SEMESTER – V

CLINICAL & IMMUNOBIOCHEMISTRY

THEORY

Programme: B.Sc. **Max. Hours: 60**
Course Code: U20/BIC/DSC/501 **Hours per week: 4**
Course Type: DSC – 5 **Max. Marks: 100**
No. of credits: 4

Course Objective:

Prepare the students for clinical and immunological aspects of human body.

Course Outcomes:

CO1: Understand the physiology with respect to important systems of the human body.

CO2: Analyze the biochemical aspects of the clinical conditions in the human body.

CO3: Remember the organization of the immune system and understand different immunological responses.

CO4: Apply the principles, procedures and applications of various immune techniques.

MODULE I: PHYSIOLOGY (15 Hrs)

Composition of blood and coagulation of blood.
Hemoglobin and transport of gases in blood (oxygen and CO_2)
Heart – Structure of the heart, cardiac cycle and cardiac factors controlling blood pressure.
Muscle - Types of muscles, Structure of myofibril, organization of contractile proteins mechanism of muscle contraction. Anabolic steroids.
Nervous system - structure of neuron, resting potential, action potential, propagation of nerve impulse, synapse, synaptic transmission. Excitatory and inhibitory neurotransmitters.
Physiology of vision – visual pigments and visual cycle.
Bone – types, composition. Effect of ageing on bones.

MODULE II: CLINICAL BIOCHEMISTRY (15 Hrs)

Plasma proteins in health and disease. Disorders of blood coagulation(haemophilia).
Types of anemias, haemoglobinopathies – sickle cell anemia and thalassemia
Structure and functions of the liver. Liver diseases – jaundice, hepatitis, cirrhosis.
Liver function tests – conjugated and total bilirubin in serum, albumin globulin ratio, hippuric acid and bromosulphthalein test, serum enzymes in liver diseases - SGPT, SGOT and alkaline phosphatase.
Kidneys-structure of nephron, urine formation, normal and abnormal constituents of urine. Biological buffers. Role of kidneys in maintaining acid base and electrolyte balance in the body.
Renal function tests – creatinine and urea clearance tests, phenol red test.
Biochemical tests for the diagnosis of heart disease – HDL/ LDL, cholesterol, SGOT, LDH, CK, C- reactive protein, cardiac troponins.

MODULE III: IMMUNOLOGY (15 Hrs)

Organisation of immune system. Organs and cells of the immune system. Innate and acquired immunity Cell mediated and humoral immunity. Antigen, epitopes/ antigenic determinants. Concept of haptens, adjuvants. Major histocompatibility antigens. Blood group antigens.
Structure & Classification of immunoglobulins, Isotype, allotype&idiotype
Theories of antibody formation - Clonal selection theory of antibody formation. Genetic basis of antibody diversity. Outlines of hypersensitivity reactions. Fundamentals of graft rejection and MHC proteins. Outline of autoimmunity.

MODULE IV: IMMUNOLOGICAL TECHNIQUES (15 Hrs)

Antigen – antibody reactions – immunoprecipitation, agglutination, immunodiffusion.
Immunodiagnostics - RIA & ELISA, direct & indirect immunofluorscence, flow cytometry, biosensor assay &immuno blotting techniques. Monoclonal antibodies.
Vaccines and their classification – Traditional vaccines- Live and attenuated vaccines, toxoids. Modern vaccines – recombinant, peptide vaccines and DNA vaccines.

Reference Books:

1. Judy Owen, Jenni Punt and Stranford: Kuby Immunology 2012 Seventh Edition. ISBN-10: 1-4292-1919-X; ISBN-13: 978-1-4292-1919-8.

2. Gerard .J. Tortora and Bryan Derrickson : Principles of Anatomy and Physiology, 13th edition, 2011. John Wiley & sons Inc. ISBN-13: 978-1118345009.

3. Thomas. M. Devlin : Textbook of Biochemistry with Clinical Correlations, 7th edition, 2010; Wiley – Liss New York. ISBN-13: 978-0470281734.

4. Delves, Martin, Burton &Roitt: Roitt's Essential Immunology. 12th Edition 2012, Wiley Blackwell. ISBN-13: 000-1405196831.

5. Dr. A.C. Deb, Concepts of Biochemistry 1999, Books and Allied Publication Ltd. ISBN: 81-87134-29-1.

CLINICAL & IMMUNOBIOCHEMISTRY

MODEL QUESTION PAPER

THEORY

Course Code: U20/BIC/DSC/501 **Max Marks: 60**
Credits: 4 **Time: 2 Hrs**

SECTION – A

I. Answer the following **4 x 10 = 40 M**

1. Explain the role of kidney in glomerular filtration and reabsorption.

OR

2. Explain in detail the physiology of Vision. What is visual cycle.

3. List out the various Liver Function Tests

OR

4. Explain the disorders of Blood Coagulation. Add a note on Sickle Cell Anemia.

5. Write in detail about cell mediated immunity

OR

6. Give the basic structure of Immunoglobulins and write their classification.

7. Explain how monoclonal antibodies are produced by hybridoma technology

OR

8. What are vaccines? Write about the various types of vaccines used for the prevention of common diseases.

SECTION – B

II. Answer any <u>FOUR</u> **4 x 5 = 20 M**

9. Neurotransmitters
10. Renal Function Tests
11. SGPT
12. Major Histocompatibility Complex
13. ELISA
14. Glucose Tolerance Test