

**APPOINTMENT OF EXAMINERS:**

There shall be at least four examiners. Out of whom not less than 50% must be an external examiners. Of the four examiners, the senior most internal examiner will act as Chairman/Convenor. The Chairman will make distribution of . Practical & viva-voce, so that all examiners will examine each candidate.

**Theory.**

Paper I.	50 marks.
Paper II.	50 marks.

TOTAL	100 marks.
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Theory – viva.	20 marks
( paper I & II – 10 marks each.)	

**Practical :**

Q.1. Quantitative.	20 marks.
Q.2. Qualitative/Quantitative.	15 marks.
Q.3. Spotting.	5 marks.

Total	40 marks.
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**Internal assessment**

Theory	20 marks.
Practical	20 marks.

Total	40 marks.
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**Standard of passing :** A candidate must obtain 50% in aggregate with Minimum of 50% in theory & Minimum of 50% in practical & minimum of 50% in Internal Assessment.

**DETAILS OF SYLLABUS FOR HUMAN BIOCHEMISTRY.**

**Structural formulae are not obligatory.**

**Must know:**

- 1. Chemistry of carbohydrates:** classification and biochemical importance, chemistry and functions of monosaccharides(excluding isomerism), disaccharides and polysaccharides including Glycosaminoglycans (mucopolysaccharides).
- 2. Chemistry of Lipids:** classification and biological importance of triacyl glycerol, phospholipids, glycolipids, fatty acids (PUFA), prostaglandin, steroids and lipoproteins.
- 3. Chemistry of proteins:** general nature of amino acids, various ways of classification of amino acids, biologically important peptides, classification, properties and biological importance of proteins. Structural organization of proteins, Plasma

proteins-functions, clinical significance of various fractions, methods of separation (only principle).

4. **Enzymes :** General nature, classification of enzymes, specificity and mode of action of enzymes, factors affecting enzyme activity. Enzyme inhibitions (Kinetic not required). Clinical importance (Diagnostic, therapeutic and as a Laboratory reagent ) of enzymes and isoenzymes.
5. **Biological oxidation:** General concept of oxidation and reduction. Role of enzymes and co-enzymes. Electron transport chain. Substrate level and Oxidative phosphorylation, Role of uncouplers and inhibitors.
6. **Haemoglobin:** Chemistry and functions of haemoglobin . Types of normal and abnormal hemoglobins.(HbS, M,Thalassemia). Haemoglobin derivatives.
7. **Vitamins:** General nature, classification, sources, active forms and metabolic role, deficiency manifestations, daily requirement and hypervitaminosis.
8. **Nutrition:** Balance diet for normal adult, Quality of dietary protein, SDA, protein energy malnutrition ( Kwashiorkor and Marasmus).
9. **Carbohydrate Metabolism:** Biochemical aspects of digestion and absorption of carbohydrates. Synthesis and break down of glycogen, Glycolysis, Rapoport Lumbering cycle, Citric acid cycle, Gluconeogenesis, HMP shunt pathway and its biological significance, Uric acid pathway (significance only). Metabolism of Galactose and Galactosemia. Blood sugar level and its regulation, oral GTT and glycosuria, Biochemistry of diabetes mellitus.
10. **Protein Metabolism:** Biochemical aspects of digestion and absorption of proteins. Fate of amino acid in the body (Deamination, Transamination, Transdeamination, Decarboxylation), Fates of ammonia (Urea cycle, glutamine formation), Metabolism of aromatic and sulphur containing amino acids and their inborn errors. Metabolism of Glycine.
11. **Lipid Metabolism:** Biochemical aspects of digestion and absorption of Lipids. Beta oxidation, biosynthesis of saturated fatty acids only, cholesterol biosynthesis, transport (role of HDL & LDL) Excretion, Ketogenesis, Ketolysis and Ketosis. Adipose tissue metabolism, Lipolysis and re-esterification, fatty liver and atherosclerosis.
12. **Chemistry and Metabolism of purines:** nucleosides, nucleotides. Biologically important free nucleotides, Biosynthesis of purines (sources of ring & regulatory steps only, conversion of IMP to GMP & AMP) and salvage pathway, Biosynthesis

- of pyrimidines, Breakdown of purines and pyrimidines, Gout, Lesch- Nyhan Syndrome
13. Metabolic interrelationship of carbohydrates, lipids and proteins metabolism.
  14. **Hormones** : General characteristics and Mechanism of hormone action. cAMP the second messenger, phosphatidylinositol /calcium system as second messenger.
  15. **Chemistry of nucleic acids:** structure and function of DNA and RNA, Genetic code, DNA Replication, Transcription, Translation, chain initiation, chain elongation , chain termination, Inhibitors of protein biosynthesis.
  16. Molecular Mechanism of gene expression and regulation 1) Lac-operon model, Mutations.
  17. **Mineral Metabolism** : Study of (i) Calcium and phosphorous (ii) sodium, potassium & chloride; (iii) magnesium, copper & iodine; (iv) Iron, (v) manganese, selenium, zinc & fluoride. Their importance in body in brief.
  18. Water and electrolyte balance and imbalance.
  19. Acid base balance and imbalance.
  20. **Haemoglobin Metabolism** : Synthesis and break down of haemoglobin, porphyria (in brief), Fate of bilirubin, different types of Jaundice.
  21. **Function tests:** (i) Liver function tests, (ii) Kidney function tests & (iii) Thyroid function tests.
  22. **Detoxication mechanisms:** (Bio- transformation) oxidation, reduction, conjugation, hydrolysis.

**Desirable to know :**

1. Introduction of Biochemistry as a basic science for the study of medicine, It's importance in clinical practice.
2. Molecular and functional organization of a cell and its subcellular components.
3. **Genetic engineering** : Recombinant DNA , Restriction endonuclease, Chimeric molecule, and Gene library. Applications of recombinant DNA technology in relation to medicine.
4. **Molecular concept of body defence and their applications:**
  - i) Immunoglobulins- structure & functions, ii) Free radicals, enzymatic and non-enzymatic antioxidants .

5. **Radioisotopes** : Uses of radioisotopes (therapeutic, diagnostic) and hazards.

6. Metabolic changes during starvation.

**Nice to know :**

1. **Environmental Biochemistry**: Definition, chemical stress, air & water pollution.

2. **Biochemistry of cancer** : carcinogens, and outline mechanism of carcinogenesis.

### TOPICS OF THE LECTURES AND APPROXIMATE NUMBER OF LECTURES, HUMAN BIOCHEMISTRY - FIRST PHASE- M.B.B.S.

Lectures.

1.	Introduction to Biochemistry, Cell structure and function.	1
2.	Chemistry of Carbohydrates.	4
3.	Chemistry of Proteins.	4
4.	Chemistry of Lipids.	4
5.	Chemistry of Nucleo proteins.	2
6.	Enzymes.	6
7.	Biological oxidation.	2
8.	Chemistry and functions of Haemoglobin; abnormal haemoglobin.	2
9.	Carbohydrate Metabolism.	6
10.	Protein Metabolism.	6
11.	Lipid Metabolism.	6
12.	Integration of metabolism and metabolic changes during starvation.	2
13.	Mechanism of hormones action.	1
14.	Vitamins (Fat & Water soluble)	6
15.	Nutrition.	2
16.	Purines and Pyrimidine metabolism.	2
17.	Chemistry and functions of Nucleic acids.; Protein biosynthesis, Gene expression, mutations.	5
18.	Genetic engineering and it applications.	2
19.	Biochemistry of cancer.	1
20.	Radioisotopes.	1
21.	Haemoglobin metabolism, liver function tests, Detoxification mechanisms.	3
22.	Kidney function tests, Thyroid function tests	2
23.	Mineral Metabolism.	4
24.	Water and Electrolyte Balance.	2
25.	Acid base balance,	2
26.	Environmental Biochemistry.	1
27.	Molecular concept of body defence.	2