

MGR University questions from April 2001 to Feb 2012

Important Note about this biochemistry manual and some suggestions:

- Only essay questions and short notes are given in this manual.
- Questions in *italics* are from paper II. Normal font are paper I.
- The question papers where the questions are asked are given in brackets.
- The first question paper in the bracket contains the question and other papers in the brackets may contain
 - the same question or
 - asked in a different form or
 - asked as a short answer or
 - it may be a part of other question
- Students are asked to refer the answers in the answer keys. Refer the answer for the question in the keys of the first question paper in bracket. For ex. Structure of proteins (Sep 02, Oct 03, Aug 06, 07, 11, Feb 10). Refer answers in Sep 02 keys.
- Since biochemistry is a vast subject and many chapters contain questions which can also appear in other chapters, we ask the students to not only check the questions for a chapter in the same chapter in this manual, but also to look in other chapters' questions. For ex. Thyroid function tests may come both in hormones chapter and function tests chapter.
- While writing answers, draw diagrams and flowcharts in pleasant colors wherever appropriate. It will get you more marks. Don't use red or green colors much.
- Underline important points or words or write them in a bold format
- If you know only part of the answer, write it. Don't write rubbish things. It will irritate the evaluators and marks will be reduced.
- Don't write anything not related to the question.
- Biochemistry is a tough subject to pass. Mugging up will get you nowhere. Understand the concept and read.
- Read every day or you will forget soon. Our subject is very volatile.
- All the best. Everyone should aim for Distinction and gold medal.

1. Subcellular organelle and cell membrane.

- a. Structure of cell membrane (Apr 01, Aug 08, feb 08, 10)
- b. Mitochondria(mar 02)
- c. Comparison between prokaryotic and eukaryotic cell (Aug 06)
- d. Active transport (feb 09)
- e. Functions of mitochondria (feb 12)

2. Amino acids: structure and properties

- a. *Essential aminoacids (Aug 05)*
- b. *Iso electric pH (Feb 06)*

3. Proteins: structure and function

- a. *structure of proteins(sep 02, Oct 03, Aug 06, 07, 11, feb 10)*
- b. *methods of elucidation of protein structure (Oct 03)*
- c. *alpha helix (Aug 06,sep 02, Oct 03, Aug 07, feb 08, Aug 11)*
- d. *secondary structure of proteins (feb 08, sep 02, Oct 03, Aug 06, 07, 11)*
- e. *denaturation (Aug 09)*
- f. *precipitation reactions of proteins(feb 12)*
- g. collagen (feb 09)
- h. levels of organization of proteins (feb 09)
- i. glycoproteins (feb 10)

4. Enzymes

- a. Lineweaver Burke plot (Apr 01)
- b. Effects of different factors on rate of enzyme catalyzed reactions (Apr 01)
- c. Classification of enzymes (Apr 01, Aug 06)
- d. Factors regulating enzyme activity. Name four clinically important enzymes and their importance (Mar 02, Feb 10)
- e. Km value and its significance (mar 02, Oct 03)
- f. Isoenzymes (Oct 03, Aug 04,05,08, Feb 05, 07)
- g. Enzyme inhibition (essay feb 05,11)
- h. Allosteric enzymes and its regulation (Aug 05)
- i. Factors regulating enzyme activity (SN Feb 06, Aug 10)
- j. Enzymes in AMI (feb 08)
- k. Enzyme poisons (Aug 09)
- l. Define, classify enzymes and explain concept of active site (feb 10)

5. Carbohydrate chemistry

- a. mutarotation (Feb 06)
- b. define and classify polysaccharides with examples (Aug 06)
- c. chondroitin sulphate (Aug 07)
- d. glycosides (Aug 07)

- e. GAGs (Feb 09)
- f. Isomerism in carbohydrates (Aug 11)

6. Lipid chemistry

- a. essential FA (Mar 02, Mar 02, Feb 05, 12)
- b. phospholipids (Aug 04, Feb 07, 12, Aug 05)
- c. eicosanoids (Aug 05)
- d. PUFA (Aug 07)
- e. Cholesterol structure and function (Aug 09)

7. ETC and oxidative phosphorylation

- a. Name four protein complexes of respiratory chain with their components (Apr 01)
- b. Chemiosmotic hypothesis (Apr 01, Feb 08, 09, 10, Sep 02, Aug 08, 11, Feb 07, 08, 09)
- c. Inhibitors of ETC (Mar 02, Aug 05, 10)
- d. Uncouplers (Mar 02, Aug 04)
- e. Coupling of Oxidative phosphorylation, uncouplers (Oct 03, Aug 08, 09, 11)
- f. Role of Cyt in ETC (Aug 06)
- g. Oxidative phosphorylation (Feb 07, 08, 11, Aug 09)
- h. Biological oxidation – definition, ETC, oxidative phosphorylation (Essay Aug 07)
- i. Components and chemiosmotic theory of ETC (essay Aug 11)
- j. Components, reactions and inhibitors of ETC (Feb 12)

8. Carbohydrate metabolism

- a. *Describe biochemical actions of insulin in carbohydrate, lipid and protein metabolism. Name the disorder associated with insulin deficiency. How do you confirm the diagnosis (Apr 01, Mar 02, Feb 06, Feb 07)*
- b. *Regulation of blood glucose (Feb 08)*
- c. Von Gierke's disease (Apr 01, Oct 03)
- d. Regulation of blood glucose (Mar 02, Apr 03, Aug 05, Feb 11)
- e. Glycolysis. Substrate level phosphorylation (Mar 02)
- f. Galactosemia (Mar 02, Feb 05, Aug 08)
- g. Structure and functions of insulin (Sep 02, Feb 09)
- h. Glycogen metabolism and GSD (Sep 02, Feb 06, Feb 11)
- i. Absorption of carbohydrates (Aug 04, Feb 08)
- j. HMP shunt pathway- significance (Feb 05)
- k. Gluconeogenesis, glucose –alanine cycle (Essay Feb 07)
- l. HMP shunt (Feb 07, 10)
- m. HbA_{1c} (Aug 07, Feb 11, 12)
- n. Renal glycosuria (Aug 07)
- o. GSD (Feb 08)
- p. Gluconeogenesis and regulation (Aug 08)
- q. Uronic acid pathway (Feb 09)
- r. Renal glycosuria (Aug 09)

- s. Rapaport leuberling shunt (feb 10)
- t. Substrate level phosphorylation (Aug 10)
- u. Gluconeogenesis (Aug 10, feb 12)
- v. HMP shunt – significance , disorders (Aug 10)
- w. Cori's cycle and glucose alanine cycle (Aug 11)
- x. Glycogenolysis (Aug 11)
- y. Fructose intolerance (Aug 11)
- z. Glycogen metabolism (feb 11)
- aa. Causes of hypoglycemia (feb 12)

9. Lipid metabolism

- a. *Prostaglandins* (feb 05)
- b. *Sphingolipidoses*(Aug 09)
- c. *Ketone bodies*(feb 05)
- d. Absorption of lipids (Apr 01, Oct 03)
- e. Define ketosis and its Causes (Apr 01)
- f. Classification and functions of lipoproteins. Metabolism of LDL (Apr 01)
- g. Lipoproteins (mar 02, feb 05)
- h. Tests to identify ketone bodies in urine (Mar 02)
- i. Fatty liver and lipotropic factors (Sep 02,)
- j. Role of LDL receptors and diseases caused its defects (Oct 03)
- k. Cholesterol synthesis, regulation and products obtained from it (Aug 04, Feb 06, 11)
- l. Bile salts (Aug 04)
- m. Synthesis and utilization of ketone bodies (essay in feb 05) (SN Aug 07, 08)
- n. FA synthesis (Aug 05)
- o. LDL metabolism (Aug 05)
- p. What are ketone bodies? Describe the formation of ketone bodies (feb 06,07,aug 07,08,feb 11)
- q. Beta-oxidation of fatty; acids under the following heading a. definition b. site c. steps and D. energetic (Aug 08, feb 08)
- r. Apo lipoproteins(Aug 07)
- s. Beta oxidation, carnitine, energetics (Essay Feb 08)
- t. Catabolism of cholesterol (feb 08)
- u. Digestion and absorption of lipids (Aug 08)
- v. Cholesterol synthesis and regulation. Sources and fate of Acetyl CoA (feb 09)
- w. HDL functions and metabolism (Feb 10)
- x. Digestion and absorption of TAG (Aug 10)
- y. Important derivatives of cholesterol (Aug 10)
- z. Hyperlipidemia classification and importance (Aug 11)
- aa. Sphingolipidosis (Aug 11)
- bb. HDL cycle 9aug 11)
- cc. Fatty acid synthase complex(feb 11)

10.Urea cycle and amino acid metabolism

- a. *name the inherited disorder associated with tyrosine metabolism noting the enzyme deficiency (Apr 01, Apr 01, Nov 01, Feb 05, Feb 12)*
- b. *metabolic role of methionine (Apr 01, Oct 03, Feb 07, Aug 08, Feb 09)*
- c. *name aromatic amino acids and write about metabolism of phenylalanine (Nov 01, Oct 03, Feb 05)*
- d. *Urea cycle (nov 01, Aug 05,06,09, Feb 08,09)*
- e. *MSUD (Mar 02, Aug 09, Feb 12)*
- f. *Metabolism of Glycine (Aug 04, feb 09)*
- g. *Alkaptonuria(Aug 04, 08)*
- h. *Role of glutathione in aminoacid transport (Aug 05)*
- i. *Tryptophan metabolism and IEMs associated with it (Sep 02, Feb 06)*
- j. *GABA*
- k. *Metabolism of branched chain aminoacids (Aug 07)*
- l. *Polyamines(Aug 07)*
- m. *Transamination (Feb 08, 10, Aug 08)*
- n. *Transmethylation (feb 08, 10)*
- o. *Functions of methionine and cysteine(Aug 08)*
- p. *Formation of zinc and creatine*
- q. *Steps of SAM cycle. Transmethylation with 5 examples(Feb 10)*
- r. *Formation of specialized products from glycine(Feb 10)*
- s. *Formation of epinephrine (Aug 10)*
- t. *Synthesis and mechanism of action of NO.(feb 11)*
- u. *Homocystinurias (Feb 11)*
- v. *Urea cycle and its disorders(Sep 02)*
- w. *Alkaptonuria (feb 12)*

11.TCA cycle

- a. *Interpretation of metabolism via TCA cycle (Apr01)*
- b. *Sources of Acetyl Co A(Apr 01)*
- c. *Anapleurotic reactions (Apr 01, Feb 06)*
- d. *TCA cycle (Essay Aug 04,06,10,11 Feb 09)*
- e. *Fate of acetyl CoA (feb 05)*
- f. *Explain how pyruvate enters Krebs cycle. how many ATPs are produced (feb 09)*

12.Integration of metabolism

- a. *Compare the metabolic changes in well fed state and starvation*
- b. *Role of liver in integration of metabolism during postprandial state (Oct 03)*

13.Plasma proteins

- a. *Functions of plasma proteins (Feb 06, 09)*

- b. *Functions of albumin(Aug 09, feb 12)*

14.Immune chemistry

- a. *Structure and functions of immunoglobulins (feb 08, 12, Aug 11)*

15.Heme synthesis and break down

- a. *Vandenbergh reaction (feb 08, 12)*
- b. *Porphyrias. Any three in detail (feb 10, 09)*
- c. *Function tests for differential diagnosis of jaundice (Apr 01)*
- d. *AIP (Apr 01, feb 06)*
- e. *Heme catabolism (Apr 01, Aug 05, Feb 11)*
- f. *Excretion of bilirubin and clinical importance of bilirubin estimations (Oct 03, Aug 10)*
- g. *Obstructive jaundice (Aug 04)*
- h. *Synthesis and conjugation of bilirubin (Feb 05,11)*
- i. *Physiological jaundice (feb 06)*
- j. *Congenital hyperbilirubinemias (Feb 07)*
- k. *Heme synthesis and porphyrias (essay feb 08)*
- l. *Porphyrias(Aug 09)*
- m. *Transport of bilirubin (Aug 10)*

16.Hemoglobin

- a. *Abnormal Hb (Mar 02, Aug 10)*
- b. *Hemoglobinopathies (Mar 02, Aug 08)*
- c. *Sickle cell disease(Sep 02, Aug 08)*
- d. *Structure of Hb (Aug 04,)*
- e. *Hemoglobin catabolism (feb 11)*
- f. *Thalasemias (Feb 12)*

17.Vitamins

- a. *Role of Vit D in calcium metabolism (Feb 05)*
- b. *Methyl melonic aciduria (Feb 06)*
- c. *Chemistry, sources, RDA and role of Vit D(Apr 01,sep 02, Oct 03)*
- d. *Vitamin K (Apr 01)*
- e. *Vitamins required by the nerve. Sources, RDA, functions and deficiency of any one vitamin(Mar 02)*
- f. *Thiamine (Essay Oct 03, Aug 07)*
- g. *Biotin (Aug 04, feb 08)*
- h. *Vitamin E (Aug 04, 10)*
- i. *Vitamin C (essay Aug 05,feb 12)*
- j. *Justify the statement that vitamin D is an hormone (Essays mar 02, sep 02, Apr 01, SN Oct 03)*
- k. *Vitamin A (essay Aug 06, 10)*

- l. Wald's visual cycle (Feb 08, 09)*
- m. Vitamin C functions (Aug 08, 09, 11)*
- n. Beriberi (Aug 09)*
- o. Folic acid (feb 10)*
- p. Role of niacin as coenzyme (Aug 11)*
- q. B12 (essay feb 11)*
- r. Active form of Vit D and its role (feb 11)*

18.Minerals

- a. Calcium normal blood levels and factors regulation it (Apr 01, Aug 04, 05)*
- b. Write in detail about calcium metabolism(Aug 04, feb 07)*
- c. Iodine (nov 01)*
- d. Wilson's disease (mar 02, Aug 07)*
- e. Trace elements (Oct 03)*
- f. Metabolism of Zinc(Aug 04)*
- g. Iron (feb 05, Aug 06)*
- h. Storage and transport of iron in the body (feb 08, 11, Aug 06)*
- i. Functions of phosphorous(Aug 07)*
- j. Zinc and selenium (feb 08)*
- k. Fluorosis(Aug 11)*
- l. Calcium homeostasis (feb 09)*
- m. Fluorosis (Aug 09)*

19.Nutrition

- a. Calculate your daily calorie requirement (Apr 01, Oct 03)*
- b. Disorders of malnutrition (Apr 01)*
- c. SDA (mar 02, mar 02)*
- d. Biological value of protein (sep 02, feb 10)*
- e. PEM (Apr 01,Aug 04,06,09, feb 08,11)*
- f. RDA (feb 05)*
- g. Kwashiorkor (Aug 05)*
- h. BMR (Aug 05, 08, Feb 07)*
- i. Balanced diet (Aug 07, 11, feb 12)*
- j. Fiber diet (feb 08)*
- k. Nutritional importance of protein (feb 10)*
- l. Total parenteral nutrition (Feb 10)*
- m. Obesity (feb 12)*

20.Xenobiotics

- a. Detoxification of xenobiotics (Apr 01, Feb 05, Feb 07, Aug 11)*
- b. Detoxification by Hydroxylation (Aug 05)*

- c. *Phase II detoxification (feb 11)*

21. Pollution and heavy metal poisons

- a. *Describe any two heavy metal poisoning (Oct 03)*

22.Free radicals and antioxidants

- a. *Cyt p450 (Aug 04, 10)*
- b. *Antioxidants(feb 11)*
- c. *Antioxidants (Apr 01)*

23.Acid base balance

- a. *Metabolic acidosis (Apr 01, Aug 04, 07, Feb06, Aug 09, Feb 11)*
- b. *Role of kidneys in acid base balance (Apr 01, Mar02, Oct 03, Feb 05, 07, 09, 12 Aug10, 11)*
- c. *Blood buffers (Nov 01, Aug 08)*
- d. *How acid base balance is maintained in the body (Oct 03, feb 05, 07, 09, Aug 10, 11)*
- e. *Anion gap(Aug 05)*
- f. *Buffer systems in the body(Aug 06, feb 07, Oct 03, feb 05, 09, Aug 10,11)*
- g. *Role of lungs in acid bas balance (Aug 07, 10,11, Feb 05, 07, Oct 03)*

24.Electrolyte and water balance

- a. *Explain the metabolic interrelation ships between sodium concentration and water volume. (Apr 01)*
- b. *Water distribution and its balance in the body. (feb 10)*
- c. *Dehydration (Aug 10)*
- d. *Water toxicity(Aug 10)*

25.Hormones

- a. *Mechanism of hormone action. Write about cAMP mediated signal transduction (Oct 03)*
- b. *Mechanism of action of thyroid hormones (Aug 05)*
- c. *G proteins (Aug 06)*
- d. *Functions of adrenocortical hormones(Aug 09)*
- e. *Role of parathormone in Ca, P homeostasis(Aug 11)*
- f. *cAMP (feb 11)*
- g. *functions of glucocorticoids(feb 12)*
- h. *cAMP (Feb 05)*

26.Nucleotide chemistry and metabolism

- a. *Disorders associated with purine metabolism (Apr 01,)*

- b. Gout (Apr 01, Feb 05,07, Aug 08,09)
- c. PRPP synthesis and importance (Mar 02)
- d. Salvage pathway(Sep 02, Aug 04, 05, 07, 10, 11, feb 10, 12)
- e. Synthetic nucleotides (Aug 05)
- f. Denovo synthesis of purine nucleotides (Feb 06)
- g. Hyperuricemia (feb 08, 11)
- h. Orotic aciduria(Aug 10)
- i. Hyperuricemia (Aug 09)
- j. What are nucleotides and name three important nucleotides and their importance (feb 10)
- k. Purine salvage pathway (feb 12)

27. Structure of Nucleic acids and replication

- a. Types, functions, components of nucleic acids , Chargaff's rule, types of DNA double helix and differences between DNA and RNA (Aug 06, feb 10)
- b. Structure of DNA (Apr 01)
- c. Replication (Apr 01, Aug 07)
- d. tRNA (nov 01, Aug 04,10, sep 02, Feb 06)
- e. DNA repair mechanism(Oct 03, Aug 07, feb 12)
- f. point mutation(sep 02)
- g. mutation (Aug 08, 11, feb 11)
- h. differences between DNA and RNA (Aug 08)
- i. cell cycle(Aug 11)
- j. classify RNA and its functions (Aug 09)
- k. tRNA (feb 10)

28. Transcription and translation

- a. Genetic code (Nov 01, Mar02, Feb 05.07, Aug 10)
- b. Degeneracy of the code (feb 05)
- c. Translation (Mar 02)
- d. Post translational modification (sep 02, Aug 06, 07, feb 10, 12)
- e. Post transcriptional modifications (Aug 08, feb 11)
- f. Reverse transcription (Aug 09)
- g. Transcription and post transcriptional processing(Feb 11)

29. Regulation of gene expression

- a. Lac Operon (Aug 04, 10, feb 06)

30. Applications of molecular biology

- a. Use of plasmids (Apr 01, Aug 09)
- b. PCR (Apr 01, Sep 02, Feb 10)

- c. *Applications of Recombinant DNA technology (Oct 03, Aug 06, 07)*
- d. *Restriction enzymes (Aug 07)*
- e. *Gene therapy(Feb 10)*
- f. *Cloning. Steps of recombinant DNA technology(Aug 11)*
- g.

31.Aids and cancer

- a. *Oncogenes (Apr 01, Nov 01, Feb 07, Aug 08)*
- b. *Carcinogen (Mar 02)*
- c. *AIDS(Sep 02)*
- d. *Applications of tumor markers(Oct 03, Aug 04, 05, 09)*

32.Isotopes

- a. *What are isotopes? Applications of isotopes in Biochemistry. (feb 10)*

33.Special techniques

- a. *Partition chromatography (Apr 01)*
- b. *Southern blot technique (Apr 01, Ma 02, Aug 08)*
- c. *Electrophoresis (Principle) (Apr 01)*
- d. *Principle and applications of electrophoresis (Aug 06, feb 07,11)*
- e. *Chromatography (Nov 01, Mar02)*
- f. *Colorimeter (Nov 01, Aug 09)*
- g. *Blotting techniques(Aug 05)*
- h. *TLC (Feb 06)*
- i. *Flurometry (feb 08)*
- j. *Separation of serum proteins by paper electrophoresis. Patterns of electrophoresis in multiple myeloma and nephrotic syndrome(Aug 10)*
- k. *Serum protein electrophoresis(Aug 11)*
- l. *Electrophoresis (sep 02)*
- m. *Chromatography (Feb 09)*

34.Function tests

- a. *Tests for glomerular function (Apr 01)*
- b. *Tests for thyroid function (Nov 01, Oct 03)*
- c. *Biochemical investigations in cirrhosis(Oct 03)*
- d. *Clearance tests(Aug 04)*
- e. *LFT (Aug 05, 09)*
- f. *Assessment of hypothyroidism(feb 11)*
- g. *Tubular function tests(feb 12)*
- h. *Van den Bergh Test (Mar 02, mar 02)*
- i. *Creatinine clearance test (sep 02)*

- j. GTT (Aug 08)
- k. Cardiac troponins (Aug 09)

35. Miscellaneous

- a. *Occupational hazards(sep 02)*