JINNAH SINDH MEDICAL UNIVERSITY

STUDY GUIDE	
PROGRAM	**MBBS**
MODULE TITLE	**Hematopoietic System- II**
ACADEMIC YEAR	**Third Year, 2024**
INTRODUCTION	In this module, students will get an opportunity to learn about the causes, manifestations, diagnoses, and treatment of common blood-related conditions. Due emphasis will be given on prevention. Modern-day conditions, highly relevant to Pakistan, like Dengue, will be dealt with along with endemic diseases like Malaria.
RATIONALE	In third world countries like Pakistan, blood-borne diseases are not only common, but they are also one of the leading causes of preventable death. Nutritional deficiency anemia is rampant in this region and Thalassemia is not unheard of. Upcoming doctors need to be cognizant of the gravity of the situation and have the necessary clinical skills to diagnose common conditions and justify plans for management and prevention.
OUTCOMES	By the end of the module, students should be able to justify initial plans of management and prevention of common blood disorders based on knowledge of relevant basic sciences.
DEPARTMENTS INVOLVED	**1.** Community Medicine, **2.** Forensic Medicine & Toxicology, **3.** Medicine **4.** Pathology & Microbiology, **5.** Pharmacology **6.** Surgery

	7. Paediatrics
MODULE OBJECTIVES	**By the end of the module, students will be able to:**
LECTURES COMMUNITY MEDICINE	**1. Nutritional Anemia** • Define Anemia • Classify Anemia • List the causes of nutritional anemia • Explain the consequences of nutritional anemia • Discuss prevention and control of nutritional anemia **2. Immunity, Vaccines and Cold Chain** • Define Immunity • Explain the difference between Vaccination and Immunization • Describe Live and Killed Vaccines • Discuss the adverse reactions following immunization • Explain Cold Chain and its importance **3. Expanded Programme of Immunization** • Explain the objective of EPI Programme • Describe immunization • Discuss the ongoing EPI programme in Pakistan **4. Cancer epidemiology and prevention** • Define cancer and its epidemiology • Classify cancers • Discuss different carcinogens • Explain levels of prevention of cancer **5. Malaria and prevention**

	• Explain the epidemiology of Malaria • Discuss the risk factors of Malaria • List the types of Malarial Parasite • Name the Vector of Malaria • Discuss the Prevention and Control of Malaria • Describe National Control Programme of Pakistan **6. Dengue fever and prevention** • Explain the epidemiology of Dengue • Discuss risk factors of Dengue • List the Vectors of Dengue • Discuss the prevention and control of Dengue **7. Prevalence of Thalassemia & Sickle cell disease** • Describe Thalassemia • Classify different types of Thalassemia • Describe Sickle cell disease • List the different types of Sickle cell diseases • Discuss the prevalence of Thalassemia and Sickle cell diseases in Pakistan **8. Hospital-acquired infections** • Define nosocomial infections • Explain the criteria for surveillance of Nosocomial infections • Describe the Epidemiology of Nosocomial infections • List the measures for the prevention of Nosocomial infections
FORENSIC MEDICINE	**1. Biological Stains (Blood)** • List the tests used to identify blood in a stain • Identify the tests used for determination of origin (species), age, source (Arterial or venous), blood groups and sexing of

bloodstain

- Differentiate between antemortem and postmortem blood stains
- Explain the role of blood stain pattern analysis in forensic medicine
- Describe the tests for blood stains (Physical, Microscopic, Chemical, Biological, Spectroscopic)

2. Biological Stains (Seminal Stains)

- Describe the composition of semen
- List the criteria for normal sperm count as per WHO guidelines
- Discuss the medico legal importance of seminal stains
- Enumerate the various methods of collection of seminal material and determination of motility of sperms
- Describe the physical, chemical, microscopic, electrophoretic, and immunological tests for the examination of seminal stains.
- Explain the role of seminal stains in determination of blood groups

3. Analytic Techniques

- Explain the methods, principles and uses of the following analytic techniques:
  - I. Thin Layer Chromatography
  - **II.** Gas Chromatography
  - III. High Pressure Liquid Chromatography
  - **IV.** Spectrophotometry
  - **V.** Stass Otto process

4. Laws in relation to medical man – I

- Describe Medical ethics, its background (Hippocratic Oath) and

	its significance • Explain the principles of Bioethics • List the duties of doctor as advised by international code of medical ethics • Discuss the regulatory council {Pakistan Medical Commission (PMC)}, its composition, • Functions and its role in Medical and Dental education. **5. Laws in relation to medical man – II** • List privileges & obligations of registered medical practitioner • Describe Professional misconduct (Infamous conduct) • Explain the types of Consent and its role in relation to Medical Examination and • List the criteria for giving valid consent • Describe doctrine of informed consent (Rule of full disclosure) • Discuss the deviations/exemptions of consent **6. Laws in relation to medical man-III** • Describe Professional negligence • List the types of negligence • Explain the following terms with examples: I Res- Ipsa- Loquotar ii. Novus Actus Interveniens iii. Vicarious Liability **7. Laws in relation to medical man – IV** • Summarize 5 DS for plaintiff's success • Briefly discuss the following: I. Compensation for Medical Negligence II. Defenses for defendant doctor

	III. Defenses for reducing damages • List the salient features of Transplantation of Human Organs & tissues Act 2010 • Explain Euthanasia, its types and ethical issues related to it. **8. Hepatic Poisons- Alcohol** • Enumerate the sources of alcohol and various concentrations of alcohol which effect human behavior with medico legal imp • Explain the absorption, metabolism and excretion of alcohol • Describe the signs and symptoms of alcohol intoxication • Discuss the procedure of examination of a drunkard by a Medico legal officer • Describe the preservation of specimens and Lab tests for alcohol detection • Briefly discuss chronic alcoholism, and withdrawal syndromes, and Antabuse therapy • Enumerate the postmortem findings of alcoholism • Discuss Methyl Alcohol intoxication, its complications and postmortem findings
MEDICINE	**1. Approach to patients with anemia** • Discuss etiology, differential diagnoses, investigations relevant for anemia • Discuss the outline of management plan for the conditions **2. Approach to patients with bleeding disorders** • Describe the clinical features and investigations relevant for bleeding disorders • Discuss the outline of management plan for the conditions
PAEDIATRICS	**1. Vaccination (**Immunization/ EPI)

	• Describe the scheduled for vaccination • List indication and adverse effect of integration
PATHOLOGY & MICROBIOLOGY	**1. Classification of anemia** • Define anemia • Describe the morphologic characteristics and reference range of red cell includes • Classify anemia according to underlying mechanism and morphology • Discuss the effects of acute and chronic blood loss **2. Anemia of diminished Erythropoiesis- I** • List the types of anemia associated with red cell underproduction • Discuss the causes of megaloblastic anemia • Describe the peripheral blood findings/morphology in megaloblastic anemia • Define pernicious anemia • Discuss metabolism and its biochemical functions of vitaminB12 • Describe the pathogenesis, morphology and clinical features of pernicious anemia • List the causes of folate deficiency • Discuss the metabolic processes related to folic acid • List the chronic illnesses associated with anemia of chronic diseases • Briefly discuss the mechanism involved in anemia of chronic diseases • Briefly discuss the basis of anemia in renal failure, hepatocellular disease & endocrine disease **3. Anemia of Diminished Erythropoiesis- II**

	• Define aplastic anemia, pure red cell aplasia, myelophthisic anemia, polycythemia • List the causes of pure red cell aplasia & myelophthisic anemia • Describe the normal iron metabolism • Discuss the etiology of iron deficiency anemia • Describe the pathogenesis & clinical features of iron deficiency anemia • Discuss the morphological findings in bone marrow and peripheral blood smear • Discuss the major causes, pathophysiology, morphology & clinical features of aplastic anemia • Discuss the causes of both the types of polycythemia **4. Hemolytic Anemias- I** • Describe extravascular & intravascular hemolysis • Briefly discuss morphology of hemolytic anemia • Define hereditary spherocytosis • Describe the pathogenesis, morphology & clinical features of hereditary spherocytosis • Discuss the causes & pathogenesis of G6PD deficiency • Briefly discuss the ABO incompatibility and Rh- immunization **5. Hemolytic Anemias- II** • Define sickle cell disease, immunohemolytic anemia and Paroxysmal Nocturnal Hemoglobinuria (PNH) • Describe the pathogenesis, morphology & clinical features of sickle cell disease • Discuss the pathogenesis, manifestations & diagnosis of PNH • Classify immunohemolytic anemia

	• Discuss direct & indirect Coombs antiglobulin test • Discuss the causes of hemolytic anemia resulting from trauma to red cells **6. Thalassemia syndrome** • Define thalassemia syndrome • Classify thalassemia • Discuss the pathogenesis, the clinical syndromes, diagnosis &types of beta thalassemia • Discuss the morphology of beta thalassemia major/minor • Discuss the pathogenesis & types of alpha thalassemia **7. Overview and classification of WBC disorders (non-neoplastic)** • Briefly discuss pathogenesis, causes, morphology and clinical features in neutropenia and leukocytosis. • List the causes of neutrophilia, eosinophilia, basophilia, monocytosis, and lymphocytosis. • Summarize lymphadenitis (acute and chronic nonspecific lymphadenitis patterns) **8. Neoplastic disorders of WBC (Acute leukemia)** • Discuss etiologic and pathogenetic factors of white cell neoplasms. • Define acute leukemia, acute lymphoblastic leukemia, and acute myeloblastic leukemia • Describe the pathogenesis, morphology, clinical presentation, and prognosis of acute lymphoblastic and acute myeloblastic leukemia **9. Non-Hodgkin's lymphoma**

	• List the WHO classification of Non-Hodgkin Lymphomas • Discuss pathogenesis, morphology, and clinical features of Small lymphocytic lymphoma (chronic lymphocytic leukemia), Follicular Lymphoma, Diffuse Large B-cell lymphoma, Burkitt Lymphoma, Mantle Cell Lymphoma, Hairy Cell Leukemia **10. Hodgkin's lymphoma** • Discuss the pathogenesis, morphology, and clinical presentation of Hodgkin Lymphoma (HL) • List subtypes of HL • Differentiate between Hodgkin Lymphoma (HL) and Non-Hodgkin Lymphomas (NHL) • Enumerate the clinical staging of Hodgkin and Non-Hodgkin Lymphomas (Ann Arbor Classification) • Discuss the pathogenesis, morphology, and clinical presentation of Hodgkin Lymphoma **11. Myeloproliferative disorders (MPD) and Myelodysplastic Syndrome (MDS)** • Define MPD and MDS • Describe pathogenesis, morphological findings, and clinical features of Chronic Myelogenous Leukemia, Polycythemia Vera, Essential Thrombocytosis, Primary Myelofibrosis, MDS **12. Bleeding disorders- I** • List the causes of thrombocytopenia • Briefly discuss the bleeding disorders caused by vessel wall abnormalities • Describe clinical presentation and morphological findings in Immune Thrombocytopenic Purpura (ITP)

- Differentiate between acute and chronic ITP
- Briefly discuss Bernard-Soulier syndrome & Glanzmann Thrombasthenia
- Summarize drug-induced Thrombocytopenia

I3. Bleeding disorders- II

- Define Disseminated Intravascular Coagulation (DIC)
- Describe the etiology and pathogenesis of DIC
- Discuss etiology, pathogenesis, & clinical presentation of Thrombotic Thrombocytopenic Purpura and Hemolytic Uremic Syndrome

14. Coagulation disorders

- Explain the factor VIII- Von Willebrand (vWF) Complex
- Discuss the types and clinical presentation of Von Willebrand disease
- Describe the genetic defects, clinical features, and lab findings in Hemophilia A & B

MICROBIOLOGY

15. Gram-negative rods: (Zoonotic organisms)

- Discuss the important properties, pathogenesis, clinical findings, laboratory diagnosis and prevention of Francisella, Yersinia, Pasteurella, Bartonella, Brucella

16. Rickettsiae

- Describe the important properties of Rickettsiae
- Name the diseases caused by Rickettsiae
- List the clinical findings of Rickettsial infections
- Describe the transmission and pathogenesis of Rickettsiae
- Discuss laboratory diagnosis and prevention of Rickettsiae

17. Arboviruses

- Discuss in detail important properties, transmission, clinical features, laboratory diagnosis, and prevention Dengue, Yellow fever, Chikungunya, and Ebola fever

18. HIV

- Discuss the important properties of HIV
- Summarize replicative cycle of HIV
- Describe transmission, and epidemiology of HIV
- Discuss pathogenesis related of HIV/ AIDS
- Discuss the prevention of HIV and AIDS

19. Blood and tissue protozoa- I (including Malarial Parasite)

- Discuss the basic terminologies related to parasitology
- Discuss the important properties of plasmodium, its pathogenesis and epidemiology
- Describe the clinical findings and laboratory diagnosis of Malaria

20. Blood and tissue protozoa- II

- Discuss the important properties of Leishmania & Toxoplasma
- Describe the pathogenesis, clinical findings, laboratory diagnosis, prevention of Leishmaniasis and Toxoplasma

21. Tissue nematodes

- List the tissue nematode
- Discuss the important properties of tissue nematodes; Wuchereria, Dracunculus and Ankylostoma
- Describe the pathogenesis, clinical findings, laboratory diagnosis and prevention of these nematodes

22. Serological testing of bacterial and viral diseases

	• Discuss the diagnosis of infectious diseases on the basis of serology (Ab-based test) • Discuss the concepts of agglutination, precipitation and immunofluorescence, ELISA • Discuss identification in cell culture **23. Patient safety and infection control- Patient care & safety:** • Define Safety • Discuss the significance of building of a safety culture • Explain the integration of risk management activity • Explain the importance of involving patients and the public • Describe the implementation of solutions to prevent harm
PHARMACOLOGY	**1. Drugs used to treat Anemia and Hematopoietic Growth Factors I & II** • List the hematopoietic agents • Explain the basic and clinical pharmacology of drugs used to treat anemias (including Iron, Vit.B12 and Folic Acid) **2. Coagulants & Anti-Coagulants** • Classify anticoagulants • Discuss basic and clinical pharmacology of anticoagulant **3. Fibrinolytic & Thrombolytic drugs** • Classify fibrinolytic & thrombolytic drugs • Describe their basic and clinical pharmacology **4. Introduction to Anti-Microbial Therapy** • Explain the general principles of antimicrobial therapy • Classify and discuss mechanism(s) of action of antimicrobials • Discuss antimicrobial spectra of different drug classes and drug

	resistance mechanisms • List the clinical uses and their adverse effects **5. Cell Wall Synthesis Inhibitors-I (β-Lactam Antibiotics)** • Classify the types of Penicillin • Describe the basic and clinical pharmacology of Penicillin **6. Cell Wall Synthesis Inhibitors-II (Cephalosporins & Others)** • Classify Cephalosporin's • Describe the basic and clinical pharmacology of Cephalosporins and other drugs **7. Protein Synthesis Inhibitors-I & II** • Classify Protein Synthesis Inhibitors • Describe the basic and clinical pharmacology of protein synthesis inhibitors **8. Anti-Metabolites (Sulfonamides & Trimethoprim)** • Classify Sulfonamides and Trimethoprim • Describe basic and clinical pharmacology of Sulfonamides and Trimethoprim **9. Fluoroquinolones** • Classify Fluoroquinolones • Describe basic and clinical pharmacology • List clinical uses and adverse effects **10. Anti-Viral Drugs-I** • Classify drugs used in the treatment of various viral infections

	(except drugs used in viral hepatitis) • Discuss their mode of action, pharmacokinetics, pharmacodynamics and adverse effects **11. Anti-Protozoal Drugs-I (Anti-Malarial Drugs)** • Discuss different classes of anti-protozoal drugs • Classify Anti-malarial drugs • Discuss their pharmacokinetics and pharmacodynamics. • Describe their clinical uses and adverse effects **12. Immunosuppressive and Immunomodulants** • Classify immunosuppressant and immunomodulants drugs • Describe the basic and clinical pharmacology of immunosuppressant and immunomodulants • Explain their importance and the conditions in which they are used **13. Anti-Cancer Drugs-I & II** • Describe causes of cancer and discuss rationale of cancer chemotherapy • Classify anticancer drugs according to cell cycle specificity • Discuss their basic and clinical pharmacology of anti-cancer drugs **14. Anti-Fungal Drugs** • Classify anti-fungal drugs • Discuss the basic and clinical pharmacology of antifungal drugs
SURGERY	**1. Metabolic Response to Injury** • Discuss the basic concepts in homeostasis • Describe the graded nature of response to injury

	• Explain the mediators of the metabolic response to injury • Explain the metabolic stress response to surgery and trauma: the 'ebb and flow' model • Discuss the changes in body composition following injury • List the avoidable factors that compound the response to injury. **2. Fluid & Electrolytes** • Define the body fluid compartments, minimal obligatory output, daily fluid and electrolyte requirements for normal individuals, • Explain the fluid and electrolyte requirements in the pre-operative, peri-operative and postoperative period (insensible fluid losses, maintenance fluid requirements, individual patient's fluid requirements, replacement fluid and electrolytes, Macronutrient requirements, Crystalloids and colloids fluids, isotonic, hypertonic, hypotonic fluids), • Describe the management of fluid overload **3. Wound Healing** • Classify wound closure and healing • Describe the types of wounds • Describe the phases of normal wound healing • Factors influencing wound healing • Explain the various types of abnormal wound healing and their treatment: Hypertrophic Scar & Keloids • Differentiate between acute and chronic wounds • Explain the management of acute and chronic wounds, scars and contractures • Discuss Compartment syndrome
TUTORIALS	**1. Blood grouping**

FORENSIC MEDICINE	• List the commonly used blood grouping systems • Discuss the medico- legal importance of ABO and Rh blood group **2. Medico-Legal report and examination of person who consumed alcohol** • Explain the procedure of examination of a drunkard person • Discuss the medicolegal report of a person who consumed alcohol **3. Kerosene oil and petroleum products poisoning (Hydrocarbons)** • Describe the mode of action, signs, symptoms, treatment, postmortem findings and medico legal aspects of Kerosene oil and petroleum products poisoning
PATHOLOGY & MICROBIOLOGY	**1. Examination of bone marrow** • List the types of bone marrow • Discuss sites for bone marrow procedures • List the indications for bone marrow examination • Discuss M:E ratio • Diagnose common hematological conditions based on main morphological characteristics **2. Interpretation of Complete Blood Count** • Interpret peripheral blood smear • Interpret the reports of Complete Blood Count **3 Interpretation of Bleeding disorders** • Interpret bleeding disorders based on data provided **4. Diagnosis of HIV** • Discuss the screening tests for HIV (1st, 2nd, and 3rd generation tests, p24Ag & Ab test, home based kits and blood bank screening) • Discuss the confirmatory tests of HIV (Western blot and

	immunofluorescence) **5. Laboratory investigations of Malarial parasite, Dengue fever and LD bodies** • Discuss the immuno-chromatographic test (ICT), thick and thin blood films for malaria • Discuss ICT and serologic tests (IgM and IgG) for Dengue fever • Discuss Giemsa staining for LD bodies
PHARMACOLOGY	**1. Coagulants, Anti-Coagulants, Fibrinolytic & Thrombolytic Agents** • Classify coagulants, anti-coagulants, fibrinolytic and thrombolytic agents • Discuss their pharmacokinetics & pharmacodynamics, clinical uses and adverse effect **2. Cell Wall Synthesis Inhibitors** • Classify cell wall synthesis inhibitors • Discuss their pharmacokinetics and dynamics, and their clinical importance **3. Protein Synthesis Inhibitors** • Classify protein synthesis inhibitors • Discuss their pharmacokinetics and dynamics, and clinical importance **4. Anti-Viral Drugs-I** • Classify anti-viral drugs • Discuss their pharmacokinetics and pharmacodynamics • Discuss clinical importance of anti-viral agents (except drugs used in viral hepatitis) **5. Drug treatment of Malaria & Dengue** • Classify the drugs used to treat malaria • Discuss their pharmacokinetics, pharmacodynamics, and resistance

	• Discuss the clinical importance of anti-malarial agents and drugs used in dengue fever **6. Immunomodulants and Suppressants Drugs** • Classify Immunosuppressive and Immunomodulants • Discuss their basic and clinical pharmacology **7. Anti-Cancer Drugs** • Classify anti-cancer drugs • Discuss their basic and clinical pharmacology
SKILLS LAB	**1. Injection Techniques** • Arterial Cannulation • Intravenous Cannulation **2. Equipment / material needed** • Gloves • Needles • Sterile gauze
INTERNAL ASSESSMENT	• Internal assessment will be according to JSMU policy. The details of internal assessment will be determined by the respective institutions. • Internal assessment carries 20% weightage in the final, end-of-year examination.
FINAL EXAMINATION	• MCQs and OSPE (observed and unobserved) • Clinical topics taught in this module will be assessed in final year as well
MODULE EVALUATION	• Course will be evaluated through a feedback form which will be posted on the JSMU website