

APPLIED BIOCHEMISTRY

PLACEMENT: II SEMESTER

THEORY: 2 credits (40 hours) (includes lab hours also)

DESCRIPTION: The course is designed to assist the students to acquire knowledge of the normal biochemical composition and functioning of human body, its alterations in disease conditions and to apply this knowledge in the practice of nursing.

COMPETENCIES: On completion of the course, the students will be able to

1. Describe the metabolism of carbohydrates and its alterations.
2. Explain the metabolism of lipids and its alterations.
3. Explain the metabolism of proteins and amino acids and its alterations.
4. Explain clinical enzymology in various disease conditions.
5. Explain acid base balance, imbalance and its clinical significance.
6. Describe the metabolism of hemoglobin and its clinical significance.
7. Explain different function tests and interpret the findings.
8. Illustrate the immunochemistry.

COURSE OUTLINE

T – Theory

| Unit | Time (Hrs) | Learning Outcomes | Content | Teaching/ Learning Activities | Assessment Methods |
|------|------------|--|--|--|--|
| I | 8 (T) | Describe the metabolism of carbohydrates and its alterations | <p>Carbohydrates</p> <ul style="list-style-type: none">• Digestion, absorption and metabolism of carbohydrates and related disorders• Regulation of blood glucose• Diabetes Mellitus – type 1 and type 2, symptoms, complications & management in brief• Investigations of Diabetes Mellitus<ul style="list-style-type: none">○ OGTT – Indications, Procedure, Interpretation and types of GTT curve○ Mini GTT, extended GTT, GCT, IV GTT○ HbA1c (Only definition)• Hypoglycemia – Definition & causes | <ul style="list-style-type: none">• Lecture cum Discussion• Explain using charts and slides• Demonstration of laboratory tests | <ul style="list-style-type: none">• Essay• Short answer• Very short answer |

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| II | 8 (T) | <p>Explain the metabolism of lipids and its alterations</p> | <p>Lipids</p> <ul style="list-style-type: none"> • Fatty acids – Definition, classification • Definition & Clinical significance of MUFA & PUFA, Essential fatty acids, Trans fatty acids • Digestion, absorption & metabolism of lipids & related disorders • Compounds formed from cholesterol • Ketone bodies (name, types & significance only) • Lipoproteins – types & functions (metabolism not required) • Lipid profile • Atherosclerosis (in brief) | <ul style="list-style-type: none"> • Lecture cum Discussion • Explain using charts and slides • Demonstration of laboratory tests | <ul style="list-style-type: none"> • Essay • Short answer • Very short answer |
| III | 9 (T) | <p>Explain the metabolism of amino acids and proteins</p> <p>Identify alterations in disease conditions</p> | <p>Proteins</p> <ul style="list-style-type: none"> • Classification of amino acids based on nutrition, metabolic rate with examples • Digestion, absorption & metabolism of protein & related disorders • Biologically important compounds synthesized from various amino acids (only names) • In born errors of amino acid metabolism – only aromatic amino acids (in brief) • Plasma protein – types, function & normal values • Causes of proteinuria, hypoproteinemia, hyper-gamma globinemia • Principle of electrophoresis, normal & abnormal electrophoretic patterns (in brief) | <ul style="list-style-type: none"> • Lecture cum Discussion • Explain using charts, models and slides | <ul style="list-style-type: none"> • Essay • Short answer • Very short answer |

| Unit | Time (Hrs) | Learning Outcomes | Content | Teaching/ Learning Activities | Assessment Methods |
|------|------------|---|---|---|--|
| IV | 4 (T) | Explain clinical enzymology in various disease conditions | <p>Clinical Enzymology</p> <ul style="list-style-type: none"> • Isoenzymes – Definition & properties • Enzymes of diagnostic importance in <ul style="list-style-type: none"> ○ Liver Diseases – ALT, AST, ALP, GGT ○ Myocardial infarction – CK, cardiac troponins, AST, LDH ○ Muscle diseases – CK, Aldolase ○ Bone diseases – ALP ○ Prostate cancer – PSA, ACP | <input type="checkbox"/> Lecture cum Discussion <input type="checkbox"/> Explain using charts and slides | <ul style="list-style-type: none"> • Essay • Short answer • Very short answer |
| V | 3 (T) | Explain acid base balance, imbalance and its clinical significance | <p>Acid base maintenance</p> <ul style="list-style-type: none"> • pH – definition, normal value • Regulation of blood pH – blood buffer, respiratory & renal • ABG – normal values • Acid base disorders – types, definition & causes | <ul style="list-style-type: none"> • Lecture cum Discussion • Explain using charts and slides | <ul style="list-style-type: none"> • Short answer • Very short answer |
| VI | 2 (T) | Describe the metabolism of hemoglobin and its clinical significance | <p>Heme catabolism</p> <ul style="list-style-type: none"> • Heme degradation pathway • Jaundice – type, causes, urine & blood investigations (van den berg test) | <ul style="list-style-type: none"> • Lecture cum Discussion • Explain using charts and slides | <ul style="list-style-type: none"> • Short answer • Very short answer |
| VII | 3 (T) | Explain different function tests and interpret the findings | <p>Organ function tests (biochemical parameters & normal values only)</p> <ul style="list-style-type: none"> • Renal • Liver • Thyroid | <ul style="list-style-type: none"> • Lecture cum Discussion • Visit to Lab • Explain using charts and slides | <ul style="list-style-type: none"> • Short answer • Very short answer |

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| VIII | 3 (T) | Illustrate the immunochemistry | Immunochemistry <ul style="list-style-type: none"> • Structure & functions of immunoglobulin • Investigations & interpretation – ELISA | <ul style="list-style-type: none"> • Lecture cum Discussion • Explain using charts and slides • Demonstration of laboratory tests | <ul style="list-style-type: none"> • Short answer • Very short answer |
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Note: Few lab hours can be planned for observation and visits (Less than 1 credit, lab hours are not specified separately).

Bibliography:

1. U. Satyanarayan, Essentials of biochemistry, Books & allied (P) Ltd., Kolkata publisher, 2004.
2. Deb A.C.: Concepts of biochemistry (Theory & Practical) 1st edition, books & allied (P) Ltd. Publisher, Kolkata, 1999.
3. Deb. A.C. Fundamentals of biochemistry of biochemistry: 1st edition New central book Ag (P) Ltd., 2004.
4. Jacob Anthikad, Biochemistry for nurses; 2nd edition, Jaypee; 2001..
5. Gupta. R.C., Multiple choice questions in Biochemistry, 2nd edition, Jaypee, 2004

Suggested Assessment/ Evaluation Methods

| Scheme of Internal Assessment of theory out of 25 marks | | | | | |
|---|---|--|--------------|------------------|---------------------------|
| Sr. No | Theory | Quantity | Marks | Round off | Final Round off IA |
| 1. | Class Test I | | 50 marks | 30 | Out of 15 |
| 2. | Class Test II | | 75 Marks | 30 | |
| 3. | Written Assignment | 2 | 50 | 10 | Out of 10 |
| 4. | Seminar/Microteaching/individual presentation | 2 | 50 | 12 | |
| 5. | Group project/Work/Report | 1 | 50 | 6 | |
| 6 | Attendance | (95-100%: 2 marks, 90-94: 1.5 marks, 85-89: 1 mark, 80-84: 0.5 mark, <80: 0) | | 2 | |
| (Marks of each component to be rounded of the respective columns marks and the final IA need to be calculated out of 25 (15+10). | | | | | |