STUDY GUIDE	
PROGRAM	**MBBS**
MODULE TITLE	**Foundation Module- II**
ACADEMIC YEAR	**Third Year - 2026**
INTRODUCTION	This module has been designed to introduce students to basic concepts essential for understanding a number of issues related to diseases process, their prevention and treatment. It is hoped that learners will be able to apply these key concepts in future, system- based modules to understand the diseases processes and their Management.
RATIONALE	In the 2nd spiral, before students understand the complex issues related to organ systems, it becomes necessary for them to have clear concepts underlying them. This module is designed so that it proceeds from simple to more complex basic issues. Concepts dealt with in this module will be Revisited in many other modules in the future.
OUTCOMES	By the end of the module, students should be able to describe main concepts from each of the disciplines taught
DEPARTMENTS INVOLVED	1. Biochemistry, 2. Community Medicine, 3. Forensic Medicine & Toxicology, 4. Pathology & Microbiology, 5. Pharmacology
MODULE OBJECTIVES	**By the end of the module, students will be able to:**
LECTURES	**1. Regulation of gene expression**

BIOCHEMISTRY	• Define the term gene expression • Explain the mechanism of gene expression in prokaryotes and eukaryotes • Justify the need for gene expression **2. DNA isolation** • Define DNA Isolation • Describe the different methods of isolation of DNA • Explain the uses of DNA isolation **3. Recombinant DNA technology** • Define the term Recombinant DNA technology • Describe the different types of Recombinant technologies and their uses • Explain the significance of Recombinant technology **4. Hybridization and blotting techniques** • Define the terms related to Hybridization and blotting techniques • Explain the types of hybridization and blotting techniques and their methods (Flow chart) • Describe the uses and significance of each method
COMMUNITY MEDICINE	**1. Introduction to public health** • Define common terminologies used in Community Medicine • Discuss Comprehensive Health Care • Briefly describe historical development of Public Health • Discuss development of public health in Pakistan • Explain Social Action Program • Discuss major health problems in Pakistan **2. Determinants of Disease & iceberg** • Explain determinants of disease

	• Explain determinants of Health • Discuss iceberg phenomenon **3. Natural history of disease & Levels of prevention** • Discuss the phenomenon of natural history of disease • Explain different levels of prevention **4. Introduction to Epidemiology** • Describe Epidemiology • Explain theories of disease causation **5. International organizations** • List regional offices of World Health Organization (WHO) • Discuss functions of WHO & UNICEF • Discuss UNICEF's GOBI-FFF program **6. Health Care System** • Describe health system • Define district health system • Describe the role of district management team • Explain health systems development • Discuss the situation analysis by studying health indicators and health needs. • Enumerate health services and resources • Describe major health problems of rural and urban areas of Pakistan • Explain multi-sectoral interaction and partnership • Discuss the following: i. Health system problems ii. Public health engineering iii. Financial and organizational problems iv. Problems of health planning, evaluation and research v. Primary aims of Integrated Health

7. Primary Health Care (PHC)

- Describe Primary Health Care
- Explain essential components of Primary Health Care
- Describe guidelines in PHC Planning

8. Introduction to environmental health

- Describe environmental health
- List common environmental problems
- Explain role of international agencies in environmental safety

9. Nuclear medicine

- Describe the basic concepts involved in radiation process
- State the standard permeable dose of radiation
- Describe the method of protection from radiation
- Describe safe management of radioactive waste

10. Genomics

- Differentiate between genetics and genomics
- List the chromosomal abnormalities
- Describe the steps in genetic counseling
- Explain genetic surveillance

11. Introduction to Demography

- Describe demography
- Explain sources of demographic data
- Explain the importance of demographic data
- Discuss the stages of demographic transition

12. Vital Statistics

- Describe vital statistics.
- Describe Vital statistics registration in developing countries.
- Discuss the situation of vital statistics in Pakistan

13. Morbidity & mortality determinants

- Explain morbidity measures
- Describe mortality measures

	14. Population pyramid & interpretation • Define Population pyramid • Compare the advantages and disadvantages of population pyramid **15. Introduction to infections & control of infections** • Define different terms related to infection • Discuss the incubation period, serial time period in control of infection • Differentiate between infectious and communicable diseases • Describe control measures for infectious &communicable diseases • Explain the role of immune-prophylaxis &screening in the control of infection **16. Emerging & Re-emerging diseases** • Describe emerging &re-emerging diseases • Enumerate factors contributing to emergence • Explain preventive measures for the emergence **17. Disease screening & Surveillance** • Describe Screening and its role in natural history of disease • Classify the types of screening • List criteria of a good screening test • Discuss the characteristics of a good screening test • Calculate screening measures **18. Disease Surveillance** • Describe surveillance • Differentiate between surveillance and monitoring • Describe the factors affecting the value of data **19. Health Education** • Describe Health Education • Explain the principles and stages of health education

	• Discuss health education in Pakistan • Discuss Health Information, Education and Communication (IEC) **20. Waste Disposal** • Differentiate between various terminologies of waste disposal • Describe the various ways to collect and dispose human excreta • Explain the water carriage system • Differentiate between sludge and sullage • Discuss advantages of different types of Sewage Treatment Plants **21. Biomedical Waste** • Describe Biomedical Waste • Explain various types of Biomedical Waste • Describe color coding scheme for various types of waste. **22. Outbreak Investigation** • Define an outbreak • Identify key steps in outbreak investigation • Discuss the ethical and legal considerations • Discuss the process of evaluation of the effectiveness of interventions **23. Millennium Development Goals & Sustainable Development Goals** • List MDG's and health related goals, targets and indicators • List SDG's and health related goals • Describe Pakistan's performance in health related MDG's • Discuss factors that lead to failure of achieving MDG's **24. Demographic Equations** • Calculate Demographic Balancing equations • Describe Population doubling time

	• Explain Population Momentum
FORENSIC MEDICINE	**1. Introductory lecture** • Describe basics terms related to Forensic Medicine and Toxicology. • Enumerate the branches of Forensic Sciences • Explain the importance and utility of Forensic Medicine and its branches, in medical, legal and ethical issues • Discuss the structure of Legal system and the powers of different courts in Pakistan **2. Legal Procedures - I** • Define important legal terms such as Summons, warrant, perjury, deposition, exhibit, offence, cognizable offence, non-cognizable offence, oath, conduct money, summons case, warrant case, bail, FIR • Explain medical evidence and its types (oral, documentary, hearsay, circumstantial) • List the documents prepared by a medical man (Postmortem Reports, Medico Legal Reports, Certificates such as birth certificates, death certificates, sickness certificates, certificates of unsoundness of mind) • Differentiate Dying declaration and Dying deposition **3. Legal Procedures – II** • Enumerate the types of witnesses • Explain the procedure of examination in the court • List the protocols for the conduct of Doctor in the witness box, during court attendance &; recording evidence and volunteering of a statement by the doctor in court of law • Describe Professional secrecy and Privileged communication **4. Legal Procedures – III**

	• Explain the hierarchy of Criminal courts in Pakistan • Define Pakistan Penal Code and Criminal Procedure Code; its execution and delivery • List the general presumptions of law and general exemptions of law **5. Thanatology - I** • Explain the scientific concepts regarding death • Highlight the significance of Medico-legal aspects of brain death • Enumerate Howard's criteria of death • Define the terms cause, manner, mode and mechanism of death • Describe the medico-legal aspects of sudden &unexpected deaths **6. Thanatology - II** • Explain immediate signs of death with special stress on somatic or clinical death • Define Suspended animation • Summarize postmortem changes in the eyes • Describe early changes after death such as Algor Mortis (Cooling of the body), physico-chemical changes in various body tissues and organs under various environmental conditions, such as changes in muscular system after death **7. Thanatology - III** • Describe Postmortem Lividity (Livor mortis, Hypostasis or Suggilation) and its significance • Enumerate the postmortem changes in the blood, CSF, Vitreous humor and Bone marrow **8. Thanatology - IV**

	• Explain late signs of death i.e. Putrefaction, its mechanism, changes and gases of decomposition, forensic entomology, adipocere formation and mummification **9. Thanatology - V** • Define presumption of death and presumption of survivor-ship • Explain the method of writing certificate of death according to WHO • Summarize the parameters of estimation of time since death **10. Autopsy - I** • Define autopsy and its types • List its aims and objectives • Differentiate between Medico legal and pathological autopsy • Explain Autopsy protocols **11. Autopsy - II** • Describe external examination, types of incisions, techniques of autopsy, • Explain negative and obscure autopsy • Summarize internal examination of head **12. Autopsy - III** • Describe internal examination of thoracic and abdominal cavities • Explain dissection of respiratory tract, heart, abdominal viscera, pelvic organs, and Spinal cord **13. Autopsy - IV** • Describe method of preservation of viscera for chemical and histo-pathological examination • List the preservatives used in mortuary • Define Exhumation and Postmortem artifacts **14. Traumatology - I** • Define Injury, Hurt, Wound, Assault and Battery

	• Classify Injuries • Describe blunt weapon injuries; Abrasions and Bruises **15. Traumatology – II** • Explain the types, mechanism of production and medico legal significance of Lacerated wounds • Describe Sharp weapon injuries- Incised wounds, stab wounds with medico legal significance **16. Traumatology – III** • Summarize Qisas and Diyat Act with interpretation of injuries accordingly **17. Custodial deaths** • Enumerate deaths in custody • Define Torture according to World Medical Association (Declaration of Tokyo) • Explain various torture techniques • List the sequelae of torture • Describe the role of Medical practitioner and the ethical issues with relation to torture **18. Infanticide (Pediatric Forensic Medicine- I)** • Define infanticide, feticide, still born baby and dead born baby • Discuss Maceration • List the methods of foetal age estimation • Summarize the signs of live birth • Define Precipitate labor/Unconscious delivery • List the criminal causes of death of new born babies i.e. Acts of commission and omission • Explain autopsy on bodies of new born babies **19. Battered Baby (Pediatric Forensic Medicine-II)** • Explain Battered Baby Syndrome, its etiology and clinical features • Enumerate the Injuries related to Shaken Baby Syndrome with

	mechanism • Define Cot deaths (Sudden Infant Death Syndrome) and various possibilities of death with postmortem findings, Medico legal importance of SIDS **20. Animal Poisons- Toxicology (Snakes and Scorpions)** • Classify snakes • Differentiate between poisonous and non-poisonous snakes • Differentiate between Colubridae and Viperidae • Summarize the signs and symptoms of bites by cobra and viper • Explain the principles of treatment of snake bite and Anti-venom therapy • List the medico legal aspects of snakebite • Discuss the signs, symptoms and treatment of Scorpion bite **21. Thermal Injuries (Burns, scalds)** • Classify thermal injuries and burns • Differentiate the types of burns • Calculate the surface area of burns in adults and children • List the causes of death, postmortem findings and artifacts due to burns • Differentiate ante-mortem and postmortem burning • Differentiate burns due to dry heat, moist heat and chemicals for medico legal purposes **22. Environmental (Cold/heat) trauma** • Describe the causes, clinical features and treatment of injuries due to local exposure to cold; Frostbite, trench foot, and chilblain • Explain Hypothermia; its causes, clinical features and treatment • Discuss the injuries due to general exposure to heat viz. Heatstroke, exhaustion, cramps; their causes, clinical features and treatment

	23. Forensic Electrocution &Starvation • Explain the features of injuries due to various types of electrical current • List the causes of death due to electrocution • Enumerate lightning injuries and lightning deaths • Describe the types, signs and symptoms and postmortem findings of starvation
PATHOLOGY & MICROBIOLOGY	**SECTION I: GENERAL PATHOLOGY** **TOPIC 1: CELLULAR RESPONSES TO STRESS AND TOXIC INSULTS** **ADAPTATION,INJURY, AND DEATH** **1. Introduction to Pathology Overview: Cellular Responses to Stress and Adaptation of cellular growth** • Define Pathology and Pathogenesis • Briefly discuss cellular responses to the injury and stages of the cellular response to stress and injurious stimuli • Define adaptation, hypertrophy, hyperplasia, atrophy, and metaplasia • Describe the causes and mechanism of hypertrophy, hyperplasia, atrophy, and metaplasia **2. Overview of Cell Injury and Cell Death** • List causes of cell injury • Briefly discuss various types of cell injury • Discuss morphological alterations in cell injury including both reversible and irreversible injury **3. Necrosis** • Define necrosis • Discuss the pathological and morphological types of necrosis

4. Mechanism of Cell Injury I

• Describe mechanisms of cell injury (with examples) including depletion of ATP, mitochondrial damage, influx of calcium, accumulation of oxygen derived free radicals, defects in membrane permeability, damage to DNA and proteins

• Discuss properties of the principal free radicals involved in cell injury.

5. Mechanism of Cell Injury and examples (II)

- Discuss ischemia and reperfusion injury
- Discuss chemical and toxic injury

6. Apoptosis

- Discuss causes, morphological and biochemical changes, and clinic-pathologic correlations in Apoptosis.
- Briefly describe the mitochondrial and extrinsic the pathways of apoptosis
- Briefly discuss Necroptosis

7. Intracellular Accumulations

• Summarize the pathways of abnormal accumulation

• Discuss types of pigments (exogenous and endogenous)

• Describe hyaline changes, lipid, protein, and glycogen accumulation

• Discuss briefly pathological classification of intracellular accumulations

TOPIC 2: INFLAMMATION AND REPAIR

8. Introduction to Inflammation & Acute inflammation

• Define inflammation

• Classify inflammation

	• List the causes of inflammation • Discuss the sequence of events in acute inflammatory process **9. Mediators of acute inflammation** • Name the main inflammatory mediators • Describe their role in the inflammatory process **10. Morphological pattern & outcomes of acute inflammation & Chronic Inflammation** • Define chronic inflammation • Explain different morphological pattern of acute inflammation • List the outcomes of acute inflammation • List the causes and morphological features of chronic inflammation • Describe the cells and mediators &their role in chronic inflammation • Describe the systemic effects of acute and chronic inflammation **11. Granulomatous Inflammation** • Define granulomatous inflammation • Discuss the pathogenesis of granulomatous inflammation • List the diseases with granulomatous inflammation • Discuss morphology of granulomatous inflammation **12. Tissue repair** • Define tissue repair • Describe the mechanism involved in tissue regeneration and scar formation • List the factors that influence tissue repair **13. Healing by First & Second Intention**

	• Contrast repair by primary and secondary intention • Describe the complications in tissue repair **TOPIC 3: HEMODYNAMICS AND SHOCK** **14. Edema, Effusion, Hyperemia and Congestion** • Define edema, effusion, exudate, transudate, hyperemia and congestion • Define various terminologies according to morphology of edema & effusion • Discuss the pathophysiologic categories of edema • Describe the mechanism & clinical significance of edema at different sites • Describe the morphological changes in chronic passive congestion of the lungs & liver **15. Hemostasis** • Define hemostasis • Describe the sequence of events involved in primary &secondary hemostasis including the role of platelets, endothelium & coagulation cascade • Describe the defects of primary &secondary hemostasis • Briefly discuss hemorrhagic disorders **16. Thrombosis & Embolism** • Define embolus, infarction & thrombosis • Discuss various types of thrombi according to their morphology • Describe the factors that predispose to thrombosis • Describe the morphologic features of thrombi • List the possible fate of thrombus • Describe the clinical features of venous, arterial &cardiac thrombosis

	• Define Disseminated Intravascular Coagulation (DIC) • Describe the pathogenesis of DIC **17. Embolism & Infarction** • Define embolism • List the types of embolism • Describe the clinical manifestations &consequences of pulmonary & systemic thromboembolism • Discuss the clinical conditions that give rise to fat &marrow embolism, air embolism & amniotic fluid embolism • Classify infarction • Describe the morphologic features of red & white infarct • List the factors that influence development of infarct **18. Shock** • Define shock • List the three major types of shock • Describe the mechanism of three major types of shock • Discuss the factors involved in the pathophysiology of septic shock • Describe the three stages of shock • List the clinical features of shock **TOPIC 4: GENETIC DISORDERS** **19 Introduction to Mendelian Disorders** • Discuss the transmission pattern of single gene disorder • Discuss the pathogenesis of important autosomal recessive, autosomal dominant, and X-linked disorders • List the examples of Autosomal Dominant Disorders, Autosomal Recessive Disorders **20 Mutation**

	• Define mutation • Briefly discuss principles relating to the effects of gene mutation • Distinguish between types of mutations in the coding and non-coding regions of genes **21 Single Gene Disorders I** • Define single-gene disorders • Classify single-gene disorders on the molecular and biochemical basis • Discuss disorders associated with defects in structural proteins (Marfans syndrome) **22. Single Gene Disorders II** • Discuss disorders associated with defects in structural proteins (Ehlers-Danlos syndrome) • Discuss disorders associated with defects in receptor proteins (Familial Hypercholesterolemia) • Enumerate the types of lysosomal &glycogen storage diseases with their deficient enzymes **23. Chromosomal Disorders** • Define normal karyotype and common cytogenetic terminology • Discuss structural chromosomal abnormalities • Discuss cytogenetic disorders involving autosomes including Trisomy 21: Down Syndrome, Trisomy 18: Edwards Syndrome, Trisomy 13: Patau Syndrome • Name diseases with deletion of genes at chromosomal locus 22q11.2 (Di George syndrome, Velocardiofacial syndrome) • Discuss cytogenetic disorders involving sex chromosomes

	including Klinefelter syndrome, Turner syndrome **TOPIC 5: NEOPLASIA** **24 Introduction to Neoplasia** • Define neoplasia • Discuss the nomenclature of benign and malignant tumors with respect to tissues of origin • Describe characteristic features of benign &malignant tumors **25 Gross & Microscopy of Benign & Malignant tumors** • Define Anaplasia, Metaplasia, Dysplasia, Metastasis • Define cell differentiation and de-differentiation • Discuss all the components and morphological features of anaplasia • Discuss local invasion of tumors • Discuss pathways of spread of malignant tumors • Compare features of benign and malignant tumors **26 Epidemiology of Cancer** • Discuss the global impact of cancer • List the environmental factors involved in the pathogenesis of malignancy • Discuss different types of occupational cancers • Define acquired predisposing conditions leading to cancer development. • Discuss association between chronic inflammatory states and cancer • Discuss the role of genetic predisposition and interactions between environmental and inherited factors in cancer development **27 Molecular Basis of cancer I** • List four classes of normal regulatory genes with respect to

	neoplasia • Discuss stepwise accumulation of driver and passenger mutations • Describe cellular and molecular hallmarks of cancer • Define oncogenes, Proto-oncogenes, and Oncoproteins • Classify oncogenes according to their mode of action and associated tumors **28 Molecular Basis of cancer II** • Define Tumor Suppressor Genes • Classify tumor suppressor genes according to their mode of action and associated tumors • Discuss RB gene with respect to its role in tumor development • Discuss p53 gene with respect to its role in tumor development **29 Molecular Basis of cancer III** • Define the Warburg Effect and angiogenesis • Define evasion of programmed cell death (Apoptosis) • Discuss the stem cell–like properties of cancer cells • Discuss the effect of angiogenesis on tumor progression • Discuss local Invasion and distant metastasis in neoplastic lesions • Explain the molecular basis of multistep-carcinogenesis **30 Grading, staging & clinical effects of Neoplasia** • Define grading and staging of tumors & cancer cachexia • Classify paraneoplastic syndromes according to their clinical effects and association with various tumors • Discuss different types of laboratory investigations used for diagnosis of cancer **31 Tumor markers & carcinogenic agents**

	• Define chemical carcinogenesis, radiation carcinogenesis, microbial carcinogenesis • Classify chemical and radiation carcinogens according to their types and modes of action • Classify microbial carcinogenesis according to the viral and bacterial involvement • Classify Tumor Markers according to types and mode of action **SECTION II: GENERAL MICROBIOLOGY** **32 Introduction to Microbiology** • Define microbiology • Differentiate between prokaryotes and eukaryotes • Discuss the types of microorganisms according to shapes and staining **33 Bacterial structure I** • Discuss the difference between gram-positive and gram-negative bacteria • Discuss the essential components of bacterial structure • Describe the different shapes &staining procedure for bacteria **34 Bacterial structure II and growth cycle** • Describe the non-essential components of the bacterial structure • Explain the growth cycle • Differentiate between aerobic and anaerobic growth • Describe obligate intracellular growth, fermentation of sugars, iron metabolism **35 Bacterial genetics** • Discuss mutations

	• Describe the process of transfer of DNA within and between bacterial cells • Discuss the importance of recombination **36 Classification of Bacteria and Normal Human Microbiome** • Discuss the principles of classification of bacteria and normal human microbiome • Classify Bacteria • Discuss the normal microbiota of various areas of the body **37 Pathogenesis I** • Describe the principles of pathogenesis • List the types of bacterial infection • Explain the stages of bacterial pathogenesis • Discuss the determinants of bacterial pathogenesis (transmission, adherence, invasion) **38 Pathogenesis II** • Discuss the determinants of bacterial pathogenesis, (toxin production eg. exotoxin, endotoxin) • Discuss bacterial infection associated with cancer • Describe the stages of infectious disease, • Describe the importance of Koch's postulates **39 Host defence** • Discuss the principles of host defence, innate immunity (skin and mucous membrane) • Describe the processes of inflammatory response, phagocytosis and adaptive specific immunity **40 Bacterial Vaccines** • Explain the principles of bacterial vaccines • Discuss bacterial vaccines use for active and passive immunity **41 Anti-microbial drugs and Resistance**

	• Discuss the principles of antimicrobial drugs stewardship • Briefly discuss the mechanism of action of various antibiotics and clinical indication of antibiotics against common bacterial infections • Discuss the concept of chemoprophylaxis and pro-biotics • Discuss the principles of antibiotic resistance • Discuss genetic and non-genetic basis of resistance • Discuss specific mechanisms of resistance **42. Gram-positive cocci I** • Discuss the diseases and important properties of Staphylococci • Describe the transmission, pathogenesis and clinical findings of Staphylococci • Briefly discuss the treatment and prevention of Staphylococci **43. Gram positive cocci II** • Discuss the diseases and important properties of Streptococci • Describe the transmission, pathogenesis and clinical findings of Streptococci • Briefly discuss the treatment and prevention of Streptococci **TOPIC: VIROLOGY** **44 Basic Virology & Classification** • Compare viruses and cells • Classify viruses • Discuss symmetry, capsid and envelope of viruses • Discuss atypical virus like agents • Discuss viral vaccines and their types related to active, passive and herd immunity **45 Replication**

	• Describe viral growth curve • Describe specific events during the growth cycle • Discuss lysogeny and its relationship in bacteria to latency in human cells **46 Viral Pathogenesis & host defence** • Describe transmission and portal of entry of virus • Differentiate pathogenesis and immunopathogenesis • Differentiate nonspecific defences and specific defences **TOPIC: MYCOLOGY** **47 Basic Mycology** • Describe the structure and growth of fungi • Explain the mechanism of pathogenesis in fungal infections • Describe fungal toxins and allergies • Explain laboratory diagnoses and treatment of fungal infections **TOPIC: IMMUNOLOGY** **48 Introduction & Innate immunity** • Define immunity and its types and innate immunity • List the components of immune system • Classify types of immunity according to their function especially innate immunity • Discuss the functions of immune system • Discuss the role of T cells, B cells, natural killer cells, macrophages in immunity • Discuss the specificity of the immune response and properties, component and pattern of recognition receptors • Discuss properties, components &pattern recognition receptors. **49 Adaptive immunity (I)**

	• Define adaptive immunity • Classify T cells according to its types. • Discuss the functions of CD4 and CD8 T cells with respect to activation, co-stimulation and memory formation • Discuss the effect of superantigens on T cells **50 Adaptive immunity (II)** • Define adaptive immunity, antibody and primary response and secondary responses of antibodies • Discuss the mode of activation of B cells • Discuss effector functions of B cells • Discuss the structure of antibody • Classify antibodies according to types • Discuss the functions of antibodies **51 Major Histocompatibility Complex (MHC) &transplantation** • Define Major Histocompatibility Complex (MHC), transplantation & allograft rejection • Classify MHC proteins according to its classes • Discuss the importance of MHC in transplantation • Classify types of transplant rejections • Discuss HLA typing in the lab in association with transplantation **52 Complement System** • Define complement system • Discuss complement system with respect to activation and regulation • Discuss the role of complement in immunity • Explain the clinical aspects of complement system **53 Hypersensitivity I & II** • Define Hypersensitivity reaction, desensitization, atopy, drug

	hypersensitivity • Classify hypersensitivity according to its types • Discuss the pathogenesis of types I &II hypersensitivity reactions • Discuss various clinical presentations of type I & II hypersensitivity reactions • Discuss the treatment and prevention of types I & II hypersensitivity **54 Hypersensitivity III & IV** • Define Arthus reaction, Serum Sickness, Immune Complex Disease • Discuss the pathogenesis of type III &IV hypersensitivity • Discuss various clinical presentations of type III & IV hypersensitivity reactions • Discuss the treatment and prevention of type III & IV hypersensitivity • Explain diagnostic immunology • Discuss briefly agglutination &precipitations reactions, and ELISA • Describe ABO blood groups, transfusion reactions & Rh-incompatibility **55 Tolerance and Autoimmune Disease** • Define T & B cell tolerance, and autoimmunity • Discuss the pathogenesis of autoimmune disease • Discuss various clinical presentations of autoimmune diseases **56 Immunodeficiency** • Define immunodeficiency • Classify immunodeficiency according to its types • Discuss various clinical presentations of immunodeficiency

	diseases
PHARMACOLOGY	**1. Introduction to Pharmacology** • Discuss various branches of pharmacology and therapeutics and their applications • Discuss various terminologies used in pharmacology and pharmacokinetics and dynamics **2. Routes of drugs administration** • Classify various routes of drug administration • Explain the advantages and disadvantages of different routes of drug administration **3. Sources of drugs and their active principles** • Discuss various sources of drugs and explain their active principles • Explain different types of drug doses and their effects **4. Drug Absorption and Bioavailability** • Discuss various processes of drug permeation through biological membranes • Explain drug absorption and bioavailability and factors affecting them **5. Drug Distribution, Volume of Distribution (Vd) and Drug Clearance** • Describe drug distribution and Vd and discuss factors affecting it • Discuss plasma protein binding of drugs and its influence on drug distribution **6. Biotransformation of drugs I and II** • Describe principles of drug biotransformation &metabolic reactions (Phase-I and Phase-II) • Describe microsomal mixed function oxidase system and concept of enzyme induction and inhibition

	• Explain various factors which could affect the process of drug biotransformation **7. Excretion of drugs, Steady State Concentration (Css) and Kinetics of Drug Elimination** • Describe drug excretion • List various routes of drug excretion and factors affecting it • Discuss drug clearance and elimination and explain their kinetics • Explain Css and its clinical application • Define half-life, its calculation and its relationship with drug dosing **8. Drug Receptors and mechanisms of drug actions (I & II)** • Explain types of drug receptors, their properties • Discuss various molecular mechanisms by which therapeutic effect of the drugs are obtained **9. Dose Response relationship and factors modify it.** • Discuss the relationship between drug dosage and its clinical response with the help of graphical representation • Describe drug potency, efficacy, therapeutic index and quantal dose-effect curve **10. Adverse Drug Reactions** • Discuss drug side effects, toxic effects and their types with examples **11. Drug-Drug Interactions - I & II** • Explain types of drug interactions • Discuss the pharmacokinetic and pharmacodynamics drug interactions • Describe potentiation, synergism, summation, additive effects and drug antagonism with examples

	12. Introduction to Autonomic Pharmacology • Give a brief overview of organization of Autonomic Nervous System, its innervations, functions, biosynthesis of neurotransmitters and their anatomic locations • Describe autonomic receptor types and their effects caused either by activation or inhibition **13. Parasympatho-mimetic Drugs** • Give a brief review of cholinergic nerves, characteristics and subtypes of cholinoceptors • Classify cholinoceptor stimulants • Describe the mode of action, clinical uses and adverse effects of cholinoceptor stimulants **14. Parasympatholytic Drugs-I** • Classify anti-cholinergic drugs • Describe their pharmacokinetics &pharmacodynamics, clinical uses, adverse effects and contraindications **15. Parasympatholytic Drugs-II (Skeletal Muscle Relaxants/ Ganglion-Blocking Drugs)** • Explain the basic & clinical pharmacology of skeletal muscle relaxants and ganglion-blocking drugs **16. Sympathomimetic Drugs** • Give a brief review of adrenoreceptor types and their subtypes • Classify sympathomimetic drugs • Discuss their clinical uses, adverse effects, and contraindications **17. Sympatholytic Drugs- I & II** • Classify alpha (α) and beta (β)-adrenoceptor antagonists • Explain pharmacokinetics and pharmacodynamics, clinical

	uses, adverse effects and contraindications of adrenergic antagonists
TUTORIALS COMMUNITY MEDICINE	**1. Demographic Equations** • Apply the demographic balancing equation to estimate population changes using data on births, deaths, immigration, and emigration. • Calculate population doubling time using the Rule of 70 and growth rate. • Explain the concept of population momentum and its causes. **2. Measures of morbidity and mortality** • Calculate incidence and prevalence rates using given population data • Define mortality and describe key measures such as crude death rate, age-specific death rate, and infant mortality rate. **3. Screening** • Calculate sensitivity, specificity, positive predictive value (PPV), and negative predictive value (NPV) using 2x2 contingency tables. • Interpret calculated screening measures to assess the performance of a screening test.
FORENSIC MEDICINE	**1. General Toxicology** • Define Toxicology • Classify poisons based on chief symptoms and medico legal criteria • Explain the International toxicity rating of poisons **2. General Toxicology** • Define a poison • Differentiate between poison and a medicine

	• Explain routes of administration and excretion of poisons • List the factors that modify action of poisons • Explain the diagnosis of poisoning in living &dead **3. General Toxicology** • Discuss the duties of a doctor in a case of suspected poisoning • List the general principles of treatment of poisoning viz. Gastric lavage, Antidote therapy **4. General Toxicology** • Discuss the role of poisoning Information Centre in treatment of cases of poisoning **5. Postmortem report writing/ Autopsy Protocols** • Describe the protocols of a medico legal autopsy • Write a Postmortem Report according to WHO guidelines, based on a minimum of five scenarios **6. Autopsy hazards** • Discuss the hazards related to autopsy, and the methods to prevent these hazards **7. Traumatology** • -Draft a medico-legal report for cases of simple and grievous hurt, based on a minimum of three scenarios. **8. Crime scene investigation** Discuss the important aspects of crime scene investigation, Trace evidence and Locard's principle of exchange

PATHOLOGY	**1. Cell Adaptations, Apoptosis and Necrosis** • Discuss the morphological features of hypertrophy, hyperplasia, atrophy, metaplasia • Tabulate the differences between necrosis and apoptosis • Identify morphologic changes in cell injury culminating in necrosis and apoptosis • Discuss morphologically distinct patterns of necrosis including coagulative necrosis, liquefactive necrosis, gangrenous necrosis, caseous necrosis, fat necrosis, and fibrinoid necrosis

	2. Inflammation • Discuss the morphological aspects of various types of acute, chronic and granulomatous inflammation **3. Neoplasia** • Discuss the classification of neoplasia • Discuss the morphological aspects of different types of benign and malignant tumors. **4. Molecular diagnostic techniques** • List the indications for analysis of Inherited and acquired genetic alterations • Summarise the basic principles of recombinant genetic techniques (PCR, FISH, RFLP, (BLOTTING) and their applications in the detection of genetic diseases

PHARMACOLOGY	**1. Terms & abbreviations used in Pharmacology** • Explain the use of metric and apothecary systems of measurement in drug preparation • Discuss various terms &abbreviations and their uses in rationale prescription writing. **2. Dosage forms of drugs** • Discuss the classification, clinical usage and properties of different drug dosage forms. **3. Routes of drug administration, sources and active principles of drugs** • Explain various routes of drug administration, sources of drugs and active principles of drugs. **4. Standard format of prescription writing** • Discuss the importance and standard format of prescription writing **5. Absorption, Bioavailability, Distribution and Biotransformation of Drug**

	• Explain the process of drug absorption, bioavailability, drug distribution and biotransformation and factors that could modify them **6. Drug dosage calculations** • Explain the various formulae used to calculate the drug dosages • Calculate the drug dosage for patients having varying ages and body weights **7. Drug receptors and mode of action of drugs** • Explain drug receptors and mechanisms of action of drugs **8. Concepts of Autonomic Nervous System (ANS) &autonomic receptors** • Explain the general concept of ANS and autonomic receptors. **9. Parasympathomimetic and Parasympatholytic drugs** • Discuss the classification, pharmacokinetics &pharmacodynamics of parasympathomimetic and parasympatholytic drugs **10. Sympathomimetic and sympatholytic drugs** • Discuss the classification, pharmacokinetics, and pharmacodynamics of sympathomimetic and sympatholytic drugs
PRACTICALS **MICROBIOLOGY**	**1. Microscope and staining techniques with its types** • Identify different parts of microscope • Use of microscope in identification of histopathological specimens and micro-organisms • Name different kinds of stains and staining techniques • Simple staining and its procedure • Gram Staining and its procedure **2. Culture Media, Biochemical tests related to Gram positive organisms**

	• Name the various culture media required for bacterial identification • Discuss the properties, characteristics and relevance of various culture media • List biochemical tests related to Gram positive organisms • Describe the principle and procedure of catalase and coagulase tests **3. Bacterial structure, Pathogenesis and Antimicrobial susceptibility testing** • Briefly discuss the bacterial structure • Briefly discuss the bacterial pathogenesis • Discribe the procedure of Antimicrobial susceptibility testing **4. Sterilization & Disinfection** • Identify the apparatus for sterilization &disinfection • Discuss the uses of various disinfectants
PHARMACOLOGY	**1. Preparation of Physiological Salt Solutions (Tyrode, Ringer, Kerb`s and De-Jalon`s solution)** • Demonstrate the preparation of various physiological salt solutions listed above • Describe their composition and experimental uses • Explain the methods of calculation for solutions preparation of different strengths used experimentally **2. Preparation of ORS and 5% dextrose solution** • Prepare ORS and 5% dextrose solutions along with their composition • Discuss their uses in clinical practice • Explain the methods of calculation for solution preparation of different strengths used clinically • Calculate the deficit and replacement of fluids &electrolytes **3. Introduction to Power Lab System**

	• Identify various parts of Power Lab System • Describe their functions in detail to perform relevant experiments **4. Effect of drugs on Rabbit's eye** • Demonstrate the effects of atropine, adrenaline, ephedrine and pilocarpine on rabbit's eye **5. Effects of Drugs on the Frog's Rectus Abdominis Muscle** • Demonstrate effects of drugs on isolated skeletal muscle (Rectus Abdominis muscle of frog) by using Power Lab System • Explain the effects of Acetylcholine, Carbachol, Methacholine acting as skeletal muscle relaxants
SKILLS LAB	I- **Bleeding** • Demonstrate the appropriate methods of managing external bleeding (Direct pressure, compressing pressure points elevation) II- **Soft Tissue Injuries** • Demonstrate proper management of wounds including assessment, cleaning and dressing (head, forearm and hand, leg and ankle) III- **Vertebral Column Injury** • Demonstrate correct rolls, moves and lifts in transporting a patient to avoid spinal cord injury (log roll, spine stabilization) IV- **Bony Injuries (Fractures)** • Demonstrate the correct method of splinting fractures in the leg and arm **EQUIPMENT/MATERIAL NEEDED** **A- FIRST AID KIT** i. Bandages (crepe-2, 4 & 6 inches, cotton, triangular) ii. Surgical sterile gauze & sofra tulle iii. Safety pins (diff. sizes) iv. Scissor

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)
MODULE EVALUATION	• Course will be evaluated through a feedback form which will be posted on the JSMU website