHEMISTRY

Short Answer

1. What are the effects of lead poisoning on heme synthesis? 638 366 J14

■ CHAPTER 36: INSULIN, GLUCOSE HOMEOSTASIS AND DIABETES MELLITUS

Long Essay

1. What is the normal blood glucose level? Why does it need to be regulated? Describe the regulation of blood glucose. What are the causes of hyperglycemia and hypoglycemia? 646 161 D09(RS2), D14(RS3), D03

Short Essays

1. Regulation of blood sugar. 646 161 D12
2. Mechanisms of action of glucagon. 646 171 D07(RS2)
3. Explain the role of hypoglycemic hormones (insulin) in regulation of blood glucose. 648 169 J05(RS2)
4. Glucose tolerance test (GTT). 652 164 D02, J07, D09
5. Diabetes mellitus (metabolic changes). 654 173 D08(RS2), D12(RS3)

Short Answers

1. Glucose tolerance test (GTT) graph for renal glycosuria. — 165 D11(RS3)
2. Name two physiological actions of insulin. 643 169 D05
3. Intracellular insulin receptor. 644 168 J06(RS2)
4. What are metabolic effects of glucagon? 645 171 J04
5. How does insulin regulate blood glucose? 648 169 D13
6. Name the insulin antagonists. 648 171 D01
7. Hyperglycemic hormones and their mode of action. 648 171 D19(RS3)
8. Glucose tolerance test. 652 164 J11
9. What are the features of a normal glucose tolerance curve? 652 165 J10
10. Fasting and glucose tolerance test criteria for diagnosis of diabetes mellitus. 653 164 J19(RS3)
11. What is glycosuria? Mention the causes of different types of glycosuria. 653 165 J04

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	STNRN	VSDN	
12. Renal threshold for glucose and its significance.	653	165	D10(RS2)
13. Renal glycosuria.	653	165	J10(RS2), J99, J12, J14, J15
14. What is renal glycosuria? How do you differentiate it from diabetic glycosuria?	653	165	J03
15. Explain the rationale behind using glycated hemoglobin (HbA1c) as an indicator of glycemic control in diabetes mellitus. What is the reference range for HbA1c.	655	177	F21(RS4)

■ CHAPTER 37: CANCER

Short Essays

1. What are oncogenes? Discuss two tumor markers and their clinical application.	659, 662	711	D15(RS3)
2. Proto-oncogenes and oncogenes (mechanisms involved in activation of proto-oncogenes to oncogenes).	660	711	D10(RS2), D16
3. Tumor markers (mention five with their diagnostic importance).	662	715	F21(RS4), J07(RS2)
4. Clinical importance of alpha-fetoprotein (AFP) and prostate-specific antigen (PSA). Give their normal values.	663	715	D12(RS3)
5. Mention any four anticancer drugs and write their mechanism of action.	665	717	J21(RS4)

Short Answers

1. Mechanism of carcinogenesis.	—	—	D09(RS2)
2. Plasmids and oncogenes.	—	711	D13(RS3)
3. Prostate specific antigen (PSA).	—	716	J08(RS2)
4. Carcinogens.	658	708	N20(RS3)
5. Chemical carcinogens.	658	708	D16
6. Oncogenes—definition, examples, role in carcinogenesis.	659	711	J05(RS2), D06(RS2), D11(RS3), D18(RS3), J19(RS3), J04, J06, J09
7. Explain the process of activation of proto-oncogenes to oncogenes.	660	711	F21(RS4)
8. What are oncosuppressor genes? Name any two with their mechanism of action.	661	712	J21(RS4)

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	STNRN	VSDN	
9. Growth factors—enumerate, functions, role in carcinogenesis.	661	713	D05(RS2), D07(RS2)
10. Tumor markers—definition, examples, diagnostic significance.	662	715	D08(RS2), D14(RS3), D15(RS3), J18(RS3), D02
11. Anticancer agents.	664	716	D13(RS3)
Multiple Choice Questions			
1. Serum alpha fetoprotein level is increased in:	663	715	J21(RS4)
a. Multiple myeloma			
b. Choriocarcinoma			
c. Hepatoma			
d. Lung cancer			

■ CHAPTER 38: ACQUIRED IMMUNODEFICIENCY SYNDROME

None

SECTION 7: BASICS TO LEARN BIOCHEMISTRY

■ CHAPTER 39: INTRODUCTION TO BIO-ORGANIC CHEMISTRY

None

■ CHAPTER 40: OVERVIEW OF BIOPHYSICAL CHEMISTRY

Short Essay

1. Radioactive isotopes of iodine and their clinical application.	685	759	D10(RS2)
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Short Answers

1. How does a buffer maintain the pH? Give an example of blood buffer.	679	439	D06
2. Define radioactivity. Name the uses of: a. ¹⁸¹ I. b. Co-60.	685	757, 759	D01
3. Radioisotopes and application in medicine.	685	757	D13(RS3), N20(RS3)
4. Mention two isotopes and mention their application in medicine.	685	758	D08(RS2), D03, J07

■ CHAPTER 41: TOOLS OF BIOCHEMISTRY

Short Essays

1. Chromatography.	687	738	J00
2. Electrophoresis.	690	736	D00

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STNRN VSDN

Short Answers

- | | | | |
|---|-----|-----|-----------------------------------|
| 1. Principle of chromatography. | 688 | 738 | J15 |
| 2. Electrophoresis—principle, normal pattern of serum proteins, diagnosis importance. | 690 | 736 | D15(RS3), D16(RS3), D03, J10, J12 |
| 3. Immunoelectrophoresis. | 691 | 738 | J08(RS2) |
| 4. Enzyme-linked immunosorbent assay (ELISA). | 695 | 742 | N20(RS3) |
| 5. Monoclonal antibodies. | 696 | 699 | J14(RS3) |

CHAPTER 42: IMMUNOLOGY**Long Essay**

- | | | | |
|--|---|-----|----------|
| 1. Explain the immunological basis of vaccine development. | — | 700 | F21(RS4) |
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CHAPTER 43: MISCELLANEOUS**Long Essay**

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| 1. Discuss the significance of multi enzyme complexes with respect to carbohydrate and lipid metabolism. | — | — | J06(RS2) |
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Short Essays

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| 1. Multienzyme complexes. | — | — | D07 |
| 2. How would you explain osteoporosis in following conditions? | — | — | J01 |
| a. Prolonged use of phenobarbitone. | | | |
| b. Chronic liver or renal disease | | | |
| c. Vitamin D resistant rickets | | | |
| d. Fanconi's syndrome | | | |
| e. Vitamin D dependent rickets type II. | | | |

Short Answers

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| 1. Give reasons for the following: | | | F21(RS4) |
| a. Requirement of thiamine is increased in alcoholics. | a. 140 | a. 503 | |
| b. Prescription of folic acid during early pregnancy. | b. 155 | b. 513 | |
| 2. Give reasons for the following: | | | J21(RS4) |
| a. Muscle glycogen does not contribute to blood glucose. | a. 263 | a. 143 | |
| b. Intake of antimalarial drugs like primaquin in some people causes hemolytic anemia. | b. — | b. 75 | |
| c. Humans cannot synthesise vitamin C. | c. 136 | c. 519 | |

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| 3. Give reason for the following: | | | J21(RS4) |
| a. Restriction enzymes are termed as molecular scissors. | a. 572 | a. 644 | |
| b. Changing color of the bruise. | b. — | b. — | |
| c. Hemolytic jaundice is also called acholuric jaundice. | c. 215 | c. — | J21(RS4) |
| 4. Give reason for the following: | | | |
| a. Pellagra-like symptoms are seen in Hartnup's disease. | a. 360 | a. 316 | |
| b. Glycine does not exhibit optical activity. | b. — | b. — | |
| c. Proline is an α -helix breaker. | c. 59 | c. 37 | F21(RS4) |
| 5. Barbiturates should be given with caution in chronic alcoholics. Justify. | — | — | F21(RS4) |
| 6. State the advantages of automation in clinical biochemistry laboratory. | — | — | F21(RS4) |
| 7. Indicate the biochemical defect in lactose intolerance and Gilbert's disease. | 171, 216 | 128, 370 | D13 |
| 8. Name the enzyme defects in the following cases: (1) Refsum's disease, (2) Alkaptonuria. | 294, 353 | 205, 311 | D13 |
| 9. GABA, PUFA and SAM and their importance. | 371, 30, 361 | 294, 254, 288 | J14(RS3) |
| 10. Name two inborn errors of metabolism and the associated enzyme. | 377 | — | J09 |
| 11. Abnormal components of urine. | 729 | 412 | D13(RS3) |
| 12. Define proteinuria. Mention a biochemical test to detect proteinuria. | — | 413 | J14 |
| 13. What are G-proteins? | — | 668 | J14 |
| 14. Multienzyme complex. | — | — | D17(RS3) |
| 15. What are cold agglutinins? | — | — | D05 |
| 16. What is reference range/values? How is it calculated? | — | — | D07(RS2), J16(RS3), J19(RS3) |
| 17. Achylia gastrica. | — | — | J98 |
| 18. Reference range of potassium and albumin in the serum. | — | — | D09 |

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| 19. Normal values of: | — | — | D99 |
| a. Serum creatinine (0.5–1.5 mg/dL). | | | |
| b. Serum amylase (80–180 somogyi units/dL). | | | |
| 20. Mention the normal serum values for: | — | — | J02 |
| a. AST (4–45 IU/L). | | | |
| b. ALT (3–40 IU/L). | | | |
| c. Urea (15–40 mg/dL). | | | |
| d. Creatinine (0.5–1.5 mg/dL). | | | |
| 21. Normal serum levels of: | — | — | J06, D08 |
| a. Serum calcium (9–11 mg/dL). | | | |
| b. Serum phosphorus (3–4.5 mg/dL). | | | |
| 22. Mention the normal levels of: | — | — | D06(RS2) |
| a. Serum protein (6–8g/dL). | | | |
| b. Urea (15–40 mg/dL). | | | |
| c. Creatinine (0.5–1.5mg/dL). | | | |
| 23. Give the normal blood level of the following: | — | — | J09(RS2) |
| a. Fasting blood glucose (70–100 mg/dL). | | | |
| b. Total protein (6–8g/dL). | | | |
| c. Urea (15–40 mg/dL). | | | |
| d. Bicarbonate (24–30 mEq/L). | | | |
| e. Sodium (135–145 mEq/L). | | | |
| f. Potassium (3.5–5 mEq/L). | | | |
| 24. Give the normal values of: | — | — | D13 |
| a. Fasting blood glucose (70–100 mg/dL). | | | |
| b. Cholesterol (150–200 mg/dL). | | | |
| 25. Name the normal Serum levels of: | — | — | J14 |
| a. Sodium (135–145 mEq/L). | | | |
| b. Potassium (3.5–5 mEq/L). | | | |
| 26. Give the normal values of: | — | — | D14 |
| a. Fasting blood glucose (70–100 mg/dL). | | | |
| b. Blood urea (15–40 mg/dL). | | | |

Multiple Choice Questions

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| 1. Urine preservatives are used for all the following purposes, <i>except</i> : | — | 751 | J21(RS4) |
| a. Reduce bacterial action | | | |
| b. Minimize chemical decomposition | | | |
| c. Increase pH | | | |
| d. Decrease atmospheric oxidation of unstable compounds | | | |