



BLOOD AND IMMUNOLOGY I MODULE STUDY GUIDE

3RD YEAR MBB

Contents

Curriculum Committee KGMC	4
Outcomes of the curriculum:	6
PSYCHOMOTOR	8
AFFECTIVE	8
1. Assessment Tools:	31
2. Attendance Requirement:.....	34

Vision and Mission of KGMC

Khyber Medical University: Vision



Khyber Medical University will be the global leader in health sciences academics and research for efficient and compassionate health care.

Khyber Girls Medical College: Vision



“Excellence in health care, research, teaching and training in the service of Humanity”

Khyber Girls Medical College: Mission

The mission of KGMC is to promote compassionate and professional health care leaders Who are knowledgeable, skillful, and community oriented lifelong learners serving humanity through evidence based practices.

Curriculum Committee KGMC

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- Dr. Khalid Khan Professor Department of Pathology..... Member
- Dr. Saeed-ur-Rehman Professor Department of Pathology..... Member
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- Dr. Shams Suleman Associate Professor Department of Pharmacology.....Member
- Dr. Jamshed Alam Associate Professor Department of Surgery B.....Member
- Dr. Yousaf Jan Assistant Professor Department of Surgery B.....Member
- Dr. Naheed Siddiqui Assistant Professor Department of Forensic Medicine.....Member
- Dr. Fawad Rahim Assistant Professor Department of Medicine.....Member
- Dr. Ghazala Zarin Afridi Senior Lecturer Department of Pathology..... Member
- Dr. Jahanzeb Khan Associate Professor Department of Pediatric A.....Member

Integrated curriculum:

An integrated curriculum is all about making connections, whether to real life or across the disciplines, about skills or about knowledge. An integrated curriculum fuses subject areas, experiences, and real-life knowledge together to make a more fulfilling and tangible learning environment for students. Integrated teaching means that subjects are presented as a meaningful whole. Students will be able to have better understanding of basic sciences when they repeatedly learn in relation to clinical examples. Case based discussions, computer-based assignments, early exposure to clinics, wards, and skills acquisition in skills lab are characteristics of integrated teaching program.

Outcomes of the curriculum:

The Curricular Outcomes of the MBBS Program for a Graduating Doctor according to the PMDC are as follows:

1. Knowledgeable

Knowledgeable about the diseases and health conditions prevalent in the population of Pakistan and use Evidence-based medicine to provide best possible cost-effective care.

2. Skillful

Skillful in History taking and Physical examination to compassionately deal with a patient.

3. Community health promoter

Take appropriate decisions and actions for protecting and promoting the health of their community.

4. Critical Thinker

Evaluate critically the patient data to effectively deal with complexity of medical decisions for the best possible outcomes using evidence-based practices in service of humanity.

5. Professional

Display professional values (honesty, accountability, cultural and religious sensitivity), attitudes and behaviors (empathy, ethics, good communication skills and lifelong learner) that embody good medical practice.

6. Researcher

Exhibit a spirit of inquisitiveness, inventiveness, and ethical conduct while carrying out research in accordance with the prescribed guidelines.

7. Leader and role Model

Demonstrate exemplary conduct and leadership in Advancing healthcare, enhancing medical education, and Enhancing the trust of the public in the medical profession by being exceptional role models.

KNOWLEDGE

By the end of five year MBBS program the KGMC student should be able to;

1. Acquire a high level of clinical proficiency in history taking, physical examination, differential diagnosis, and the effective use of medicine's evolving diagnostic and procedural capabilities including therapeutic and palliative modalities
2. Manage the common prevalent diseases in community
3. Identify the common medical emergencies
4. Develop plan for prevention of common community diseases
5. Formulate a referral plan
6. Compose a prescription plan

PSYCHOMOTOR

By the end of five year MBBS program the KGMC student should be able to;

1. Demonstrate the ability to perform the disease specific relevant examination
2. Respond to common medical emergencies
3. Master the skill of first aid
4. Perform BLS
5. Apply the best evidenced practices for local health problems

AFFECTIVE

By the end of five year MBBS program the KGMC student should be able to

1. Relate to patient and careers vulnerability
2. Demonstrate ethical self-management
3. Counsel and educate patients and their families to empower them to participate in their care and enable shared decision-making.

4. Display compassion with patient and colleagues
5. Demonstrate in clinical care an understanding of the impact of psychological, social, and economic factors on human health and disease

Teaching Hours Allocation

Table 1 Hours Allocation

S. No	Subject	Hours needed
1	Pathology	30
2	Pharmacology	7
3	Forensic medicine	9
4	Community medicine	9
5	Medicine	3
6	Physiology	3
7	Pediatrics	1
8	PRIME/Medical Education and Research	2+1
	Total	65

Themes

Themes	Duration in weeks
Pallor and Fatigue	1 week
Fever	1 week
Bleeding	1 week

Learning Objectives

By the end of Blood & Immunology II Module, 3rd year MBBS students will be able to:

1. Describe the pathophysiology and diagnosis of different types of anemia.
2. Explain the pathogenesis of different hematological malignancies.
3. Discuss the diagnostic approach to malignant hematological disorders.
4. Discuss the pathophysiology and diagnosis of bleeding disorders.
5. Explain the immune system of the body and its components.
6. Describe the mechanism of defense from infection.
7. Explain hypersensitivity and allergy.
8. Discuss the rationale for immunomodulation and its impact on improving the therapeutic dynamics of autoimmune disorders and malignancies.
9. Describe the drugs for treating various types of anemia.
10. Write prescription for the prevention and treatment of iron-deficiency anemia.
11. Describe the application of blood groups in Forensic work
12. Describe the examination of blood stains
13. Describe the medico legal importance of blood as trace evidence
14. Describe the EPI schedule of Pakistan and the basic principles of Immunization.
15. Describe the most prevalent anemia's that affect the population of Pakistan, and the risk factors for vulnerable population.
16. Describe the most prevalent blood borne infections that affect the population of Pakistan, and the appropriate preventive strategies including safe blood practice.

Theme 1: Pallor and Fatigue

Subject	Topic	Learning objectives
Physiology	Red blood cells	Discuss the steps of erythropoiesis with Correlation to red cell indices and its clinical implications.
Pathology	Anemia	Discuss physiologic basis of anemia.
		Classify anemia's according to underlying Mechanism
	Blood loss	Describe the pathogenesis of blood loss Anemia
	Hereditary Spherocytosis	Discuss the pathogenesis of Hereditary Spherocytosis
		Describe morphological changes in peripheral Smear of HS patient
		Explain how will you diagnose a case of HS?
	Sickle cell Anemia	Discuss the morphology of rbcs in Sickle cell Anemia
		Describe the etiology and pathogenesis in SA
		Explain how will you diagnose a case of SA?
	Thalassemia	Describe Thalassemia
		Discuss the conditions contributing to the Pathogenesis of beta- thalassemia
		Explain the genetics of thalassemia
		Describe the morphological changes physically And on peripheral smear
		Explain how will you diagnose a case of alpha Or beta thalassemia?
	Glucose 6 phosphate dehydrogenase deficiency	Classify G6PD
		Discuss the pathogenesis of G6PD with Reference to oxidative injury of rbcs
		Describe the morphology of rbcs in G6PD Explain how will you diagnose a case of G6PD Deficiency

	Paroxysmal Nocturnal Hemoglobinuria	Describe the pathophysiology of Paroxysmal Nocturnal Hemoglobinuria
		Explain the diagnosis of a case of PNH?
	Immune hemolytic anemia's	Classify immune hemolytic anemia's
		Discuss the etiological mechanism of warm and cold antibody immune hemolytic anemia
		Explain the diagnostic workup of immune Hemolytic anemia
	Iron Deficiency Anemia	Discuss the pathophysiological mechanism of Iron deficiency anemia
		Describe the clinical course and morphological changes in Ida Explain
		Discuss the pathophysiological mechanism of Iron deficiency anemia
		Describe the clinical course and morphological changes in Ida Explain
	Megaloblastic Anemia	Describe Megaloblastic Anemia
		Describe the pathogenesis of MA with respect to Vitamin B12 and Folic acid
		Discuss the morphological changes in RBCs, WBCs and platelets in MA.
		Explain how will you diagnose the cause of MA?
	Aplastic Anemia	Enumerate causes of Aplastic anemia
		Describe the pathophysiology of aplastic anemia
		Diagnose a case of aplastic anemia
	Polycythemiavera	Discuss the pathophysiology of polycythemia vera
		Describe the clinical course and morphological features of Polycythemia vera

		Explain how will you diagnose a case of Polycythemia vera?
PHARMACOLOGY	Drugs used in Anemia	Classify the drugs used in anemia
		Describe pharmacokinetics of Iron
		Describe the various oral and parenteral formulations of iron
		Describe the adverse effects of iron therapy
		Describe the drug treatment of Iron toxicity
		Describe the various oral and parenteral preparations of cyanocobalamin (Vit B12)
		Describe the clinical use of cyanocobalamin (Vit: B12)
		Describe the clinical use of Folic acid
		Describe the pharmacological rationale of combining cyanocobalamin with folic acid and iron
		Describe the role of granulocyte colony stimulating factors (Filgrastim) and granulocyte monocyte colony stimulating factors in the treatment of leucopenia.
		Describe the role of thrombocyte colony stimulating factor (Oprelvekin) in the treatment of thrombocytopenia.
FORENSIC MEDICINE	FORENSIC EVIDENCE	Describe trace evidence
		Classify trace evidence.
		Describe Locard's exchange principle.
		Describe composition of blood and characteristics of different blood cells.
		Describe basic genetic principles related to blood groups and blood groups as hereditary factors.

	BLOOD GROUP SYSTEMS	Describe different blood groups systems. <ul style="list-style-type: none"> • Grouping based on red cell antigens • Grouping based on blood proteins • Grouping based on enzymes • Grouping based on white cell antigens. • Describe different methods for blood group determination. • Direct agglutination • Ring test • Gel diffusion • Immune-electrophoresis • Indirect agglutination
		Describe the application of blood in forensic work. (medico legal importance) <ul style="list-style-type: none"> • Inheritance claims • Rh hazards • Transfusion errors and adverse reactions • DNA profiling • Disputed paternity and maternity
COMMUNITY MEDICINE	Epidemiology of nutritional anemias	Classify nutritional anemias
		Describe the population at risk of nutritional anemia in Pakistan.
		Explain effective public health strategies for prevention of nutritional anemias in in Pakistan
		Describe risk factors for different nutritional anemia's.
		Describe effective public health strategies for prevention of different types of anemia's in Pakistan
PAEDIATRICS	Thalassemia	Describe Classification, Laboratory Investigation and management of Thalassemia
MEDICINE	Sickle Cell Anemia	Discuss the pathophysiology, investigations and management of Sickle Cell Anemia.

Theme 2: Fever

Subject	Topic	Learning objectives
Physiology	White blood cells	Classify the different types of white blood cells, Polymorph's, Lymphocytes and Plasma cells and their disorders.
Pathology	Acute myelogenous leukemia	Classify acute myelogenous leukemias according to FAB.
		Discuss the pathophysiology of AML.
		Describe the morphological features of AML.
		Explain how will you proceed for diagnosis of AML?
	Chronic myelogenous leukemia	Discuss the pathophysiology of CML.
		Describe the peripheral blood findings in CML
		Explain how will you proceed for diagnosis of CML?
	Myelodysplastic syndrome (mds)	Enlist types of MDS.
		Discuss causes, pathogenesis and Morphology.
		Interpret blood and bone marrow changes in patient with MDS.
		Discuss symptoms and diagnostic strategies for patient with MDS.
	Lymphoid neoplasms	Enumerate Lymphoid neoplasm
		Classify lymphoid neoplasms according to WHO classification.
	Acute lymphocytic leukemia	Discuss the pathophysiology of Acute lymphocytic leukemia
		Discuss the morphological features of ALL
		Explain how will you diagnose a case of ALL?
	Chronic lymphocytic leukemia	Discuss the pathophysiology of Chronic lymphocytic leukemia
		Describe the distinguishing morphological features of CLL
		Explain the diagnostic workup for a case of CLL
	Plasma cell disorder	Describe the pathogenesis of multiple myeloma
		Describe the molecular genetics involved in multiple myeloma
	Hodgkin' s lymphoma	Discuss the type of multiple myeloma
		Enlist the clinical features
		Classify Hodgkin's lymphoma
		Discuss the etiology and pathogenesis of Hodgkin's lymphoma

		Describe the morphological changes and clinical course of the disease in Hodgkin's Lymphoma
Non-hodgkin' s lymphoma		Enlist Non-Hodgkin's lymphoma
		Describe the basic pathologic classification of NHL (the WHO classification).
		Describe the predisposing factors to developing NHL, including infectious agents associated with development of specific lymphomas.
		Describe the morphologic features of lymph nodes involved in Non-Hodgkin Lymphoma
		Enlist the lab investigations required for diagnosis of NHL
Immunity		Describe the functions and types of immunity.
		Enlist the three lines of defenses and outline their properties
		Describe the characteristics, origin and functions of cells of immune system
		Compare innate and acquired immunity
		Compare the mechanism of active and passive immunity
Humeral immunity		Describe the role of T and B lymphocytes in immunity
		Describe the role of B lymphocytes in humeral immunity
		Describe humeral immunity
		Explain how helper T cells regulate the immune system
		Differentiate between humeral and cell mediated immunity
Cell mediated immunity		Explain the Specificity of immune response
		Describe cell mediated components of Cell mediated immunity (CMI),
		Explain types of cells in CMI system
		Describe T-cell activation and diversity
		Illustrate Schematic representation of T cell activation and diversity
		Differentiate between Primary and secondary immune response
	Antibodies	Describe antigen and antibodies.
		Differentiate B/W Monoclonal and polyclonal antibodies.
		Classify immunoglobulin
		Illustrate structure (diagram) of immunoglobulin A.
		Describe important functions of immunoglobulin
		Explain How antibodies neutralize toxins, microbes and viruses

		Illustrate class switching of immunoglobulin
		Explain transfer of immunity from mother to fetus and from mother to infant during breast-feeding
	Allergy & hypersensitivity	Describe the pathophysiology of allergy and hypersensitivity with examples
		Compare immediate and delayed hypersensitivity reactions
		Enlist the diseases associated with hypersensitivity reactions
	Immune tolerance	Describe Immunotolerance.
		Describe Immunological unresponsiveness of the body especially to self-antigens.
		Explain the role of immune system in protecting the human body.
		Distinguishing between types of immunotolerance
		Explain the mechanism of graft rejection and graft vs host disease.
	Autoimmune diseases	Describe Autoimmunity.
		Discuss Pathogenesis of Autoimmune diseases.
		Explain the factors leading to Autoimmune Diseases.
	Immunodeficiency diseases	Describe immunodeficiency
		Differentiate between Autoimmune and immunodeficiency diseases.
		Classify Congenital and acquired Immunodeficiency diseases.
		Describe the pathogenesis of HIV.
	COMPLEMENT	Describe complement.
		Describe components of the Complement System
		Describe the synthesis of complements
		Describe pathways of activation and inactivation of complement
		Describe important functions of each component of complement system
		Describe the diseases associated with deficiency of the complement proteins
PHARMACOLOG Y	Immune modulator drugs	Classify immunomodulating drugs
		Describe the role of corticosteroids as immunosuppressant agents.
		Describe mechanism of action of immunophilin ligands.
		Describe clinical uses and adverse effects of immunophilin ligands.
		Describe mechanism of action of enzyme inhibitors.
		Describe clinical uses and adverse effects of enzyme inhibitors.
		Describe mechanism of action of cytotoxic agents as immunosuppressant

		Describe clinical uses and adverse effects of cytotoxic agents
		Describe mechanism of action of immunosuppressive antibodies used as immunosuppressant
		Describe clinical uses and adverse effects of immunosuppressive antibodies
		Describe mechanism of action of monoclonal antibodies
		Describe clinical uses and adverse effects of monoclonal antibodies
		Describe mechanism of action of immunostimulant drugs
		Describe clinical uses and adverse effects of immunostimulant drugs
		Describe the advantages and disadvantages of various combinations of Immuno-modulating drugs
		Describe Forensic Lab Systems
Prime/research	Academic writing and plagiarism	Emphasize the role of academic writing in research
		Explain the role of “Grammarly” for use in academic writing
		Define plagiarism
		Enlist plagiarism detection software
Forensic medicine	Forensic Lab Procedures	Describe Forensic Lab Procedures <ul style="list-style-type: none"> · Forensic histopathology · Naked eye examination · Histological examination · Forensic histochemistry · Steam distillation · Micro-diffusion analysis · Stas-Otto method · Colour reaction method · Chromatography · Spectroscopy · Electrophoresis · Radio-activation technique

Community medicine	Immunization	Detection of insecticide compounds
		Define immunity
		Explain the types of immunity
		Discuss immunizing agents
		Explain the hazards of immunization
		Explain the cold chain in the context of immunization
	Vaccination	Explain the importance of vaccination in the control of infectious diseases
		Describe the basic principles of vaccination
		List the main types of vaccine and illustrate them with examples
		Describe vaccines that are associated with adverse reactions
		Explain the difference between live attenuated and inactivated vaccines
		Describe the role of vaccines in preventing disease.
		Differentiate between vaccination and immunization
		Describe the strategies used from community medicine's perspective to promote vaccination in communities. (EPI)
		Explain various programs of vaccination in Pakistan with particular reference to EPI.
		Describe the factors responsible for success and failure of vaccination programs in Pakistan.
	Epidemiology of blood borne diseases/infections	List the important blood borne diseases in Pakistan as prioritized by the National Institute of health (NIH)
		Discuss the global burden of blood borne diseases & compare with Pakistan
		Describe important blood borne pathogens
		Explain the evidence based public health practices to reduce transmission of blood borne infectious disease
		Explain the evidence based best practices and procedures for safe blood transfusion and prevention of needle stick injury
		Classify myeloproliferative neoplasms.
MEDICINE	Myeloproliferative Disorders (MPN)	Discuss the investigations & management steps of CML.

Theme 3: Bleeding

Subject	Topic	Learning objectives
Physiology	Platelets	Enumerate the causes of thrombocytopenia.
		Explain the intrinsic and extrinsic pathways of Coagulation
Pathology	Thrombocytopenia & von willebrand disease	Enlist causes of Thrombocytopenia
		Describe the pathogenesis of immune thrombocytopenic purpura
		List thrombotic microangiopathies
		Explain the diagnostic plan for ITP
		Classify VWD
		Enlist investigations required for diagnosis of VWD
	Hemophilia	Discuss the pathogenesis of hemophilia A and B
		Describe the clinical course of the disease.
		Enlist the laboratory investigation for diagnosing a case of hemophilia
	Disseminated intravascular coagulopathy	Enlist major disorders associated with DIS
		Discuss the pathophysiology of DIC
		Explain the morphological changes in DIC
		Explain how will you diagnose DIC?
	Transfusion medicine	Describe various blood component preparation
		Identify indications for different blood components
		Describe transfusion reactions associated with blood transfusion
Pharmacology	Anti-plasmin (antifibrinolytic) drugs	Describe mechanism of action of Anti- plasmin (antifibrinolytic) drugs
		Describe clinical uses and adverse effects of Anti-plasmin (antifibrinolytic) drugs
	Drug treatment of Haemophilia	Describe the drug treatment for various types of Haemophilia
		Describe the role of Desmopressin in the treatment of haemophilia

Forensic medicine	Blood stains	Describe examination of blood stains. <ul style="list-style-type: none"> Physical examination Chemical examination Physicochemical examination Micro chemical examination Spectroscopic examination Immunological and enzymological methods for species determination
		Describe the medico legal importance of blood stains.
	Collection And Preservation Of Biological Material	Describe the collection and preservation of biological material <ul style="list-style-type: none"> Blood Swabs and smears Saliva Semen
Medicine	Platelets (itp)	Describe Clinical features, investigations and management of a patient with Immune Thrombocytopenia (ITP).
PRIME/Medical education	Principles of medical ethics	Explain the pillars of medical ethics
		Explain the privacy and confidentiality of the patients and its medico-legal and cultural aspects
	Confidentiality	Exhibit Confidentiality of colleagues and patients
		Appropriately use of social media

Practical Work

Subject	Topic	Learning objectives
		Theme 1
Pathology	Normal complete Blood count	Differentiate between a normal blood cells of different lineages
	ABNORMAL PERIPHERAL SMEAR IN DIFFERENT ANEMIAS	Differentiate between a normal and an abnormal RBC
		Identify different shapes of RBCs.
		Identify the common types of Anemia on the basis of RBC morphology
Pharmacology	Iron- deficiency anemia	Write prescription for a patient at risk of developing iron-deficiency anemia
		Write Chart order for treating an in-door patient with iron-deficiency anemia
Field visit	Visit to blood bank of a tertiary care hospital	Explain safe blood transfusion practices
		List the common pathogens that cause blood borne infections which may be acquired from unsafe blood transfusion practices.
		List the most common transfusion reactions seen in a blood bank in a local teaching hospital in Pakistan
		Communicate with health care staff effectively
		Describe the standard operating procedures (SOP's) of blood transfusion
Pathology	Normal white cell smear	Describe causes of leukocytosis
		Differentiate different types of white blood cells under microscope
Forensic medicine	Microscopic examination of animal and human blood	Perform Microscopic examination of animal and human blood.

	Examination of blood stains under ultraviolet light	Perform examination of blood stains under ultraviolet light.
	Different pattern of stains	Identify different pattern of stains.
Field visit	Visit to basic health care unit EPI Center	Observe administration of different vaccines as part of Expanded Program of immunization
		(EPI) schedule of Pakistan at the vaccination center.
		List and explain the route of administration and mechanism of storage and maintenance of cold chain of each vaccine in the EPI schedule (support with images where possible)
		List the different components of each vaccine in the EPI schedule including the adjuvants, preservatives and explain their relevance to the vaccine.
		Differentiate between live attenuated vaccines, conjugate vaccines, subunit vaccines, and toxoid vaccines in the EPI schedule and their mode of action
		Identify the contraindications for vaccination that may present an additional risk
		Describe the organization of EPI center
		Explain the role of EPI center.
		Observe the process of vaccination on a case.
Pathology	Coagulation tests	Interpret Prothrombin time and activated partial thromboplastin time
		Interpret bleeding time and clotting time

Learning Resources

S#	Subjects	Textbooks
1.	Community Medicine	1.Community Medicine by Parikh 2. Community Medicine by M Illyas 3. Basic Statistics for the Health Sciences by Jan W Kuzma
2.	Forensic Medicine	1. Nasib R. Awan. Principles and practice of Forensic Medicine 1st ed. 2002. 2. Parikh, C.K. Parikh's Textbook of Medical Jurisprudence, Forensic Medicine and Toxicology. 7th ed.2005. 3.Knight B. Simpson's Forensic Medicine. 11th ed.1993. 4. Knight and Pekka. Principles of forensic medicine. 3rd ed. 2004 5. Krishan VIJ. Text book of forensic medicine and toxicology (principles and practice). 4th ed. 2007 6. Dikshit P.C. Text book of forensic medicine and toxicology. 1st ed. 2010 7. Polson. Polson's Essential of Forensic Medicine. 4th edition. 2010. 8. Rao. Atlas of Forensic Medicine (latest edition). 9. Rao.Practical Forensic Medicine 3rd ed ,2007. 10. Knight: Jimpson's Forensic Medicine 10th 1991,11th ed.1993 11. Taylor's Principles and Practice of Medical Jurisprudence. 15th ed.1999
3.	Pathology	1. Robbins & Cotran, Pathologic Basis of Disease, 9th edition. 2. Rapid Review Pathology, 4th edition by Edward F. Goljan MD
4.	PHARMACOLOGY	1. Lippincott Illustrated Pharmacology 2. Basic and Clinical Pharmacology by Katzung

Assessment Plan - 3rd Year MBBS

The year-3 will be assessed in 3 blocks

- 1) Block-1 (Foundation 2 and Infection and Inflammation modules) will be assessed in paper-G
- 2) Block-2 (Multisystem, blood and MSK modules) will be assessed in paper-H
- 3) Block-3 (CVS and Respiratory module) will be assessed in paper-I
- 4) Each written paper consists of 120 MCQs and
- 5) Internal assessment will be added to final marks in KMU as shown in below table.
- 6) In OSPE, each station will be allotted 6 marks, and a total of 120 (+10% marks of internal assessment) marks are allocated for each OSPE/OSCE examination.

Year 3 Professional Exam in System-based Curriculum

Theory paper	Modules	Theory marks	Internal assessment theory (10%)	OSPE/OSPE	Internal assessment OSPE/OSPE (10%)	TOTAL MARKS
Paper G	Foundation-II Inf.&Inflamm.	120	14	120	14	268
Paper H	Multisystem Blood MSK-II	120	13	120	14	267
Paper I	CVS-II Respiratory-II	120	13	120	12	265
TOTAL MARKS		360	40	360	40	800

*Research viva of 20 marks will be conducted in paper-L. However, the rest of 15 marks will be decided by the concerned department internally for the contribution of the students in research project/thesis.

Assessment Blueprints

Table 2: Paper H Blood & Immunology MCQs

Subjects	Total MCQs
MSK	44
Multisystem I	41
Blood and Immunology	35
Total	120

Table 3: Blood & Immunology OSCEs

Subjects	Total OSCEs
MSK	10
Multisystem I	0
Blood and Immunology	10
Total	20

A minimum of 20 stations will be used in final exams. Total marks will be 120 (6 marks for each station).

Teaching and learning strategies:

The following teaching learning methods are used to promote better understanding:

- Interactive Lectures
- Hospital Clinic visits
- Small Group Discussion
- Skills session
- Self-Directed Study

Interactive lectures:

An interactive lecture is an easy way for instructors to intellectually engage and involve students as active participants in a lecture-based class of any size. Interactive lectures are classes in which the instructor breaks the lecture at least once per class to have students participate in an activity that lets them work directly with the material.

- The instructor might begin the interactive segment with an engagement trigger that captures and maintains student attention.
- Then the instructor incorporates an activity that allows students to apply what they have learned or give them a context for upcoming lecture material.
- As the instructor feels more comfortable using interactive techniques he or she might begin to call upon a blend of various interactive techniques all in one class period.

Hospital/Clinic Visits:

In small groups, students observe patients with signs and symptoms in hospital or clinical settings. This helps students to relate knowledge of basic and clinical sciences of the relevant module.

Small Group Discussion (SGD):

The shy and less articulate are more able to contribute. Students learn from each other. Everyone gets more practice at expressing their ideas. A two way discussion is almost always more creative than individual thoughts. Social skills are practiced in a 'safe' environment e.g. tolerance, cooperation. This format helps students to clarify concepts acquire skills or attitudes. Students exchange opinions and apply knowledge gained from lectures, tutorials and self-study. The facilitator role is to ask probing questions, summarize, or rephrase to help clarify concepts.

Skills Practical Session:

Skills relevant to respective module are observed and practiced where applicable in skills laboratory or Laboratories of various departments.

Self-Directed Learning (SDL):

Self-directed learning, which involves studying without direct supervision in a classroomLibrary, is a valuable way to learn and is quickly growing in popularity among parents and students. Students' assume responsibilities of their own learning through individual study, sharing and discussing with peers, seeking information from Learning Resource Centre, teachers and resource persons within and outside the college. Students can utilize the time within the college scheduled hours of self-study.

Time Table:

The timetables for the module will be shared via Edmodo and the notice boards in advance.

1. **Assessment Tools:**

Theoretical knowledge is tested by a written examination system constituted by multiple choice questions (MCQs). The assessment of practical knowledge involves oral, spot, or objective structured practical examinations (OSPE).

Multiple Choice Questions (MCQs):

- Multiple choice questions (MCQs) are a form of assessment for which students are asked to select the best choice from a list of answers.
- MCQ consists of a stem and a set of options. The stem is usually the first part of the assessment that presents the question as a problem to be solved; the question can be an incomplete statement which requires to be completed and can include a graph, a picture or any other relevant information. The options are the possible answers that the student can choose from, with the correct answer called the key and the incorrect answers called distractors.
- Correct answer carries one mark, and incorrect 'zero mark'. There is NO negative marking.
- Students mark their responses on specified computer-based sheet designed for the college.
- The block exam will comprise of 120 MCQs and will be compiled according to the shared blueprint.

Objective Structured Practical Examination (OSPE)

- The content may assess application of knowledge, or practical skills.
- Student will complete task in define time at one given station.
- All the students are assessed on the same content by the same examiner in the same allocated time.

- A structured examination will have observed, unobserved, interactive and rest stations.
- Observed and interactive stations will be assessed by internal or external examiners.
- Unobserved will be static stations in which students will have to answer the questions related to the given pictures, models or specimens the provided response sheet.
- Rest station is a station where there is no task given, and in this time student can organize higher thoughts.
- The Block OSPE will be comprise of 20 examined station and 5 rest stations. The stations will be assigned according to the shred blueprint. There will be 8 stations for viva of core subjects like Pathology, Pharmacology, Forensic Medicine and Community Medicine (2 station for viva of each core subject) and 2 clinical station and rest of 10 out of 20 stations will be assigned according to shared blue prints.

Internal Evaluation:

Internal evaluation is a process of quality review undertaken within an institution for its own ends. 10% marks of internal evaluation will be added to final marks. This 10% will be based on

Marks obtained	14 out of total 40 marks of internal assessment in block H Paper

Marks obtained	14 out of total 40 marks of internal assessment in block H OSPE

2. Attendance Requirement:

More than 75% attendance is mandatory to sit for the examinations.

Learning Resources for Students

Physiology

- Guyton and Hall physiology
- Ganong physiology
- Human Physiology from cells to system by lauree sherwood
- BRS Physiology
- Neuroscience by Dale Purves

Biochemistry

- Chatterjee text book of Biochemistry
- Harpers Biochemistry
- Lippincotts Biochemistry
- Satya Narayan biochemistry

PATHOLOGY

- Robbins textbook of pathology
- Harsh mohan text book of pathology
- Levison text book of microbiology
- Paniker parasitology
- Chatterjee book of parasitology

PHARMACOLOGY

- Basic & Clinical Pharmacology, 14edition
- Katzung & Trevor's Pharmacology: Examination & Board Review, 10edition
- Lippincott Illustrated Reviews: Pharmacology, 8th edition
- Pharmacology for Medical Graduates by Tara V. Shanbhag

FORENSIC MEDICINE

- Parikh's textbook of Medical Jurisprudence and Toxicology.
- Principles and Practice of Forensic Medicine by Nasir R Awan
- Forensic medicine and toxicology principals and practice by Krishan Vij
- Knights forensic pathology by Bernard knight, Pekka saukko
- Forensic medicine and toxicology Nagesh Kumar G rao

Apart from these resource learning ,students can consult books available in library or recommended by the specialty experts.