
# KERALA UNIVERSITY OF HEALTH SCIENCES

## Syllabus for

## BACHELOR OF MEDICINE AND BACHELOR OF SURGERY (MBBS) Course

### Course Code 001

## Vol 2

## Microbiology, Pathology and Pharmacology

2019 Academic year onwards

# Contents

# Microbiology

# Microbiology

## A. GOAL

The broad goal of the teaching of undergraduate students in Microbiology is to provide an understanding of the natural history of infectious diseases to deal with the etiology, pathogenesis, laboratory diagnosis, treatment and prevention of infections in hospital and community.

B. OBJECTIVES

1. Competencies

At the end of course, the student shall

- **a.** Understand the role of microorganisms in health and disease.
- **b.** Understand the immunological mechanism in health and disease.
- **c.** Understand the epidemiology, pathogenesis, clinical features, diagnosis, treatment and prevention of infectious diseases.
- **d.** Understand the basic concepts of hospital infection control and Biomedical waste management.
- **e.** Choose appropriate laboratory investigations and interpret it for the diagnosis of the infectious diseases.
- **f.** Understand the basis of Antibiotic Stewardship programme.
- **g.** To understand the National control programs for infectious diseases: NTEP, NACP, Malaria control programme, Universal Immunisation programme and others.
- **h.** Select and apply appropriate sterilisation and disinfection methods for prevention of infections.
- **i.** Recommend laboratory investigation regarding microbiological testing of water, air, milk and food.

2. Integration

The teaching should be aligned and integrated horizontally and vertically in organ system with emphasis on host microbe –environment interactions and their alterations in health and disease to provide an overall understanding of infectious diseases, their diagnosis, treatment and prevention.

| Lectures | Small group learning Tutorials/Seminars/Integrated learning) | Self-directed learning | Total |
|---|---|---|---|
| **70 hours** | **135 hours** | **10 hours** | **215 hours** |

| Sl. No | Systems | No. of Lectures | Hrs |
|---|---|---|---|
| 1 | General Microbiology and Immunology | 21 | 21 |
| 2. | CVS and blood stream infections | 6 | 7 |
| 3. | GIT and Hepatobiliary infections | 7 | 6 |
| 4. | Musculoskeletal and Skin soft tissue infections | 8 | 9 |
| 5. | Central Nervous system infections | 5 | 6 |
| 6. | Respiratory infections | 7 | 9 |
| 7. | Genitourinary and Sexually transmitted Infections | 3 | 4 |
| 8. | Zoonotic and Miscellaneous infections | 7 | 8 |
| | **TOTAL** | **64** | **70** |

**Abbreviations**

| | | |
|---|---|---|
| **L** | **:** | Lecture |
| **SGD** | **:** | Small Group Discussion |
| **SEM** | **:** | Seminar |
| **DOAP** | **:** | Demonstrate, Observe, Assess and Perform |

**System wise Total Small group learning. (Tutorials / Seminars / Integrated learning / DOAP / Practical:**

| Sl. No. | Systems | No. of SGT / Seminars | Hrs. | DOAP Session / Practical | Hrs. |
|---|---|---|---|---|---|
| 1 | General Microbiology and Immunology | 5 | 7 | 12 | 17 |
| 2. | CVS and Hematology | 8 | 13 | 4 | 7 |
| 3. | GIT and Hepatobiliary | 8 | 19 | 4 | 12 |
| 4. | Musculoskeletal and Skin, soft tissue | 1 | 6 | 1 | 3 |
| 5. | Central Nervous System | 1 | 4 | 1 | 2 |
| 6. | Respiratory System | 4 | 6 | 2 | 6 |
| 7. | Genitourinary and Sexually Transmitted Infections | 2 | 2 | | 2 |
| 8. | Zoonotic and miscellaneous | 7 | 10 | 7 | 19 |
| | **TOTAL** | **36** | **67** | **31** | **68** |
| | **GRAND TOTAL** | **135** | | | |

**SDL (Self Directed Learning):**

| Sl, No | Topics | No. of hours |
|---|---|---|
| 1 | ELISA test | 1 |
| 2 | PCR test | 1 |
| 3 | Needle stick Injury | 1 |
| 4 | Microbial agents of bioterrorism | 1 |
| 5 | HAI Surveillance | 1 |
| 6 | Antimicrobial agents | 1 |
| 7 | Methods of detection of Antimicrobial resistance | 1 |
| 8 | Transfusion transmitted infections | 1 |
| 9 | Vector borne and ectoparasitic infections | 1 |
| 10 | Ocular and ear infections | 1 |
| | **Total** | **10** |

**Lectures: 70**

| No | COMPETENCY The student should be able to | Lectures | Topics | Hrs. |
|---|---|---|---|---|
| **Topic: General Microbiology and Immunity Number of competencies: (11) Number of procedures that require certification: (01)** | | | | |
| MI1.1 | Describe the different causative agents of infectious diseases, the methods used in their detection | L | 1. Introduction and history of Microbiology<br>2. Bacterial Morphology and Physiology of bacteria<br>3. Overview of bacterial infections<br>4. Pathogenesis and Lab diagnosis of bacterial infections<br>5. Introduction to virology<br>6. Lab diagnosis of viral infections<br>7. Introduction to mycology and overview of fungal infections<br>8. Introduction to parasitology and overview of parasitic infections | 8 |
| MI1.3 | Describe the epidemiological basis of common infectious diseases | L | 9. Normal microbial flora and Infection | 1 |
| MI1.4 | Classify and describe the different methods of sterilization and disinfection. Discuss the application of the different methods in the laboratory, in clinical and surgical practice | L | 10. Sterilisation<br>11. Disinfection | 2 |
| MI1.6 | Describe the mechanisms of drug resistance and the methods of antimicrobial susceptibility testing and monitoring of antimicrobial Therapy | L | 12. Bacterial Genetics<br>13. Mechanisms of Antimicrobial resistance | 2 |
| MI1.7 | Describe the immunological mechanisms in health | L | 14. Immunity<br>15. Antigen & Antibody<br>16. Complement | 4 |

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|---|---|---|---|---|
| MI1.8 | Describe the mechanisms of immunity and response of the host immune system to infections | L | 17. Structure and Function of Immune System<br>18. Immune response | 3 |
| MI1.9 | Discuss the immunological basis of vaccines and describe the Universal Immunisation Schedule | L | 19. Immunoprophylaxis | 1 |
| MI1.10 | Describe the immunological mechanisms in immunological disorders (hypersensitivity, autoimmune disorders and immunodeficiency states) and discuss the laboratory methods used in detection. | | 20. Hypersensitivity<br>21. Autoimmunity | Horizontal Integration: Pathology |
| MI1.11 | Describe the immunological mechanisms of transplantation and tumor Immunity | | 22. Immunology of Transplantation<br>23. Tumour Immunity and Immune deficiency disorders | |
| | **TOTAL** | | **21** | **21** |
| | | | | |
| **Topic: CVS and Blood Number of competencies: (7) Number of procedures that require certification: (NIL)** | | | | |
| MI2.1 | Describe the etiologic agents in rheumatic fever and their diagnosis | L | 1.Overview of CVS (Rheumatic fever and Infective endocarditis) and blood stream infections | 1 |
| MI2.2 | Describe the classification, etiopathogenesis, clinical features and discuss the diagnostic modalities of Infective endocarditis | L | | |

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|---|---|---|---|---|
| MI3.3 | Describe the enteric fever pathogens and discuss the evolution of the clinical course and the laboratory diagnosis of the diseases caused by them | | 2. Rickettsial infections<br>3. Miscellaneous bacterial blood stream infections. (Brucellosis, Leptospirosis, Borreliosis)<br>4. Systemic Candidiasis and systemic fungal infections<br>5. Enteric fever | 3<br><br><br><br>1 |
| MI2.4 | List the common microbial agents causing anemia. Describe the morphology, mode of infection and discuss the pathogenesis, clinical course, diagnosis, prevention and treatment of the common microbial agents causing Anemia | L | 6. Viral haemorrhagic fevers ( Dengue fever, Chikungunya and others) | 2 |
| | **TOTAL** | | **6** | **7** |
| **Topic: Gastrointestinal and hepatobiliary system Number of competencies: (8) Number of procedures that require certification: (NIL)** | | | | |
| MI3.1 | Enumerate the microbial agents causing diarrhea and dysentery. Describe the epidemiology, morphology, pathogenesis, clinical features and diagnostic modalities of these agents | L | 1. Overview of Gastrointestinal infections<br>2. Gastrointestinal infections due to Enterobacteriaceae (E. coli, Shigella, Yersinia, Non typhoidal Salmonella)<br>3. Vibrio<br>4. Viral gastroenteritis | 3 |
| MI3.5 | Enumerate the causative agents of food poisoning and discuss the pathogenesis, clinical course and laboratory diagnosis | L | 5. Food poisoning ( S.Aureus, Cl. botulinum, Bacillus cereus and others) | 1 |
| MI3.6 | Describe the etiopathogenesis of Acid Peptic Disease (APD) and the clinical course. Discuss the diagnosis and management of the causative agent of APD | L | 6. Miscellaneous bacterial infections of GIT (Helicobacter, Campylobacter and Cl. Difficile) | 1 |
| MI3.7 | Describe the epidemiology, etio-pathogenesis and discuss the viral markers in the evolution of Viral hepatitis. Discuss the modalities in the diagnosis and prevention of viral hepatitis | L | 7. Overview of infections of hepatobiliary system | 1 |
| | **TOTAL** | | **7** | **6** |

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|---|---|---|---|---|
| **Topic: Musculoskeletal system, skin and soft tissue infections Number of competencies: (3) Number of procedures that require certification:(NIL)** | | | | |
| MI4.1 | Enumerate the microbial agents causing anaerobic infections. Describe the etiopathogenesis, clinical course and discuss the laboratory diagnosis of anaerobic infections | L | 1. Cl. perfringens and infections due to non-sporing anaerobes | 1 |
| MI4.2, MI4.3 | Describe the etiopathogenesis, clinical course and discuss the laboratory diagnosis of skin and soft tissue, bone & joint infections | L | 2. Overview of skin, soft tissue and musculoskeletal infections<br>3. Staphylococcal infections<br>4. Streptococcal infections<br>5. Leprosy and Miscellaneous bacterial infections of skin and soft tissue (Anthrax, Actinomycosis, Nocardiosis, Non venereal trepanomatosis, Non Tuberculous Mycobacteria causing skin infections and others)<br>6. Viral exanthems – Herpes viruses<br>7. Other cutaneous viral infections (Pox virus, Parvo virus, Measles, Rubella, Coxsackie virus and others)<br>8. Fungal infections of skin, soft tissue and musculoskeletal system (Superficial mycosis- Dermatophytes, Sub cutaneous mycosis, Candidiasis | 8 |
| | **TOTAL** | | **8** | **9** |
| | | | | |
| **Topic: Central Nervous System infections Number of competencies:(3) Number of procedures that Require certification: (NIL)** | | | | |
| MI5.1 | Describe the etiopathogenesis, clinical course and discuss the laboratory diagnosis of Meningitis | L | 1. Overview of CNS infections, Fungal infections of CNS (Cryptococcal meningitis)<br>2. Bacterial meningitis<br>3. Viral meningitis and myelitis (Poliomyelitis, Coxsackie and others)<br>4. Tetanus | 4 |

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| MI5.2 | Describe the etiopathogenesis, clinical course and discuss the laboratory diagnosis of Encephalitis | L | 5. Viral encephalitis class 1- Rabies virus<br>6. Viral encephalitis class 2 – HSV, Arboviral, Nipah V, Hendra V, Slow virus, Prions | 2 |
| | **TOTAL** | | **6** | **6** |
| | | | | |
| **Topic: Respiratory tract infections Number of competencies:(3) Number of procedures that require certification:(02)** | | | | |
| MI6.1 | Describe the etio-pathogenesis, laboratory diagnosis and prevention of Infections of upper and lower respiratory tract | L | 1. Overview of respiratory tract infections – fungal and parasitic infections of respiratory tract<br>2. Bacterial pharyngitis – Strep.pyogenes, C. diphtheriae<br>3. Bacterial lobar pneumonia- Streptococcus pneumoniae, Klebsiella pneumoniae, H. influenzae and Atypical pneumonia ( Mycoplasma, Chlamydia, Legionella)<br>4. Tuberculosis and Non tuberculous mycobacterial infections<br>5. Pertussis and infections due to non-fermenting GNB<br>6. Myxovirus infections of the respiratory tract-Orthomyxovirus & Paramyxovirus<br>7. COVID-19 and miscellaneous viral infections of the respiratory tract | 9 |
| | **TOTAL** | | **7** | **9** |
| | | | | |
| **Topic: Genitourinary & Sexually transmitted infections Number of competencies:(3) Number of procedures that require certification:(NIL)** | | | | |
| MI7.1 | Describe the etio-pathogenesis and discuss the laboratory diagnosis of infections of genitourinary System | L | 1. Gonorrhoea, NGU, Vulvovaginitis and other genital tract infections | 1 |

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|---|---|---|---|---|
| MI7.2 | Describe the etio-pathogenesis and discuss the laboratory diagnosis of sexually transmitted infections. Recommend preventive measures | L | 2. Ulcerative genital disease – Syphilis, LGV, genital Herpes, Granuloma inguinale and soft chancre | 2 |
| MI7.3 | Describe the etio-pathogenesis, clinical features, the appropriate method for specimen collection, and discuss the laboratory diagnosis of urinary tract infections | L | 3. UTI | 1 |
| | **TOTAL** | | **3** | **4** |
| | | | | |
| **Topic: Zoonotic diseases and miscellaneous. Number of competencies:(16) Number of procedures that require certification:(01)** | | | | |
| MI8.1 | Enumerate the microbial agents and their vectors causing Zoonotic diseases. Describe the morphology, mode of transmission, pathogenesis and discuss the clinical course laboratory diagnosis and Prevention | L | 1. Overview of zoonotic diseases | 1 |
| MI8.2 | Describe the etio-pathogenesis of opportunistic infections(OI) and discuss the factors contributing to the occurrence of OI, and the laboratory diagnosis | L | 2. Overview of opportunistic diseases | 1 |
| MI8.3 | Describe the role of oncogenic viruses in the evolution of virus associated malignancy | L | 3. Oncogenic viral infections and congenital infections<br>4. Emerging and reemerging infections | 2 |

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| MI8.4 | Describe the etiologic agents of emerging infectious diseases. Discuss the clinical course and Diagnosis | L | | |
| 8 | Define Health Care Associated Infections (HAI) and enumerate the types. Discuss the factors that contribute to the development of HAI and the methods for prevention | L | 5. Health care associated infections | 2 |
| MI8.6 | Describe the basics of infection control | L | 6. Infection prevention and control, Biomedical waste management | 1 |
| MI8.8 | Describe the methods used and significance of assessing the microbial contamination of food, water and air | L | 7. Microbiology of Food, water and Air, Environmental surveillance | 1 |
| | **TOTAL** | | **7** | **8** |

## Small group learning (Tutorials/Seminars/Integrated learning/ DOAP/Practical: (110Hrs)

| No | COMPETENCY<br>The student should be able to | Small group learning (Tutorials/Seminars/ Integrated learning) | No. of Hrs | Practical/ DOAP | No. of Hrs |
|---|---|---|---|---|---|
| **Topic: General Microbiology and Immunity Number of competencies:(11) Number of procedures that require certification:(01)** | | | | | |
| MI1.1 | Describe the different causative agents of infectious diseases the methods used in their detection | | | 1. Culture Media (SGL-Demonstration)<br>2. Culture methods (SGL-Demonstration)<br>3. Identification of bacteria (SGL-Demonstration) | 3 |

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|---|---|---|---|---|---|
| MI1.2 | Perform and identify the different causative agents of Infectious diseases by Gram Stain, ZN stain and stool routine microscopy | 1. Lab diagnosis of infections(SGD) | 1 | 4. Morphology of Bacteria (2) (SGL- Demonstration)<br>5. Simple staining(DOAP)<br>6. Gram staining (DOAP)<br>7. ZN Staining(DOAP) | |
| MI1.4 | Classify and describe the different methods of sterilization and disinfection. Discuss the application of the different methods in the laboratory, clinical and surgical practical | 2. Sterilisation (SGD) | 2 | 8. Sterilisation (SGL- Demonstration) | 1 |
| MI1.5 | Choose the most appropriate method of sterilization and disinfection to be used in specific situations in the laboratory, in clinical and surgical Practice | 3. Disinfection (Lab, OT, OPD) (SGD) | 2 | 9. Disinfection (SGL- Demonstration)<br>10. Exercise on selection of appropriate method of sterilization and disinfection | 2 |
| MI1.6 | Describe the mechanisms of drug resistance, and the methods of antimicrobial susceptibility testing and monitoring of antimicrobial Therapy | 4. Antimicrobial stewardship(SGD) | 1 | 11. Antimicrobial susceptibility testing (SGL- Demonstration) | 1 |
| MI1.7 | Describe the immunological mechanisms in health | 5. Serological reactions (SGD) | 1 | 12. Serological reactions (SGL- Demonstration) | 1 |
| MI1.10 | Describe the immunological mechanisms in immunological disorder ( hypersensitivity, autoimmune disorders and immunodeficiency states) and discuss the laboratory methods used in detection | | | 13. ELISA and Western blot test (SGL – Demonstration) | 1 |
| MI1.9 | Discuss the immunological basis of vaccines and describe the Universal Immunisation schedule | | | 14. Vaccines (SGL- Demonstration) | 1 |
| | **TOTAL** | **5** | **7** | **14** | **17** |

| **Topic: CVS and Blood** | **Number of competencies:(7)** | **Number of procedures that require certification:(NIL)** | | | |
|---|---|---|---|---|---|
| MI2.1 | Describe the etiological agents in rheumatic fever and their diagnosis | 1. Causative agents of Rheumatic Fever and its diagnosis (SGD) | 1 | | |
| MI2.2 | Describe the classification, etio-pathogenesis, clinical features and discuss the diagnostic modalities of Infective endocarditis | 2. Discuss the diagnostic modalities of Infective endocarditis (SGD) | 1 | | |
| MI2.3 | Identify the microbial agents causing Rheumatic Heart Disease & infective Endocarditis | 1 | | 1. Gram staining- Streptococcus, Pneumococcus and Enterococcus (DOAP) | 2 |
| MI2.5 | Describe the etio-pathogenesis and discuss the clinical evolution and the laboratory diagnosis of anaemia causing parasites Kala azar, Malaria, Filariasis and other common parasites prevalent in India | 3. Malaria (Seminar)<br>4. Leishmania(Seminar)<br>5. Filariasis (Seminar)<br>6. Trypanosoma (Seminar)<br>7. Babesia (Seminar) | 9 | 2.Library study | 1 |
| MI2.6 | Identify the causative agents of malaria and filariasis | | | 3. Demonstration of blood smears | 1 |
| MI2.7 | Describe the epidemiology, etio- pathogenesis, evolution, complications, opportunistic infections, diagnosis, prevention and principles of management of HIV | 8. HIV (2) (Integration) | 2 | 4.Lab diagnosis of HIV (SGL-Demonstration)<br>5. Visit to ICTC<br>6.Museum study | 3 |
| | **TOTAL** | **8** | **13** | **6** | **7** |
| | | | | | |

| **Topic: Gastrointestinal and hepatobiliary system Number of competencies:(8) Number of procedures that require certification:(NIL)** | | | | | |
|---|---|---|---|---|---|
| MI3.1 | Enumerate the agents causing diarrhea and dysentery. Describe the epidemiology, morphology, pathogenesis, clinical features and diagnostic modalities of these agents | 1. Amoebiasis (Seminar)<br>2. Giardiasis (Seminar)<br>3. Coccidian parasitic infections (Seminar)<br>4. Intestinal cestodes (Seminar)<br>5. Intestinal trematodes (Seminar)<br>6. Intestinal nematodes (Seminar) | 13 | 1. Lab diagnosis of bacterial and parasitic Gastro intestinal infections (SGL-Demonstration)<br>2. Library visit | 7 |
| MI3.2 | Identify the common etiological agents of diarrhea and dysentery | | | 3. Stool examination (SGL-Demonstration) | 1 |
| MI3.4 | Identify the different modalities for diagnosis of enteric fever. Choose the appropriate test related to the duration of illness | | | 4. Lab diagnosis of Enteric fever (SGL-Demonstration) | 2 |
| MI3.7 | Describe the epidemiology, the etio-pathogenesis and discuss the viral markers in the evolution of Viral hepatitis. Discuss the modalities in the diagnosis and prevention of viral hepatitis | 7. Viral Hepatitis (A, B,C,D,E and G ) (Integration) | 2 | 5.Museum study | 1 |
| MI3.8 | Choose the appropriate laboratory test in the diagnosis of viral hepatitis with emphasis on viral Markers | | | 6.Lab diagnosis of viral infections(SGL- Demonstration) | 1 |
| | | 8. Parasitic infections of the liver ( Echinococcosis, Trematodes affecting liver and others) (Seminar) | 4 | | |
| | **TOTAL** | **8** | **19** | **6** | **12** |

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|---|---|---|---|---|---|
| **Topic: Musculoskeletal system, skin and soft tissue infections Number of competencies:(3) Number of procedures that require certification :(NIL)** | | | | | |
| MI4.1 | Enumerate the microbial agents causing anaerobic infections. Describe the etiopathogenesis, clinical course and discuss the laboratory diagnosis of anaerobic infections | | | 1. Lab diagnosis of anaerobic infections (SGL-Demonstration) | 1 |
| MI4.3 | Describe the etio-pathogenesis of infections of skin and soft tissue and discuss the clinical course<br>and the laboratory diagnosis | (Seminar)<br>1. Parasitic infections – Cutaneous leishmaniasis, Cysticercosis, Tissue nematodes (Filarial Tissue nematodes, Dracunculus medinenesis, Trichinella spiralis), Larva migrans | 6 | 2. Lab diagnosis of skin and soft tissue infections (SGL-Demonstration) | 2 |
| | **TOTAL** | **1** | **6** | **2** | **3** |
| | | | | | |
| **Topic: Central Nervous System infections Number of competencies:(3) Number of procedures that require certification:(NIL)** | | | | | |
| MI5.3 | Identify the microbial agents causing meningitis | 1. Parasitic infections of the CNS ( Seminar) | 4 | 1. Lab diagnosis of CNS infections (SGL-Demonstration) | 2 |
| | **TOTAL** | **1** | **4** | **1** | **2** |
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| **Topic: Respiratory tract infections Number of competencies:(3) Number of procedures that require certification:(02)** | | | | | |
| MI6.1 | Describe the etio-pathogenesis, laboratory diagnosis and prevention of infections of upper and lower respiratory tract | 1. Mycobacterium tuberculosis (Integration)<br>2. Parasitic infections of the respiratory tract ( Seminar) | 2<br>2 | | |
| MI6.2 | Identify the common etiologic agents of upper respiratory tract infections (Gram stain) | 3. Lab diagnosis of URTI (SGD) | 1 | 1. Lab diagnosis of URTI (SGL-Demonstration)<br>2. Lab diagnosis of LRTI (SGL-Demonstration)<br>3. Gram staining<br>4. Acid fast staining | 6 |
| MI6.3 | Identify the common etiologic agents of lower respiratory tract infections (Gram Stain & Acid fast stain) | 4. Lab diagnosis of LRTI (SGD) | 1 | | |
| | **TOTAL** | **4** | **6** | **4** | **6** |
| | | | | | |
| **Topic: Genitourinary &Sexually transmitted infections Number of competencies:(3) Number of procedures that require certification :(NIL)** | | | | | |
| MI7.1 | Describe the etio-pathogenesis and discuss the laboratory diagnosis of infections of genitourinary System | 1.Lab diagnosis of UTI (SGD) | 1 | .1. Lab diagnosis of UTI (SGL-Demonstration) | 1 |
| MI7.2 | Describe the etio-pathogenesis and discuss the laboratory diagnosis of sexually transmitted infections. Recommend Preventive measures | 2.Lab diagnosis of STI (SGD) | 1 | 2. Lab diagnosis of STI (SGL-Demonstration) | 1 |
| | **TOTAL** | **2** | **2** | **2** | **2** |

| **Topic: Zoonotic diseases and miscellaneous Number of competencies:(16)** | | | | **Number of procedures that require certification:(01)** | |
|---|---|---|---|---|---|
| MI8.1 | Enumerate the microbial agents and vectors causing zoonotic diseases. Describe the morphology, modes of transmission , pathogenesis and discuss the clinical course, laboratory diagnosis and prevention | | | 1.Lab diagnosis of Zoonosis (SGL-Demonstration) | 2 |
| MI8.2 | Describe the etio pathogenesis of opportunistic infections (OI) and discuss the factors contributing to the occurrence of OI and the lab diagnosis | | | 2.Lab diagnosis of OI (SGL-Demonstration) | 2 |
| MI8.5 | Define Healthcare Associated Infections(HAI) and enumerate the types. Discuss the factors that contribute to the Development of HAI and the methods for prevention | 1. Bundle care approach (SGD) | 2 | | |
| MI8.7 | Demonstrate Infection control practices and use of Personal Protective Equipment (PPE) | | | 3.Hand hygiene (DOAP)<br>4.USE of PPE(DOAP)<br>5.Biomedical waste management (DOAP)<br>6.Post exposure prophylaxis(DOAP)<br>7.Vaccines(SGL- Demonstration) | 9 |
| MI8.9 | Discuss the appropriate method of collection of samples in the performance of laboratory tests in the detection of microbial agents causing infectious Diseases | | | 8. Collection and transport of specimens for culture(SGL-Demonstration) | 2 |

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|---|---|---|---|---|---|
| MI8.10 | Demonstrate the appropriate method of collection of samples in the performance of laboratory tests in the detection of microbial agents causing Infectious diseases | | | 9.Collection and transport of specimens for serology and molecular tests(SGL-Demonstration) | 2 |
| MI8.11 | Demonstrate respect for patient samples sent to the laboratory for performance of laboratory tests in the detection of microbial agents causing infectious Diseases | 2.Confidentiality pertaining to patient identity in laboratory results (SGD).<br><br>3. AETCOM in Microbiology (SGD) | 4 | | |
| MI8.12 | Discuss confidentiality pertaining to patient identity in laboratory results | | | | |
| MI8.13 | Choose the appropriate laboratory test in the diagnosis of the infectious disease | 4. Appropriate laboratory test in the diagnosis of the infectious disease (SGD) | 1 | 10.Exercise- Interpretation of lab reports (SGL –Demonstration) | 1 |
| MI8.15 | Choose and interpret the results of the laboratory tests used in diagnosis of the infectious disease | 5.Molecular tests (SGD)<br><br>6.Serological Reactions (SGD) | 1<br>1 | 11.Exercise- Interpretation of lab reports (SGL –Demonstration) | 1 |
| MI8.16 | Describe the National Health Programs in the prevention of common infectious disease. | 7.National Health Programmes (SGD) | 1 | | |
| | **TOTAL** | **7** | **10** | **11** | **19** |

**Format for Internal assessment examinations**

| Sl. No. | Exam | Theory | Practical |
|---|---|---|---|
| 1. | 1st Internal assessment examination (PCT 1) | 100 | 100 |
| 2. | 2nd Internal assessment examination (PCT 2) | 100 | 100 |
| 2. | Model examination (Prelims) | 200 | 100 |
| | **Total** | **400** | **300** |

- Model examination pattern will be as per University examination.
- Respective colleges/departments will conduct formative assessments/ internal assessment examinations and maintain records of the same. Individual institutions have the liberty to make necessary adjustments of teaching /learning methods, provided the total number suggested by NMC is not altered.

**TOPIC SPLIT UP**

TOPICS FOR THEORY PAPER-I

A. General Microbiology
B. Immunology
C. Hospital infection control
D. Infections of blood stream and cardiovascular system
E. Infections of skin, soft tissues and musculoskeletal system
F. Genitourinary and sexually transmitted infections
G. AETCOM

TOPICS FOR THEORY PAPER-II

A. Infections of gastrointestinal and hepatobiliary system
B. Infections of respiratory system
C. Infections of central nervous system

D. Miscellaneous topics (Opportunistic infections, Zoonosis, Congenital infections, Anaerobic infections, Oncogenic viruses, Emerging and Re-emerging diseases etc.)

E. AETCOM

| **THEORY PAPER MARK SPLIT UP - PAPER 1** | | |
|---|---|---|
| **Sl. no** | **TOPICS** | **Max. percentage of marks allotted** |
| 1 | General Microbiology, Immunology and Hospital infection control | **45** |
| 2 | AETCOM | **5** |
| 3 | Infections of bloodstream and cardiovascular system, skin, soft tissue and musculoskeletal system, genitourinary and sexually transmitted infections. | **50** |
| | **(Split up of marks for the systems given below)** | |
| | **Bacteriology** | 15 |
| | **Virology** | 15 |
| | **Parasitology** | 10 |
| | **Mycology** | 10 |
| **THEORY PAPER MARK SPLIT UP - PAPER II** | | |
| 4 | Infections of respiratory system, gastrointestinal tract and hepatobiliary system | **60** |
| 5 | Infections of central nervous system, and miscellaneous (Opportunistic infections, Zoonosis, Congenital | **35** |
| 6 | infections, Emerging and Re-emerging diseases etc.) **AETCOM** | **5** |
| | **(Split up of marks for the systems given below)** | 35 |
| | **Bacteriology** | 35 |
| | **Virology** | 20 |
| | **Parasitology** | 5 |
| | **Mycology** | |

## Practical assessment pattern for MBBS Students

## CBME curriculum (Total marks=80)

| Sl. no | Practical | Marks |
|---|---|---|
| 1 | **Clinical case based exercise on Gram staining** | **10** |
| | 1. Staining | 3 |
| | 2. Observation with neat labelled diagram | 2 |
| | 3. Interpretation | 2 |
| | 4. Discussion | 3 |
| | | |
| 2 | **Clinical case based exercise on Acid fast staining of sputum smears** | **10** |
| | 1. Staining | 3 |
| | 2. Observation with neat labelled diagram | 2 |
| | 3. Interpretation | 2 |
| | 4. Discussion | 3 |
| | | |
| 3 | **Spotters – (Two marks each x 10 ), questions preferably clinical case based** | **20** |
| | Bacteriology-1nos | |
| | Mycology-3nos | |
| | Parasitology -4 nos. | |
| | Immunology-1 nos. | |
| | Vaccines-1 no | |
| | | |
| 4 | **Clinical case based exercise on Sample collection and transport** | **5** |
| | | |
| 5 | **OSPE ( any one)** | **5** |
| | 1. PPE – Donning and Doffing | |
| | 2. Hand hygiene- method and indication | |
| | 3. Biomedical waste management – segregation compliance | |
| | | |
| 6 | **Clinical microbiology applied exercise-(10 marks each x 3) based on clinical infection syndrome** | **30** |
| | 1. Hospital infection control | 10 |
| | Sterilization, Disinfection, Environmental surveillance, Needle stick injuries-PEP for HIV, Hepatitis B, Blood spillage, Transmission based precautions | |
| | 2. Bacteriology | 10 |
| | 3. Virology | 10 |
| | **TOTAL MARKS FOR PRACTICAL** | **80** |
| | **VIVA VOCE** | **20** |
| | **TOTAL MARKS** | **100** |

## Recommended Books

### A. Text Books:

| Sl. No. | Name of the Book | Author |
|---|---|---|
| 1 | Ananthanarayanan and Paniker's Textbook of Microbiology | R. Ananthanarayan<br>C K Jayaram Paniker |
| 2 | Complete Microbiology for MBBS | Prof. C.P.Baveja |
| 3 | Essentials of Medical Microbiology | Apurba Shastry |
| 4 | Essentials of Medical Microbiology | Rajesh Bhatia & Itchpujani |
| 5 | Principles of AMR and AMS for undergraduate students | Nitin Bansal, Abdul Gafur (E Book) |

### B. Reference Books:

| Sl. No. | Name of the Book | Author |
|---|---|---|
| 1 | Essentials of Hospital Infection Control | Apurba S Sastr, Deepashree R |
| 2 | Harrison's Principles of Internal Medicine | J Loscalzo, DL Kasper, DL Lango, AS Fauci, SL Hauser, JL Jameson |
| 3 | Mandell, Douglas, and Bennett's Principles and Practice of Infectious Diseases: 2-Volume Set | John E. Bennett MD, Raphael Dolin MD, Martin J. Blaser MD |
| 4 | Davidsons Principles and Practice of Medicine | ID Penman, SH Ralston, MWJ Strachan, RP Hobson |
| 5 | Park's Textbook of Preventive and Social Medicine | K Park |

# Pathology

# PATHOLOGY COURSE CONTENT

| Distribution of teaching hours | |
|---|---|
| **Teaching method** | **Hours** |
| Lectures | 80 |
| Small group teachings/tutorials/Integrated teaching/Practical | 165 |
| Self-directed learning | 10 |
| **Total Teaching hours** | **255** |
| | |
| AETCOM- (Attitude Ethics & Communication) 3 modules | 16 |
| Formative assessment and term examinations | 30 |

| | Topic | Competencies | Hours |
|---|---|---|---|
| 1 | Introduction to Pathology | 3 | 1 |
| 2 | Cell Injury and Adaptation | 8 | 8 |
| 3 | Amyloidosis | 2 | 3 |
| 4 | Inflammation | 4 | 6 |
| 5 | Healing and repair | 1 | 2 |
| 6 | Hemodynamic disorders | 8 | 8 |
| 7 | Neoplastic disorders | 5 | 8 |
| 8 | Basic diagnostic cytology | 3 | 4 |
| 9 | Immunopathology and AIDS | 8 | 7 |
| 10 | Infections and Infestations | 7 | 5 |
| 11 | Genetic and Paediatric diseases | 3 | 3 |
| 12 | Environmental and nutritional diseases | 4 | 3 |
| 13 | Introduction to haematology | 5 | 4 |
| 14 | Microcytic anaemia | 3 | 4 |
| 15 | Macrocytic anaemia | 4 | 4 |
| 16 | Haemolytic anaemia | 9 | 10 |
| 17 | Aplastic anaemia | 2 | 1 |
| 18 | Leukocytic disorders | 3 | 5 |
| 19 | Lymph node and Spleen | 7 | 8 |
| 20 | Plasma cell disorders | 1 | 1 |
| 21 | Haemorrhagic disorders | 5 | 5 |
| 22 | Blood banking and transfusion | 6 | 5 |

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|---|---|---|---|
| 23 | Clinical Pathology | 3 | 5 |
| 24 | Gastrointestinal tract | 16 | 14 |
| 25 | Hepatobiliary system | 9 | 8 |
| 26 | Respiratory system | 10 | 8 |
| 27 | Cardiovascular system | 12 | 10 |
| 28 | Urinary system | 18 | 12 |
| 29 | Male genital system | 6 | 6 |
| 30 | Female genital system | 12 | 12 |
| 31 | Breast | 6 | 5 |
| 32 | Endocrine system | 13 | 10 |
| 33 | Bone and Soft tissue | 6 | 4 |
| 34 | Skin | 4 | 4 |
| 35 | Central nervous system | 3 | 4 |
| 36 | Eye | 1 | 1 |

| Topic: Introduction to Pathology | Competencies: 03; Hours: 01 | | Number of procedures that require certification: (NIL) | |
|---|---|---|---|---|
| **No.** | **Competency** | **Core (Y/N)** | **Suggested TL method** | **Horizontal / Vertical Integration** |
| PA1.1 | Describe the role of a pathologist in diagnosis and management of disease | Y | Lecture, Small group discussion | |
| PA1.2 | Enumerate common definitions and terms used in Pathology | Y | Lecture, Small group discussion | |
| PA1.3 | Describe the history and evolution of Pathology | N | Lecture, Small group discussion | |
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| **Topic: Cell Injury and Adaptation** | **Competencies: 08; Hours: 08** | | **Number of procedures that require certification: (NIL)** | |
| **No.** | **Competency** | **Core (Y/N)** | **Suggested TL method** | **Horizontal / Vertical Integration** |
| PA2.1 | Demonstrate knowledge of the causes, mechanisms, types and effects of cell injury and their clinical significance | Y | Lecture, Small group discussion | |
| PA2.2 | Describe the aetiology of cell injury. Distinguish between reversible-irreversible injury: mechanisms; morphology of cell injury | Y | Lecture, Small group discussion | |
| PA2.3 | Intracellular accumulation of fats, proteins, carbohydrates, pigments | Y | Lecture, Small group discussion | |
| PA2.4 | Describe and discuss cell death- types, mechanisms, necrosis, apoptosis (basic as contrasted with necrosis), autolysis | Y | Lecture, Small group discussion | General Surgery |
| PA2.5 | Describe and discuss pathologic calcifications, gangrene | Y | Lecture, Small group discussion | General Surgery |
| PA2.6 | Describe and discuss cellular adaptations: atrophy, hypertrophy, hyperplasia, metaplasia, dysplasia | Y | Lecture, Small group discussion | |
| PA2.7 | Describe and discuss the mechanisms of cellular aging and apoptosis | N | Lecture, Small group discussion | |
| PA2.8 | Identify and describe various forms of cell injuries, their manifestations and consequences in gross and microscopic specimens | Y | DOAP session | |
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| **Topic: Amyloidosis** | **Competencies: 02; Hours: 03** | | **Number of procedures that require certification: (NIL)** | |
| **No.** | **Competency** | **Core (Y/N)** | **Suggested TL method** | **Horizontal / Vertical Integration** |
| PA3.1 | Describe the pathogenesis and pathology of amyloidosis | Y | Lecture, Small group discussion | |
| PA3.2 | Identify and describe amyloidosis in a pathology specimen | N | DOAP session | |

| Topic: Inflammation | Competencies: 04; Hours: 06 | | Number of procedures that require certification: (NIL) | |
|---|---|---|---|---|
| **No.** | **Competency** | **Core (Y/N)** | **Suggested TL method** | **Horizontal / Vertical Integration** |
| PA4.1 | Define and describe the general features of acute and chronic inflammation including stimuli, vascular and cellular events | Y | Lecture, Small group discussion | General Surgery |
| PA4.2 | Enumerate and describe the mediators of acute inflammation | Y | Lecture, Small group discussion | General Surgery |
| PA4.3 | Define and describe chronic inflammation including causes, types, non-specific and granulomatous; and enumerate examples of each | Y | Lecture, Small group discussion | |
| PA4.4 | Identify and describe acute and chronic inflammation in gross and microscopic specimens | Y | DOAP session | |
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| **Topic: Healing and repair** | **Competencies: 01; Hours: 02** | | **Number of procedures that require certification: (NIL)** | |
| **No.** | **Competency** | **Core (Y/N)** | **Suggested TL method** | **Horizontal / Vertical Integration** |
| PA5.1 | Define and describe the process of repair and regeneration including wound healing and its types | Y | Lecture, Small group discussion | General Surgery |
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| **Topic: Hemodynamic disorders** | **Competencies: 08; Hours: 08** | | **Number of procedures that require certification: (NIL)** | |
| **No.** | **Competency** | **Core (Y/N)** | **Suggested TL method** | **Horizontal / Vertical Integration** |
| PA6.1 | Define and describe edema, its types, pathogenesis and clinical correlations | Y | Lecture, Small group discussion | General Medicine |
| PA6.2 | Define and describe hyperaemia, congestion, haemorrhage | Y | Lecture, Small group discussion | |
| PA6.2.1 | Identify and describe the gross and microscopic features of chronic venous congestion in a pathologic specimen | Y | DOAP session | |
| PA6.3 | Define and describe shock, its pathogenesis and its stages | Y | Lecture, Small group discussion | General Surgery |
| PA6.4 | Define and describe normal haemostasis and the etiopathogenesis and consequences of thrombosis | Y | Lecture, Small group discussion | |
| PA6.5 | Define and describe embolism and its causes and common types | Y | Lecture, Small group discussion | |

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| PA6.6 | Define and describe Ischaemia/infarction its types, aetiology, morphologic changes and clinical effects | Y | Lecture, Small group discussion | |
| PA6.7 | Identify and describe the gross and microscopic features of infarction in a pathologic specimen | Y | DOAP session | |
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| **Topic: Neoplastic disorders** | **Competencies: 05; Hours: 08** | | **Number of procedures that require certification: (NIL)** | |
| **No.** | **Competency** | **Core (Y/N)** | **Suggested TL method** | **Horizontal / Vertical Integration** |
| PA7.1 | Define and classify neoplasia. Describe the characteristics of neoplasia including gross, microscopy, biologic, behaviour and spread. Differentiate between benign from malignant neoplasms | Y | Lecture, Small group discussion | |
| PA7.2 | Describe the molecular basis of cancer | Y | Lecture, Small group discussion | |
| PA7.3 | Enumerate carcinogens and describe the process of carcinogenesis | Y | Lecture, Small group discussion | |
| PA7.4 | Describe the effects of tumour on the host including paraneoplastic syndrome | Y | Lecture, Small group discussion | |
| PA7.5 | Describe immunology and the immune response to cancer | N | Lecture, Small group discussion | Microbiology |
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| **Topic: Basic diagnostic cytology** | **Competencies: 03; Hours: 04** | | **Number of procedures that require certification: (NIL)** | |
| **No.** | **Competency** | **Core (Y/N)** | **Suggested TL method** | **Horizontal / Vertical Integration** |
| PA8.1 | Describe the diagnostic role of cytology and its application in clinical care | Y | Lecture, Small group discussion | General Surgery |
| PA8.2 | Describe the basis of exfoliative cytology including the technique and stains used | Y | Lecture, Small group discussion | General Surgery |
| PA8.3 | Observe a diagnostic cytology procedure and its staining and interpret the specimen | Y | DOAP session | |
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| **Topic: Immunopathology and AIDS** | **Competencies: 08; Hours: 07** | | **Number of procedures that require certification: (NIL)** | |
| **No.** | **Competency** | **Core (Y/N)** | **Suggested TL method** | **Horizontal / Vertical Integration** |
| PA9.1 | Describe the principles and mechanisms involved in immunity | Y | Lecture, Small group discussion | Microbiology |
| PA9.2 | Describe the mechanism of hypersensitivity reactions | Y | Lecture, Small group discussion | Microbiology |
| PA9.3 | Describe the HLA system and the immune principles involved in transplant and mechanism of transplant rejection | Y | Lecture, Small group discussion | Microbiology |

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| PA9.4 | Define autoimmunity. Enumerate autoimmune disorders | Y | Lecture, Small group discussion | |
| PA9.5 | Define and describe the pathogenesis of systemic lupus erythematosus | Y | Lecture, Small group discussion | |
| PA9.6 | Define and describe the pathogenesis and pathology of HIV and AIDS | Y | Lecture, Small group discussion | Microbiology |
| PA9.7 | Define and describe the pathogenesis of other common autoimmune disease | N | Lecture, Small group discussion | |
| PA9.8 | Classify and briefly describe the immunodeficiency syndromes | N | Lecture, Small group discussion | |
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| **Topic: Infections and Infestations** | **Competencies: 07; Hours: 05** | | **Number of procedures that require certification: (NIL)** | |
| **No.** | **Competency** | **Core (Y/N)** | **Suggested TL method** | **Horizontal / Vertical Integration** |
| PA10.1 | Define and describe the pathogenesis and pathology of malaria | Y | Lecture, Small group discussion | Microbiology |
| PA10.1.1 | Identify and describe the microscopic features of plasmodium vivax and falciparum in a peripheral blood smear | Y | DOAP session | |
| PA10.2 | Define and describe the pathogenesis and pathology of cysticercosis | Y | Lecture, Small group discussion | Microbiology |
| PA10.3 | Define and describe the pathogenesis and pathology of leprosy | Y | Lecture, Small group discussion | Microbiology |
| PA10.3.1 | Identify and describe the microscopic features of leprosy | Y | DOAP session | |
| PA10.4 | Define and describe the pathogenesis and pathology of common bacterial, viral, fungal, protozoal and helminthic diseases | N | Lecture, Small group discussion | Microbiology |
| PA10.4.1 | Identify and describe the microscopic features of rhinosporidiosis | Y | DOAP session | |
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| **Topic: Genetic and Paediatric diseases** | **Competencies: 03; Hours: 03** | | **Number of procedures that require certification: (NIL)** | |
| **No.** | **Competency** | **Core (Y/N)** | **Suggested TL method** | **Horizontal / Vertical Integration** |
| PA11.1 | Describe the pathogenesis and features of common cytogenetic abnormalities and mutations in childhood | Y | Lecture, Small group discussion | Paediatrics |
| PA11.2 | Describe the pathogenesis and pathology of tumour and tumour-like conditions in infancy and childhood | N | Lecture, Small group discussion | Paediatrics |
| PA11.3 | Describe the pathogenesis of common storage disorders in infancy and childhood | N | Lecture, Small group discussion | Paediatrics |

| Topic: Environmental and nutritional diseases | Competencies: 04; Hours: 03 | Number of procedures that require certification: (NIL) |
|---|---|---|

| No. | Competency | Core (Y/N) | Suggested TL method | Horizontal / Vertical Integration |
|---|---|---|---|---|
| PA12.1 | Enumerate and describe the pathogenesis of disorders caused by air pollution, tobacco and alcohol | Y | Lecture, Small group discussion | Community Medicine |
| PA12.2 | Describe the pathogenesis of disorders caused by protein calorie malnutrition and starvation | Y | Lecture, Small group discussion | Biochemistry, Paediatrics |
| PA12.3 | Describe the pathogenesis of obesity and its consequences | Y | Lecture, Small group discussion | General Medicine |
| PA12.4 | Classify and describe vitamin deficiencies | Y | Lecture, Small group discussion | Paediatrics , General Medicine |

| Topic: Introduction to haematology | Competencies: 05; Hours: 04 | Number of procedures that require certification: (NIL) |
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| No. | Competency | Core (Y/N) | Suggested TL method | Horizontal / Vertical Integration |
|---|---|---|---|---|
| PA13.1 | Describe haematopoiesis and extra medullary haematopoiesis | Y | Lecture, Small group discussion | General Medicine |
| PA13.2 | Describe the role of anticoagulants in haematology | Y | Lecture, Small group discussion | General Medicine |
| PA13.3 | Define and classify anaemia | Y | Lecture, Small group discussion | General Medicine |
| PA13.4 | Enumerate and describe the investigation of anaemia | Y | Lecture, Small group discussion | General Medicine |
| PA13.5 | Perform, identify and describe the peripheral blood picture in anaemia | Y | DOAP session | |

| Topic: Microcytic anaemia | Competencies: 03; Hours: 04 | Number of procedures that require certification: (NIL) |
|---|---|---|

| No. | Competency | Core (Y/N) | Suggested TL method | Horizontal / Vertical Integration |
|---|---|---|---|---|
| PA14.1 | Describe iron metabolism | Y | Lecture, Small group discussion | Biochemistry |
| PA14.2 | Describe the aetiology, investigations and differential diagnosis of microcytic hypochromic anaemia | Y | Lecture, Small group discussion | General Medicine |
| PA14.3 | Identify and describe the peripheral smear in microcytic anaemia | Y | DOAP session | |

| Topic: Macrocytic anaemia | Competencies: 04; Hours: 04 | | Number of procedures that require certification: (NIL) | |
|---|---|---|---|---|
| **No.** | **Competency** | **Core (Y/N)** | **Suggested TL method** | **Horizontal / Vertical Integration** |
| PA15.1 | Describe the metabolism of Vitamin B12 and the aetiology and pathogenesis of VitB12 deficiency | Y | Lecture, Small group discussion | Biochemistry, General Medicine |
| PA15.2 | Describe laboratory investigations of macrocytic anaemia | Y | Lecture, Small group discussion | General Medicine |
| PA15.3 | Identify and describe the peripheral blood picture of macrocytic anaemia | Y | DOAP session | |
| PA15.4 | Enumerate the differences and describe the aetiology and distinguishing features of megaloblastic and non-megaloblastic macrocytic anaemia | N | Lecture, Small group discussion | General Medicine |
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| **Topic: Haemolytic anaemia** | **Competencies: 09; Hours: 10** | | **Number of procedures that require certification: (01)** | |
| **No.** | **Competency** | **Core (Y/N)** | **Suggested TL method** | **Horizontal / Vertical Integration** |
| PA16.1 | Define and classify haemolytic anaemia | Y | Lecture, Small group discussion | Biochemistry, General Medicine |
| PA16.2 | Describe the pathogenesis and clinical features and hematologic indices of haemolytic anaemia | Y | Lecture, Small group discussion | Biochemistry, General Medicine |
| PA16.3 | Describe the pathogenesis, clinical features, hematologic indices and peripheral blood picture of sickle cell anaemia and thalassemia | Y | Lecture, Small group discussion | Biochemistry, General Medicine |
| PA16.3.1 | Describe the pathogenesis, clinical features, hematologic indices and peripheral blood picture of hereditary spherocytosis | Y | Lecture, Small group discussion | Biochemistry, General Medicine |
| PA16.3.2 | Describe the pathogenesis and clinical features and lab diagnosis of G6PD deficiency | N | Lecture, Small group discussion | Biochemistry, General Medicine |
| PA16.4 | Describe the aetiology, pathogenesis, hematologic indices and peripheral blood picture of acquired haemolytic anaemia | Y | Lecture, Small group discussion | Biochemistry, General Medicine |
| PA16.5 | Describe the peripheral blood picture in different haemolytic anaemias including immune haemolytic anaemia | Y | Lecture, Small group discussion | General Medicine |
| PA16.6 | Prepare a peripheral blood smear and identify haemolytic anaemia from it | Y | DOAP session<br>**Certifiable skill** | |
| PA16.7 | Describe the correct technique to perform a cross match | Y | Lecture, Small group discussion | |
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| Topic: Aplastic anaemia | Competencies: 02; Hours: 01 | Number of procedures that require certification: (NIL) |
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| No. | Competency | Core (Y/N) | Suggested TL method | Horizontal / Vertical Integration |
|---|---|---|---|---|
| PA17.1 | Enumerate the aetiology, pathogenesis and findings in aplastic anaemia | N | Lecture, Small group discussion | General Medicine |
| PA17.2 | Enumerate the indications and describe the findings in bone marrow aspiration and biopsy | N | Lecture, Small group discussion | General Medicine |

| Topic: Leukocytic disorders | Competencies: 03; Hours: 05 | Number of procedures that require certification: (NIL) |
|---|---|---|

| No. | Competency | Core (Y/N) | Suggested TL method | Horizontal / Vertical Integration |
|---|---|---|---|---|
| PA18.1 | Enumerate and describe the causes of leucocytosis, Leucopenia, lymphocytosis and leukemoid reaction | Y | Lecture, Small group discussion | General Medicine |
| PA18.2 | Describe the aetiology, genetics, pathogenesis, classification, clinical features, and hematologic features of acute and chronic leukaemia | Y | Lecture, Small group discussion | Paediatrics, General Medicine |
| PA18.2.1 | Identify and describe the peripheral smear findings in neutrophilia, eosinophilia, acute leukaemia and chronic myeloid leukaemia | Y | DOAP session | |

| Topic: Lymph node and Spleen | Competencies: 07; Hours: 08 | Number of procedures that require certification: (NIL) |
|---|---|---|

| No. | Competency | Core (Y/N) | Suggested TL method | Horizontal / Vertical Integration |
|---|---|---|---|---|
| PA19.1 | Enumerate the causes and describe the differentiating features of lymphadenopathy | Y | Lecture, Small group discussion | General Surgery |
| PA19.2 | Describe the pathogenesis and pathology of tuberculous lymphadenitis | Y | Lecture, Small group discussion | General Surgery |
| PA19.3 | Identify and describe the features of tuberculous lymphadenitis in a gross and microscopic specimen | Y | DOAP session | |
| PA19.4 | Describe and discuss the pathogenesis, pathology and the differentiating features of Hodgkin's and non-Hodgkin's lymphoma | Y | Lecture, Small group discussion | General Surgery |
| PA19.5 | Identify and describe the features of Hodgkin's lymphoma in a gross and microscopic specimen | Y | DOAP session | |

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| PA19.6 | Enumerate and differentiate the causes of splenomegaly | Y | Lecture, Small group discussion | General Surgery, General Medicine |
| PA19.7 | Identify and describe the gross specimen of an enlarged spleen | Y | DOAP session | |
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| **Topic: Plasma cell disorders** | **Competencies: 01; Hours: 01** | | **Number of procedures that require certification: (NIL)** | |
| **No.** | **Competency** | **Core (Y/N)** | **Suggested TL method** | **Horizontal / Vertical Integration** |
| PA20.1 | Describe the features of plasma cell myeloma | Y | DOAP session | General Medicine |
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| **Topic: Haemorrhagic disorders** | **Competencies: 05; Hours: 05** | | **Number of procedures that require certification: (NIL)** | |
| **No.** | **Competency** | **Core (Y/N)** | **Suggested TL method** | **Horizontal / Vertical Integration** |
| PA21.1 | Describe normal haemostasis | Y | Lecture, Small group discussion | |
| PA21.2 | Classify and describe the aetiology, pathogenesis and pathology of vascular and platelet disorders including ITP and haemophilias | Y | Lecture, Small group discussion | Paediatrics |
| PA21.3 | Differentiate platelet from clotting disorders based on the clinical and hematologic features | Y | Lecture, Small group discussion | General Medicine |
| PA21.4 | Define and describe disseminated intravascular coagulation, its laboratory findings and diagnosis of disseminated intravascular coagulation | Y | Lecture, Small group discussion | General Medicine |
| PA21.5 | Define and describe the laboratory findings and diagnosis of Vitamin K deficiency | Y | Lecture, Small group discussion | General Medicine |
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| **Topic: Blood banking and transfusion** | **Competencies: 06; Hours: 05** | | **Number of procedures that require certification: (NIL)** | |
| **No.** | **Competency** | **Core (Y/N)** | **Suggested TL method** | **Horizontal / Vertical Integration** |
| PA22.1 | Classify and describe blood group systems (ABO and Rh) | Y | Lecture, Small group discussion | |
| PA22.2 | Enumerate the indications, describe the principles, enumerate and demonstrate the steps of compatibility testing | Y | Lecture, Small group discussion | Obstetrics &Gynaecology |
| PA22.3 | Enumerate blood components and describe their clinical uses | Y | Lecture, Small group discussion | General Surgery, General Medicine |

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| PA22.4 | Enumerate and describe infections transmitted by blood transfusion | Y | Lecture, Small group discussion | Microbiology |
| PA22.5 | Describe transfusion reactions and enumerate the steps in the investigation of a transfusion reaction | Y | Lecture, Small group discussion | General Medicine |
| PA22.6 | Enumerate the indications and describe the principles and procedure of autologous transfusion | Y | Lecture, Small group discussion | |
| | | | | |
| **Topic: Clinical Pathology** | **Competencies: 03; Hours: 05** | | **Number of procedures that require certification: (NIL)** | |
| **No.** | **Competency** | **Core (Y/N)** | **Suggested TL method** | **Horizontal / Vertical Integration** |
| PA23.1 | Describe abnormal urinary findings in disease states and identify and describe common urinary abnormalities in a clinical specimen | Y | DOAP session | |
| PA23.2 | Describe abnormal findings in body fluids in various disease states | Y | Lecture, Small group discussion | |
| PA23.3 | Describe and interpret the abnormalities in a panel containing semen analysis, thyroid function tests, renal function tests or liver function tests | Y | DOAP session | |
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| **Topic: Gastrointestinal tract** | **Competencies: 16; Hours: 14** | | **Number of procedures that require certification: (NIL)** | |
| **No.** | **Competency** | **Core (Y/N)** | **Suggested TL method** | **Horizontal / Vertical Integration** |
| PA24.1.1 | Describe the pathogenesis and microscopic features of sialadinitis | N | Lecture, Small group discussion | |
| PA24.1.2 | Classify salivary gland tumours and describe the pathologic features of pleomorphic adenoma | Y | Lecture, Small group discussion | General Surgery |
| PA24.1.3 | Describe and identify the gross and microscopic features of pleomorphic adenoma | Y | DOAP session | |
| PA24.1.4 | Describe pathogenesis and pathologic features of esophagitis and oesophageal carcinoma | N | Lecture, Small group discussion | |
| PA24.1.1 | Describe the pathogenesis and microscopic features of sialadinitis | N | Lecture, Small group discussion | |
| PA24.2 | Describe the aetiology, pathogenesis, pathology, microbiology, clinical and microscopic features of peptic ulcer disease | Y | Lecture, Small group discussion | General Medicine |

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| PA24.3 | Describe and identify the gross and microscopic features of peptic ulcer | Y | DOAP session | |
| PA24.4 | Describe and aetiology and pathogenesis and pathologic features of carcinoma of the stomach | Y | Lecture, Small group discussion | General Surgery |
| PA24.4.1 | Describe and identify the gross and microscopic features of gastric carcinoma | Y | DOAP session | |
| PA24.4.2 | Describe the etiology, pathogenesis and pathologic features of acute appendicitis | N | Lecture, Small group discussion | General Surgery |
| PA24.5 | Describe and aetiology and pathogenesis and pathologic features of Tuberculosis of the intestine | N | Lecture, Small group discussion | General Surgery |
| PA24.6 | Describe and aetiology and pathogenesis and pathologic and distinguishing features of Inflammatory bowel disease | Y | Lecture, Small group discussion | General Surgery |
| PA24.7 | Describe the aetiology, pathogenesis, pathology and distinguishing features of carcinoma of the colon | Y | Lecture, Small group discussion | General Surgery |
| PA24.7.1 | Describe and identify the gross and microscopic features of adenocarcinoma colon | Y | DOAP session | |
| PA24.8 | Describe the etiology, pathogenesis and pathologic features of gastrointestinal stromal tumour | N | Lecture, Small group discussion | General Surgery |
| PA24.9 | Describe the etiology, pathogenesis and pathologic features of neuroendocrine tumours | N | Lecture, Small group discussion | General Surgery |

| **Topic: Hepatobiliary system** | **Competencies: 09; Hours: 08** | **Number of procedures that require certification: (01)** |
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| **No.** | **Competency** | **Core (Y/N)** | **Suggested TL method** | **Horizontal / Vertical Integration** |
|---|---|---|---|---|
| PA25.1 | Describe bilirubin metabolism, enumerate the aetiology and pathogenesis of jaundice, distinguish between direct and indirect hyperbilirubinemia | Y | Lecture, Small group discussion | Biochemistry, General Medicine |
| PA25.2 | Describe the pathophysiology and pathologic changes seen in hepatic failure and their clinical manifestations, complications and consequence | Y | Lecture, Small group discussion | General Medicine, General Surgery |
| PA25.3 | Describe the aetiology and pathogenesis of viral and toxic hepatitis: distinguish the causes of hepatitis based on the clinical and laboratory | Y | Lecture, Small group discussion | General Medicine |

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| | features. Describe the pathology, complications and consequences of hepatitis | | | |
| PA25.4 | Describe the pathophysiology pathology and progression of alcoholic liver disease including cirrhosis | Y | Lecture, Small group discussion | General Medicine, General Surgery |
| PA25.5 | Describe the aetiology, pathogenesis and complications of portal hypertension | Y | Lecture, Small group discussion | General Medicine, General Surgery |
| PA25.6 | Interpret liver function and viral hepatitis serology panel. Distinguish obstructive from non-obstructive jaundice based on clinical features and liver function tests | Y | DOAP session. **Certifiable skill** | General Medicine |
| PA25.7 | Describe and etiology, pathogenesis and pathologic features of hepatocellular carcinoma | N | Lecture, Small group discussion | |
| PA25.8 | Describe and etiology, pathogenesis and pathologic features of gall stones | N | Lecture, Small group discussion | |
| PA25.9 | Describe and identify the gross features of cirrhosis liver, hepatocellular carcinoma and chronic calculous cholecystitis | N | DOAP session | |

| **Topic: Respiratory system** | **Competencies: 10; Hours: 08** | **Number of procedures that require certification: (NIL)** |
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| **No.** | **Competency** | **Core (Y/N)** | **Suggested TL method** | **Horizontal / Vertical Integration** |
|---|---|---|---|---|
| PA26.1 | Define and describe the aetiology, types, pathogenesis, stages, morphology and complications of pneumonia | Y | Lecture, Small group discussion | Microbiology, General Medicine |
| PA26.1.1 | Describe and identify the gross and microscopic features of lobar pneumonia | Y | DOAP session | |
| PA26.2 | Describe the aetiology, gross and microscopic appearance and complications of lung abscess | Y | Lecture, Small group discussion | Microbiology, General Medicine |
| PA26.3 | Define and describe the aetiology, types, pathogenesis, stages, morphology and complications and evaluation of Obstructive airway disease (OAD) and bronchiectasis | Y | Lecture, Small group discussion | Physiology, Microbiology, General Medicine |
| PA26.4 | Define and describe the aetiology, types, pathogenesis, stages, morphology microscopic appearance and complications of tuberculosis | Y | Lecture, Small group discussion | Microbiology, General Medicine |

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| PA26.5 | Define and describe the aetiology, types, exposure, environmental influence, pathogenesis, stages, morphology, microscopic appearance and complications of Occupational lung disease | Y | Lecture, Small group discussion | Community Medicine, General Medicine |
| PA26.5.1 | Define and describe the etiology, pathogenesis, morphology, and complications of interstitial lung disease | N | Lecture, Small group discussion | |
| PA26.6 | Define and describe the etiology, types, exposure, genetics, environmental influence, pathogenesis, stages, morphology, microscopic appearance, metastases and complications of tumours of the lung and pleura | Y | Lecture, Small group discussion | General Medicine |
| PA26.6.1 | Describe and identify the gross features of carcinoma lung | Y | DOAP session | |
| PA26.7 | Define and describe the aetiology, types, exposure, genetics, environmental influence, pathogenesis, morphology, microscopic appearance and complications of mesothelioma | N | Lecture, Small group discussion | Community Medicine, General Medicine |

| **Topic: Cardiovascular system** | **Competencies: 12; Hours: 10** | **Number of procedures that require certification: (NIL)** |
|---|---|---|

| **No.** | **Competency** | **Core (Y/N)** | **Suggested TL method** | **Horizontal / Vertical Integration** |
|---|---|---|---|---|
| PA27.1 | Distinguish arteriosclerosis from atherosclerosis. Describe the pathogenesis and pathology of various causes and types of arteriosclerosis | Y | Lecture, Small group discussion | General Medicine |
| PA27.1.1 | Describe and identify the gross and microscopic features of atherosclerosis | Y | DOAP session | |
| PA27.2 | Describe the aetiology, dynamics, pathology types and complications of aneurysms including aortic aneurysms | Y | Lecture, Small group discussion | General Medicine |
| PA27.3 | Describe the aetiology, types, stages pathophysiology, pathology and complications of heart failure | Y | Lecture, Small group discussion | Physiology, General Medicine |
| PA27.4 | Describe the aetiology, pathophysiology, pathology, gross and microscopic features, criteria and complications of rheumatic fever | Y | Lecture, Small group discussion | Microbiology, General Medicine |
| PA27.5 | Describe the epidemiology, risk factors, aetiology, pathophysiology, pathology, presentations, gross and microscopic features, diagnostic tests and complications of ischemic heart disease | Y | Lecture, Small group discussion | General Medicine |
| PA27.6 | Describe the aetiology, pathophysiology, pathology, gross and microscopic features, diagnosis and complications of infective endocarditis | Y | Lecture, Small group discussion | Microbiology, General Medicine |

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|---|---|---|---|---|
| PA27.7 | Describe the aetiology, pathophysiology, pathology, gross and microscopic features, diagnosis and complications of pericarditis and pericardial effusion | Y | Lecture, Small group discussion | General Medicine |
| PA27.8 | Interpret abnormalities in cardiac function testing in acute coronary syndromes | Y | DOAP session. Integration with Physiology, General Medicine | |
| PA27.9 | Classify and describe the aetiology, types, pathophysiology, pathology, gross and microscopic features, diagnosis and complications of cardiomyopathies | N | Lecture, Small group discussion | Physiology, General Medicine |
| PA27.10 | Describe the aetiology, pathophysiology, pathology features and complications of syphilis on the cardiovascular system | N | Lecture, Small group discussion | Microbiology, General Medicine |
| PA27.11 | Classify and describe the etiology, types, and microscopic features of vasculitis | N | Lecture, Small group discussion | General Medicine |

| **Topic: Urinary system** | **Competencies: 18; Hours: 12** | **Number of procedures that require certification: (NIL)** |
|---|---|---|

| **No.** | **Competency** | **Core (Y/N)** | **Suggested TL method** | **Horizontal / Vertical Integration** |
|---|---|---|---|---|
| PA28.1 | Describe the normal histology of the kidney | Y | Lecture, Small group discussion | |
| PA28.2 | Define, classify and distinguish the clinical syndromes and describe the aetiology, pathogenesis, pathology, morphology, clinical and laboratory and urinary findings, complications of renal failure | Y | Lecture, Small group discussion | |
| PA28.3 | Define and describe the aetiology, precipitating factors, pathogenesis, pathology, laboratory urinary findings, progression and complications of acute renal failure | Y | Lecture, Small group discussion | General Medicine |
| PA28.4 | Define and describe the aetiology, precipitating factors, pathogenesis, pathology, laboratory urinary findings progression and complications of chronic renal failure | Y | Lecture, Small group discussion | General Medicine |
| PA28.5 | Define and classify glomerular diseases. Enumerate and describe the aetiology, pathogenesis, mechanisms of glomerular injury, pathology, distinguishing features and clinical manifestations of glomerulonephritis | Y | Lecture, Small group discussion | Physiology, General Medicine |

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|---|---|---|---|---|
| PA28.6 | Define and describe the aetiology, pathogenesis, pathology, laboratory, urinary findings, progression and complications of IgA nephropathy | Y | Lecture, Small group discussion | General Medicine |
| PA28.7 | Enumerate and describe the findings in glomerular manifestations of systemic disease | Y | Lecture, Small group discussion | General Medicine |
| PA28.8 | Enumerate and classify diseases affecting the tubular interstitium | Y | Lecture, Small group discussion | General Medicine |
| PA28.9 | Define and describe the aetiology, pathogenesis, pathology, laboratory, urinary findings, progression and complications of acute tubular necrosis | Y | Lecture, Small group discussion | General Medicine |
| PA28.10 | Describe the aetiology, pathogenesis, pathology, laboratory findings, distinguishing features, progression and complications of acute and chronic pyelonephritis and reflux nephropathy | Y | | Human Anatomy, General Surgery |
| PA28.11 | Define classify and describe the aetiology, pathogenesis, pathology, laboratory, urinary findings, distinguishing features progression and complications of vascular disease of the kidney | Y | | General Medicine |
| PA28.12 | Define classify and describe the genetics, inheritance, aetiology, pathogenesis, pathology, laboratory, urinary findings, distinguishing features, progression and complications of cystic disease of the kidney | Y | | Paediatrics, General Medicine |
| PA28.13 | Define classify and describe the aetiology, pathogenesis, pathology, laboratory, urinary findings, distinguishing features progression and complications of renal stone disease and obstructive uropathy | Y | | General Surgery |
| PA28.13.1 | Describe and identify the gross features of renal stones with hydronephrosis | Y | DOAP session | |
| PA28.14 | Classify and describe the aetiology, genetics, pathogenesis, pathology, presenting features, progression and spread of renal tumours | Y | | Paediatrics |
| PA28.14.1 | Describe and identify the gross and microscopic features of renal cell carcinoma | Y | DOAP session | |

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|---|---|---|---|---|
| PA28.15 | Describe the aetiology, genetics, pathogenesis, pathology, presenting features and progression of thrombotic angiopathies | N | | General Medicine |
| PA28.16 | Describe the aetiology, genetics, pathogenesis, pathology, presenting features and progression of urothelial tumours | N | | General Surgery |

| **Topic: Male genital system** | **Competencies: 06; Hours: 06** | **Number of procedures that require certification: (NIL)** |
|---|---|---|

| **No.** | **Competency** | **Core (Y/N)** | **Suggested TL method** | **Horizontal / Vertical Integration** |
|---|---|---|---|---|
| PA29.1 | Classify testicular tumours and describe the pathogenesis, pathology, presenting and distinguishing features, diagnostic tests, progression and spread of testicular tumours | Y | Lecture, Small group discussion | General Surgery |
| PA29.1.1 | Describe and identify the gross and microscopic features of seminoma testis | Y | DOAP session | |
| PA29.2 | Describe the pathogenesis, pathology, presenting and distinguishing features, diagnostic tests, progression and spread of carcinoma of the penis | Y | Lecture, Small group discussion | General Surgery |
| PA29.3 | Describe the pathogenesis, pathology, hormonal dependency, presenting and distinguishing features, urologic findings & diagnostic tests of benign prostatic hyperplasia | Y | Lecture, Small group discussion | General Surgery |
| PA29.4 | Describe the pathogenesis, pathology, hormonal dependency, presenting and distinguishing features, diagnostic tests, progression and spread of carcinoma of the prostate | Y | Lecture, Small group discussion | General Surgery |
| PA29.5 | Describe the aetiology, pathogenesis, pathology and progression of prostatitis | N | Lecture, Small group discussion | General Surgery |

| **Topic: Female genital system** | **Competencies: 12; Hours: 12** | **Number of procedures that require certification: (NIL)** |
|---|---|---|

| **No.** | **Competency** | **Core (Y/N)** | **Suggested TL method** | **Horizontal / Vertical Integration** |
|---|---|---|---|---|
| PA30.1 | Describe the epidemiology, pathogenesis, aetiology, pathology, screening, diagnosis and progression of carcinoma of the cervix | Y | Lecture, Small group discussion | Obstetrics & Gynaecology |

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|---|---|---|---|---|
| PA30.2 | Describe the pathogenesis, aetiology, pathology, diagnosis and progression and spread of carcinoma of the endometrium | Y | Lecture, Small group discussion | Obstetrics & Gynaecology |
| PA30.2.1 | Describe and identify the gross features of carcinoma endometrium | Y | DOAP session | |
| PA30.3 | Describe the pathogenesis, aetiology, pathology, diagnosis and progression and spread of carcinoma of the leiomyomas and leiomyosarcoma | Y | Lecture, Small group discussion | Obstetrics & Gynaecology |
| PA30.3.1 | Describe and identify the gross features of leiomyoma uterus | Y | DOAP session | |
| PA30.4 | Classify and describe the aetiology, pathogenesis, pathology, morphology, clinical course, spread and complications of ovarian tumours | Y | Lecture, Small group discussion | Obstetrics & Gynaecology |
| PA30.4.1 | Describe and identify the gross and microscopic features of teratoma ovary and epithelial tumours of ovary | Y | DOAP session. | |
| PA30.5 | Describe the aetiology, pathogenesis, pathology, morphology, clinical course, spread and complications of gestational trophoblastic neoplasms | Y | Lecture, Small group discussion | Obstetrics & Gynaecology |
| PA30.6 | Describe the aetiology and morphologic features of cervicitis | N | Lecture, Small group discussion | Obstetrics & Gynaecology |
| PA30.7 | Describe the aetiology, hormonal dependence, features and morphology of endometriosis | N | Lecture, Small group discussion | Obstetrics & Gynaecology |
| PA30.8 | Describe the aetiology and morphologic features of adenomyosis | N | Lecture, Small group discussion | Obstetrics & Gynaecology |
| PA30.9 | Describe the aetiology, hormonal dependence and morphology of endometrial hyperplasia | N | Lecture, Small group discussion | Obstetrics & Gynaecology |
| | | | | |
| **Topic: Breast** | | **Competencies: 06; Hours: 05** | **Number of procedures that require certification: (NIL)** | |
| **No.** | **Competency** | **Core (Y/N)** | **Suggested TL method** | **Horizontal / Vertical Integration** |
| PA31.1 | Classify and describe the types, aetiology, pathogenesis, pathology and hormonal dependency of benign breast disease | Y | Lecture, Small group discussion | Human Anatomy, General Surgery |

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|---|---|---|---|---|
| PA31.1.1 | Describe the pathogenesis, and pathologic features of fibroadenoma | Y | Lecture, Small group discussion | General Surgery |
| PA31.1.2 | Describe the pathogenesis, and pathologic features of fibroadenoma | Y | DOAP session | General Surgery |
| PA31.2 | Classify and describe the epidemiology, pathogenesis, classification, morphology, prognostic factors, hormonal dependency, staging and spread of carcinoma of the breast | Y | Lecture, Small group discussion | General Surgery |
| PA31.3 | Describe and identify the gross and microscopic features of carcinoma of the breast | Y | DOAP session. | General Surgery |
| PA31.4 | Enumerate and describe the aetiology, hormonal dependency and pathogenesis of gynecomastia | N | Lecture, Small group discussion | Paediatrics, General Medicine |

| **Topic: Endocrine system** | **Competencies: 13; Hours: 10** | **Number of procedures that require certification: (NIL)** |
|---|---|---|

| **No.** | **Competency** | **Core (Y/N)** | **Suggested TL method** | **Horizontal / Vertical Integration** |
|---|---|---|---|---|
| PA32.1 | Enumerate, classify and describe the aetiology, pathogenesis, pathology and iodine dependency of thyroid swellings | Y | Lecture, Small group discussion | Human Anatomy, Physiology, General Medicine, General Surgery |
| PA32.1.1 | Describe and identify gross and microscopic features of follicular nodular disease | Y | DOAP session | |
| PA32.2 | Describe the aetiology, cause, iodine dependency, pathogenesis, manifestations, laboratory and imaging features and course of thyrotoxicosis | Y | Lecture, Small group discussion | Physiology, General Medicine |
| PA32.3 | Describe the aetiology, pathogenesis, manifestations, laboratory and imaging features and course of thyrotoxicosis/ hypothyroidism | Y | Lecture, Small group discussion | Physiology, General Medicine |
| PA32.3.1 | Describe the etiology, pathogenesis, manifestations, laboratory and pathologic features and course of thyroiditis | Y | Lecture, Small group discussion | Physiology, General Medicine |
| PA32.3.2 | Classify and describe the etiology, pathogenesis, manifestations, and pathologic features and course of thyroid tumours | Y | Lecture, Small group discussion | |

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|---|---|---|---|---|
| PA32.3.3 | Describe and identify gross and microscopic features of papillary thyroid carcinoma | Y | DOAP session. | |
| PA32.4 | Classify and describe the epidemiology, aetiology, pathogenesis, pathology, clinical laboratory features, complications and progression of diabetes mellitus | Y | Lecture, Small group discussion | Physiology, General Medicine |
| PA32.5 | Describe the aetiology, genetics, pathogenesis, manifestations, laboratory and morphologic features of hyperparathyroidism | N | Lecture, Small group discussion | Physiology, General Medicine |
| PA32.6 | Describe the aetiology, pathogenesis, manifestations, laboratory, morphologic features, complications and metastases of pancreatic cancer | N | Lecture, Small group discussion | General Surgery |
| PA32.7 | Describe the aetiology, pathogenesis, manifestations, laboratory, morphologic features, complications of adrenal insufficiency | N | Lecture, Small group discussion | Physiology, General Medicine |
| PA32.8 | Describe the aetiology, pathogenesis, manifestations, laboratory, morphologic features, complications of Cushing's syndrome | N | Lecture, Small group discussion | Physiology, General Medicine |
| PA32.9 | Describe the aetiology, pathogenesis, manifestations, laboratory and morphologic features of adrenal neoplasm | N | Lecture, Small group discussion | Human Anatomy, Physiology, General Medicine, General Surgery |

| **Topic: Bone and Soft tissue** | **Competencies: 06; Hours: 04** | **Number of procedures that require certification: (NIL)** |
|---|---|---|

| **No.** | **Competency** | **Core (Y/N)** | **Suggested TL method** | **Horizontal / Vertical Integration** |
|---|---|---|---|---|
| PA33.1 | Classify and describe the aetiology, pathogenesis, manifestations, radiologic and morphologic features and complications of osteomyelitis | Y | Lecture, Small group discussion | Human Anatomy, Orthopaedics |
| PA33.2 | Classify and describe the aetiology, pathogenesis, manifestations, radiologic and morphologic features and complications and metastases of bone tumours | Y | Lecture, Small group discussion | Orthopaedics |
| PA33.2.1 | Describe and identify gross and microscopic features of osteoclastoma. | Y | DOAP session | |
| PA33.3 | Classify and describe the aetiology, pathogenesis, manifestations, radiologic and morphologic features and complications and metastases of soft tissue tumours | Y | Lecture, Small group discussion | Orthopaedics |

| | | | | |
|---|---|---|---|---|
| PA33.4 | Classify and describe the aetiology, pathogenesis, manifestations, radiologic and morphologic features and complications of Paget's disease of the bone | N | Lecture, Small group discussion | Orthopaedics |
| PA33.5 | Classify and describe the aetiology, immunology, pathogenesis, manifestations, radiologic and laboratory features, diagnostic criteria and complications of rheumatoid arthritis | N | Lecture, Small group discussion | General Medicine |

| **Topic: Skin** | **Competencies: 04; Hours: 04** | **Number of procedures that require certification: (NIL)** |
|---|---|---|

| **No.** | **Competency** | **Core (Y/N)** | **Suggested TL method** | **Horizontal / Vertical Integration** |
|---|---|---|---|---|
| PA34.1 | Describe the risk factors pathogenesis, pathology and natural history of squamous cell carcinoma of the skin | Y | Lecture, Small group discussion | Dermatology, Venereology & Leprosy |
| PA34.2 | Describe the risk factors pathogenesis, pathology and natural history of basal cell carcinoma of the skin | Y | Lecture, Small group discussion | Dermatology, Venereology & Leprosy |
| PA34.3 | Describe the distinguishing features between a nevus and melanoma. Describe the aetiology, pathogenesis, risk factors morphology clinical features and metastases of melanoma | N | Lecture, Small group discussion | Dermatology, Venereology & Leprosy |
| PA34.4 | Identify, distinguish and describe common tumours of the skin | N | DOAP session. | Dermatology, Venereology & Leprosy |

| **Topic: Central nervous system** | **Competencies: 03; Hours: 04** | **Number of procedures that require certification: (01)** |
|---|---|---|

| **No.** | **Competency** | **Core (Y/N)** | **Suggested TL method** | **Horizontal / Vertical Integration** |
|---|---|---|---|---|
| PA35.1 | Describe the aetiology, types and pathogenesis, differentiating factors, CSF findings in meningitis | Y | Lecture, Small group discussion | Microbiology, General Medicine |
| PA35.2 | Classify and describe the aetiology, genetics, pathogenesis, pathology, presentation sequelae and complications of CNS tumours | Y | Lecture, Small group discussion | Paediatrics |
| PA35.3 | Identify the aetiology of meningitis based on given CSF parameters | Y | DOAP session<br>**Certifiable skill** | Microbiology, General Medicine |

| Topic: Eye | | Competencies: 01; Hours: 01 | | Number of procedures that require certification: (NIL) |
|---|---|---|---|---|
| **No.** | **Competency** | **Core (Y/N)** | **Suggested TL method** | **Horizontal / Vertical Integration** |
| PA36.1 | Describe the aetiology, genetics, pathogenesis, pathology, presentation, sequelae and complications of retinoblastoma | N | Lecture, Small group discussion | Ophthalmology |

## Theory examination pattern

- Paper I – General Pathology and Haematology including Clinical Pathology (100 marks) Time: 3 hours
- Paper II – Systemic Pathology (100 marks) Time: 3 hours

| Question pattern | No. of questions | Max. marks | Total marks |
|---|---|---|---|
| Multiple choice questions | 20 | 1 mark each | 20 |
| Essay questions | 2 | 10 marks each | 20 |
| Short essay questions | 6 | 6 marks each | 36 |
| Short answers | 6 | 4 marks each | 24 |
| **Total marks** | | | **100** |

| Pattern for Multiple Choice Questions | | | |
|---|---|---|---|
| **Sl.no.** | **Type of MCQ** | **No. of MCQs** | **Marks** |
| 1 | Single response type | 5 | 5x1 = 5 marks |
| 2 | Multiple response type | 5 | 5x1 = 5 marks |
| 3 | Assertion-Reason type | 5 | 5x1 = 5 marks |
| 4 | Clinical case scenario based type | 1 scenario with 5 questions | 5x1 = 5 marks |

## Practical examination pattern

Total marks: 100 (Practical: 80 and viva voce: 20)

Practical exam will be conducted as follows

4 procedural stations: 40 marks

20 response stations: 40 marks

**Procedural stations:**

4 procedural stations of 15 minutes each (questions can be used during the procedure)

1. Peripheral blood smear preparation and staining
2. Blood grouping
3. Urine examination (including sediments shown as charts)

4. Peripheral smear reporting (one out of the following)
    a. Microcytic hypochromic anaemia
    b. Neutrophilia
    c. Eosinophilia
    d. Acute leukaemia
    e. Chronic myeloid leukaemia

**Response stations:**

20 stations of 3 minutes each

1. Gross specimens: 4 nos.
2. Histopathology slides: 4 nos.
3. Haematology slides: 2 nos.
4. Cytology slide: 1 no.
   (At least 3 out of the above 11 stations should be based on case scenario)
5. Instruments: 1 no.
6. Charts: 5 nos.
7. CBC histogram: 1 no.
8. Clinical Pathology test interpretation: 1 no.
9. Correlative exercise with clinical history (specimens /slides combination): 1 no.

**Viva voce**

Total marks: 20

Total no. of stations: 4

Station 1: Clinical Pathology and haematology

Stations 2: General Pathology

Station 3: Systemic Pathology I

Station 4: Systemic Pathology II

## List of Gross specimens

| Sl.no. | For examination | Sl.no. | For demonstration only |
|---|---|---|---|
| 1 | Fatty liver | 1 | Amyloidosis |
| 2 | Calcinosis cutis | 2 | CVC spleen |
| 3 | Gangrene | 3 | Suppurative meningitis |

| | | | |
|---|---|---|---|
| 4 | Acute appendicitis | 4 | Lobar pneumonia |
| 5 | CVC liver | 5 | Lung abscess |
| 6 | Infarct spleen | 6 | Bronchiectasis |
| 7 | TB lymph node | 7 | Emphysema |
| 8 | TB lung | 8 | Pulmonary artery embolism |
| 9 | Atherosclerosis | 9 | Myocardial infarction |
| 10 | Pleomorphic adenoma | 10 | TB intestine |
| 11 | Peptic ulcer | 11 | Madura foot |
| 12 | Gastric carcinoma | 12 | Intussusception |
| 13 | Cirrhosis liver | 13 | TB/typhoid/amoebic ulcer intestine |
| 14 | Chronic calculous cholecystitis | 14 | Adenocarcinoma colon |
| 15 | Carcinoma lung | 15 | Familial adenomatous polyposis |
| 16 | Renal stones with hydronephrosis | 16 | Hepatocellular carcinoma |
| 17 | Renal cell carcinoma | 17 | Chronic pyelonephritis |
| 18 | Seminoma testis | 18 | Carcinoma urinary bladder |
| 19 | Leiomyoma uterus | 19 | Carcinoma penis |
| 20 | Carcinoma endometrium | 20 | Carcinoma cervix |
| 21 | Mature cystic teratoma | 21 | Dysgerminoma |
| 22 | Serous/mucinous cystadenoma ovary | 22 | Hashimoto’s thyroiditis |
| 23 | Fibroadenoma | 23 | Adenoma thyroid |
| 24 | Carcinoma breast | 24 | Sequestrum |
| 25 | Multinodular goitre | 25 | Osteochondroma |
| 26 | Papillary carcinoma thyroid | 26 | Osteosarcoma |
| 27 | Osteoclastoma | 27 | Lipoma |
| 28 | Squamous cell carcinoma | 28 | Lymphoma |
| 29 | Basal cell carcinoma | 29 | Wilm’s tumour |
| 30 | Malignant melanoma | | |

# List of Histopathology slides

| Sl.no. | For examination | Sl.no. | For demonstration only |
|---|---|---|---|
| 1 | Fatty liver | 1 | Caseous necrosis |
| 2 | Calcinosis cutis | 2 | Amyloidosis |
| 3 | Coagulative necrosis | 3 | Granulation tissue |
| 4 | Acute appendicitis | 4 | Lobar pneumonia |
| 5 | TB lymph node | 5 | Tuberculoid leprosy |
| 6 | Lepromatous leprosy | 6 | Actinomycosis |
| 7 | Rhinosporidiosis | 7 | Aspergillosis |
| 8 | CVC lung | 8 | Myocardial infarction |
| 9 | Lipoma | 9 | Chronic pyelonephritis |
| 10 | Hodgkin lymphoma | 10 | Wilm's tumour |
| 11 | Pleomorphic adenoma | 11 | Seminoma testis |
| 12 | Adenocarcinoma colon | 12 | Secretory endometrium |
| 13 | Cirrhosis liver | 13 | Hydatidiform mole |
| 14 | Atherosclerosis | 14 | Serous/mucinous cystadenoma ovary |
| 15 | Renal cell carcinoma | 15 | Multinodular goitre |
| 16 | Leiomyoma | 16 | Follicular adenoma |
| 17 | Fibroadenoma | 17 | Osteochondroma |
| 18 | Carcinoma breast | 18 | Osteosarcoma |
| 19 | Hashimoto's thyroiditis | 19 | Meningioma |
| 20 | Papillary carcinoma thyroid | 20 | Schwannoma |
| 21 | Teratoma ovary | 21 | Hemangioma |
| 22 | Osteoclastoma | 22 | Malignant melanoma |
| 23 | Squamous cell carcinoma | 23 | |
| 24 | Basal cell carcinoma | 24 | |

## List of Haematology slides

| Sl.no. | For examination | Sl.no. | For demonstration only |
|---|---|---|---|
| 1 | Microcytic hypochromic anaemia | 1 | Target cell |
| 2 | Macrocytic anaemia | 2 | Sickle cell |
| 3 | Spherocytic anaemia | 3 | Reticulocyte |
| 4 | Neutrophilia | 4 | Atypical lymphocyte |
| 5 | Eosinophilia | 5 | Toxic granules |
| 6 | Acute leukaemia | 6 | MPO stain |
| 7 | Chronic myeloid leukaemia | 7 | Megaloblast |
| 8 | Normoblast | 8 | Chronic lymphatic leukaemia |
| 9 | Megakaryocyte | 9 | Filaria |
| 10 | Plasma cell myeloma | 10 | |
| 11 | Aplastic anaemia | 11 | |
| 12 | Malarial parasite – PV/PF | 12 | |

## List of Cytology slides

| Sl.no. | For examination |
|---|---|
| 1 | Granuloma lymph node |
| 2 | Fibroadenoma |
| 3 | Carcinoma breast |
| 4 | Papillary carcinoma thyroid |
| 5 | Squamous cell carcinoma – sputum/cervical smear |
| 6 | Adenocarcinoma in body fluids |

## List of Instruments

| Sl.no. | For examination |
|---|---|
| 1 | Lumbar puncture needle |
| 2 | Liver biopsy needle |

| | |
|---|---|
| 3 | Bone marrow aspiration needle |
| 4 | Wintrobe's tube |
| 5 | Westergren tube |
| 6 | Urinometer |
| 7 | Vacutainers |
| 8 | Blood collection bag |
| 9 | Ayre's spatula |
| 10 | Tissue capsule |
| 11 | Paraffin block |
| 12 | L-block |

## List of Charts

| **Sl.no.** | **For examination** |
|---|---|
| 1 | CSF analysis: Pyogenic meningitis |
| 2 | CSF analysis: Tuberculous meningitis |
| 3 | CSF analysis: Viral meningitis |
| 4 | Liver function test: Hepatocellular jaundice |
| 5 | Liver function test: Obstructive jaundice |
| 6 | Liver function test: Haemolytic jaundice |
| 7 | Liver function test: Acute viral hepatitis |
| 8 | Thyroid function test: Hypothyroidism |
| 9 | Thyroid function test: Hyperthyroidism |
| 10 | Renal function test: Acute glomerulonephritis |
| 11 | Renal function test: Chronic glomerulonephritis |
| 12 | Renal function test: Nephrotic syndrome |
| 13 | Cardiac function tests in acute coronary syndromes |
| 14 | Semen analysis |
| 15 | Thalassemia |
| 16 | Sickle cell anaemia |

| | |
|---|---|
| 17 | Hereditary spherocytosis |
| 18 | Autoimmune haemolytic anaemia |
| 19 | Multiple myeloma |
| 20 | Lymphoma |
| 21 | Bleeding disorders: Coagulation disorders |
| 22 | Bleeding disorders: Platelet disorders |
| 23 | CBC histogram: Iron deficiency anaemia |
| 24 | CBC histogram: Macrocytic anaemia |
| 25 | CBC histogram: Neutrophilia |
| 26 | CBC histogram: Acute leukaemia |
| 27 | CBC histogram: Chronic myeloid leukaemia |
| 28 | CBC histogram: Chronic lymphatic leukaemia |

**RECOMMENDED BOOKS (Latest edition)**

1. Kumar.V, Abbas.A. K, Aster.J.C. Robbins and Kumar Basic Pathology

2. Harsh Mohan. Text book of Pathology

3. Harsh Mohan. Practical Pathology

4. Ramadas Nayak, Rakshatha Nayak. Exam preparatory manual for undergraduates Pathology.

5. JCE Underwood. General and Systematic Pathology

6. Tejinder Singh. Textbook of Haematology

7. Saxena.R, Pati.H.P, Mahapatra.M. DeGruchy`s Clinical Haematology in Medical Practice

8. Nayak.R, Rai.S. Essentials in Haematology and Clinical Pathology.

9. Shameem Shariff. Essentials of Pathology.

**REFERENCE BOOKS:**

1. Rosai and Ackerman's Surgical Pathology

2. Sternberg S.S. Diagnostic Surgical Pathology

3. McKenzie.S.B, Williams.J.L. Clinical laboratory Haematology

4. Strayer D.S., Saffitz J.E. Rubin’s Pathology.

5. Means R.T., Arber.D. A, Glader.B. Wintrobe`s Clinical Haematology

6. Bain.J.B, Bates.I, Laffan.M. Dacie and Lewis Practical Haematology

7. Bancroft JD, Stevens A, Turner DR. Theory and Practice of Histological Techniques.

8. WHO Classification of Tumors

9. McPherson.R.A. Henry`s Clinical Diagnosis and Management by Laboratory Methods.

# Pharmacology

# PHARMACOLOGY

## Introduction to CBME based curriculum

### Preamble

Pharmacology is the science of drugs. This provides scientific data regarding structure, kinetics, mechanism of action at molecular level involving receptors, transducers or signalling molecules and second messengers etc. The adverse effects, precautions, contraindications and drug interactions of drugs are studied. This helps in Rational prescription of drugs with appropriate dosage form, dose, route, duration of treatment etc. The significance of using generic names of drugs and the importance of Pharmaco economics and the role of clinical pharmacology are emphasized. Knowledge in pharmacology is essential to select the ideal drug based on efficacy, safety, suitability and cost for treating patients rationally.

### GOALS

The broad goal of curriculum in Pharmacology to Indian medical graduates is

• To impart knowledge, skills and attitudes to the students so that they can prescribe drugs Rationally-(safely, effectively etc.) and maintain competency in professional life.

• To inculcate in them a rational and scientific basis of therapeutics.

### Competencies

- Knowledge regarding the pharmacologic basis of therapeutics with emphasis on essential and commonly used drugs.
- To select and prescribe drugs for a given clinical condition based on the pharmacological properties, efficacy, safety, suitability and cost.
- Ability to counsel patients regarding appropriate use of prescribed drug and drug delivery systems.
- Knowledge of pharmacovigilance, essential medicine concept and sources of drug information and industry-doctor relationship.

**Knowledge**

At the end of the course, the learner shall be able to-

• Describe the pharmacokinetics and pharmacodynamics of essential and commonly used drugs

• List the indications, precautions, contraindications, interactions and adverse reactions of commonly used drugs.

• Indicate the Rational use of drug in a particular disease with consideration of its cost, efficacy safety and suitability for individual needs, and mass therapy under national health programmes.

• Explain the pharmacological basis of rational prescription and drug use- define the diagnosis, define effective and safe treatment, Select appropriate drug and dosage regimen- (Right drug, Right dose, Right route, Right frequency, Right time, Right duration, Right patient, Right cost, Right Formulation, Right storage & Right documentation.), Adequate and appropriate prescription, inform the patient adequately and evaluate the treatment responses.

• Explain the methods of dosage calculation of the drugs used in special medical situations such as pregnancy, lactation, infancy, children, old age, renal and hepatic damage, immunocompromised patients etc.

• Explain the concept of rational drug therapy in clinical pharmacology with special focus to usage of antimicrobial drugs.

• Prescribe drugs for the control of fertility and be aware of the effects of drugs on the foetus.

• Explain the symptoms and signs, diagnosis and management of drug poisoning, insecticide poisoning, bites and sting- snake /scorpion bites, bee sting etc.

• State the principles underlying the concept of Rational drugs, Essential Drugs, P drugs etc.

• Evaluate the ethics and modalities involved in the development and introduction of new drugs and explain the phases and regulation of clinical trials.

• Understand the principles of Evidence based Medicine and Pharmacoeconomics.

• Enumerate food adulterants, occupational and environmental pesticides, insect repellents and Pollutants.

• Explain the principles and significance of Essential medicines, Over the counter drugs, Fixed dose combinations, dietary supplements, nutraceuticals and Herbal medicines.

• Enumerate the drugs producing dependence, describe the drug abuse and management of dependence and addiction. Mention the regulatory aspects regarding prescription of psychotropic drugs / drugs causing dependence.

• Explain the principles of pharmacovigilance, sources of drug information and industry-doctor relationship.

• Understand the principles to counsel the patients regarding appropriate use of prescribed drug and drug delivery systems.

**Skills**

At the end of the course, the learner shall be able to: -

• Prescribe drugs rationally for common ailments / a given condition.

• Communicate the prescription adequately and appropriately to the patient.

• Identify adverse reactions and interactions of commonly used drugs.

• Recognize and report adverse drug reactions to suitable authorities - (PvPI).

• Scan information on common pharmaceutical preparations and critically evaluate drug formulations.

• Administer drugs through various routes in a simulated environment-

load the required dose of medicines accurately in hypodermic syringes; inject medicines by the intradermal, subcutaneous, intramuscular and intravenous routes using aseptic techniques.

Set-up an intravenous drip and adjust the drip rate according to required dosage.

Administer the required dose of different drug formulations using appropriate devices and techniques (e.g., hypodermic syringes, inhalers, transdermal patches etc.)

• Calculate the drug dosage using appropriate formulae for an individual patient.

• Analyse critically, drug promotional literature for proprietary preparations in terms of actions of their ingredients, claims of pharmaceutical companies, Pharmaco economics, Rational or irrational nature of fixed dose drug combinations and uses etc.

• Retrieve drug information from appropriate sources especially electronic resources.

- Interpret the data obtained from the experiments designed for the study of effect of drugs in various experimental and clinical studies

• Demonstrate the effects of drugs on blood pressure (vasopressor and vaso-depressors with appropriate blockers) using computer aided learning and interpret the graph.

- Appraise the Principles of Clinical Pharmacy and Dispense the Medications giving proper instructions.

**Attitude, Communication and Ethics.**

At the end of the course, the learner shall be able to-

• Communicate with patients regarding proper / right way to use drugs, various drug formulations and the proper storage of drugs.

• Understand the legal, regulatory and ethical aspects of prescription

• Counsel / motivate patients for compliance / adherence to medications.

• Take adequate care and precautions to write prescriptions legibly and rationally and understanding the rationality of polypharmacy.

• Update themselves regarding recent advances.

• Demonstrate ability to prescribe and safely administer appropriate therapies including nutritional interventions, pharmacotherapy and interventions based on the principles of rational drug therapy, scientific validity, evidence and cost that conform to established national and regional health programmes and policies for Disease prevention, Health promotion and cure, Pain and distress alleviation, and Rehabilitation.

**Integration:**

Practical knowledge of use of drugs in Clinical Practice will be acquired through Integrated Teaching vertically with Preclinical and Clinical subjects and horizontally with other Para clinical subjects.

**Explanation of Terms used-**

**Competency**

The habitual and judicious use of communication, knowledge, technical skills, clinical reasoning, emotions, values, and reflection in daily practice for the benefit of the individual and community being served.

**Lecture**

Any instructional large group method including traditional lecture and interactive lecture.

**Small group discussion**

Any instructional method involving small groups of students in an appropriate learning context.

**DOAP** (Demonstration- Observation - Assistance - Performance)

A practical session that allows the student to observe a demonstration, assist the performer, perform in a simulated environment, perform under supervision or perform independently.

**Self-directed learning**

A process in which individuals take the initiative, with or without the help of others in diagnosing their learning needs, formulating learning goals, identifying human and material sources for learning, choosing and implementing appropriate learning methods.

**Skill assessment**

A session that assesses the skill of the student including those in the practical laboratory, skills lab, skills station that uses mannequins/ paper case/simulated patients/real patients as the context demands.

**CORE**

A competency that is necessary in order to complete the requirements of the subject (traditional must know)

**NON – CORE**

A competency that is optional in order to complete the requirements of the subject (traditional nice (good) to know/ desirable to know.

| **Pharmacology Curriculum** | | |
|---|---|---|
| | **Teaching Method** | **Hours** |
| 1 | Lectures (L) | 80 |
| 2 | Small Group Teaching (Tutorials / Seminars/ Practical) | 165 |
| 3 | Self-Directed Learning (SDL) | 10 |
| | Total | 255 |

| C. No. | Competency | Topics | Methodology | Hrs. |
|---|---|---|---|---|
| **I** | PH 1.1 - PH 1.12 | General Pharmacology and basic concepts of clinical Pharmacology | L | 2 |
| | | | L / SGD | 12 |
| | | | L / P | 7 |
| **II** | PH 1.13 - PH 1.15 | Autonomic nervous system | L | 1 |
| | | | L / SGD | 8 |
| **III** | PH 1.16 - PH 1.17 | Autacoids and related drugs | L | 6 |
| **IV** | PH 1.18 - PH 1.23 | Central nervous system | L | 11 |
| | | | L / SGD | 8 |
| **V** | PH 1.24 | Drugs acting on Kidney | L | 3 |
| **VI** | PH 1.25 | Drugs acting on Blood | L | 3 |
| **VII** | PH 1.26 - 1.30 | Cardiovascular system | L | 7 |
| **VIII** | PH 1.31 | Hypolipdaemic drugs | | |
| | | | L / SGD | 2 |

| | | | | |
|---|---|---|---|---|
| **IX** | PH 1.32 - 1.33 | Respiratory system. | L / SGD | 3 |
| **X** | PH 1.34 | Gastrointestinal tract | L / SGD | 5 |
| **XI** | PH 1.35 | Drugs acting on blood formation | L | 2 |
| **XII** | PH 1.36 - 1.40 | Drugs acting on Endocrine system | L | 10 |
| **XIII** | PH 1.41 | Drugs acting in Uterus | L | 1 |
| **XIV** | PH 1.42- 1.49 | Chemotherapy | L | 19 |
| **XV** | PH 1.50 - 1.64 | Miscellaneous | L | 15 |
| | | | | |
| **XVI** | | **Clinical Pharmacy** | | |
| | PH 2.1 | Demonstrate understanding of the use of various dosage forms (oral/local/parenteral; solid/liquid) | P | 14 |
| | PH 2.2 | Prepare Oral Rehydration Solution from ORS packet and explain its use | P | 4 |
| | PH 2.3 | Demonstrate the appropriate setting up of an intravenous drip in a simulated environment | P | 4 |

| | | | | |
|---|---|---|---|---|
| | PH 2.4 | Demonstrate the correct method of calculation of drug dosage in patients including those used in special situations | P | 4 |
| | PH 2.5 | Pandemic Module.<br>Therapeutic strategies including new drug development | L | 1 |
| | | | SGD | 2 |
| **XVII** | | **Clinical Pharmacology** | | |
| | PH 3.1 | Write a rational, correct and legible generic prescription for a given condition and communicate the same to the patient<br>Certification needed 5 | P | 6 |
| | PH 3.2 | Perform and interpret a critical appraisal (audit) of a given Prescription : Certification needed 3 | P | 6 |
| | PH 3.3 | Perform a critical evaluation of the drug promotional literature<br>Certification needed 3 | P | 6 |
| | PH 3.4 | To recognise and report an adverse drug reaction. | P | 4 |
| | PH 3.5 | To prepare and explain a list of P-drugs for a given case/condition : Certification needed 3. | P | 6 |
| | PH 3.6 | Demonstrate how to optimize interaction with pharmaceutical representative to get authentic information on drugs. | P | 2 |
| | PH 3.7 | Prepare a list of essential medicines for a healthcare facility | P | 4 |

| | | | | |
|---|---|---|---|---|
| | PH 3.8 | Communicate effectively with a patient on the proper use of prescribed medication | P | 4 |
| | | | | |
| **XVIII** | | **Experimental Pharmacology** | | |
| | PH 4.1 | Administer drugs through various routes in a simulated environment using mannequins | P | 10 |
| | PH 4.2 | Demonstrate the effects of drugs on blood pressure (vasopressor and vaso- depressors with appropriate blockers) using Computer Assisted Learning (CAL) | P | 6 |
| | | | | |
| **XIX** | | **Communication** | | |
| | PH 5.1 | Communicate with the patient with empathy and ethics on all aspect of drug use | SGD | 6 |
| | PH 5.2 | Communicate with the patient regarding optimal use of a) drug therapy, b) devices and c) storage of medicines | SGD | 6 |
| | PH 5.3 | Motivate patients with chronic diseases to adhere to the prescribed management by the health care provider | SGD | 6 |
| | PH 5.4 | Explain to the patient the relationship between cost of treatment and patient compliance | SGD | 6 |
| | PH 5.5 | Demonstrate an understanding of the caution in prescribing drugs likely to produce dependence and recommend the line of management | SGD | 6 |

| | | | | |
|---|---|---|---|---|
| | PH 5.6 | Demonstrate ability to educate public & patients about various aspects of drug use including drug dependence and OTC drugs | SGD | 6 |
| | PH 5.7 | Demonstrate an understanding of the legal and ethical aspects of prescribing drugs | SGD | 4 |

(Lectures- 80hrs, Lecture / small group discussion-38 hours, Lecture / practical- 7 hours. Small group discussion-40 hours, Practical-80 hours, Self-directed learning-10 hours Total: 255 hours.)

1. **General Pharmacology and basic concepts of clinical Pharmacology**

1 .PH1.1- Define and describe the principles of pharmacology and pharmacotherapeutics-Lecture - 1 Hour. Assessment: Written / Viva voce.

(Define Drug. Enumerate the Following-Sources of Drug and Sources of Drug information, branches of Pharmacology, Role of clinical Pharmacology and Evolution of Pharmacology.)

2. PH1.2- Describe the basis of Evidence based medicine and Therapeutic drug monitoring Lecture - 1 Hour. Assessment: Written / Viva voce.

(Enumerate - Study designs and sources of Research evidence, Rationale for evidence based treatment and updating treatment guidelines and Rationale for Therapeutic drug monitoring. Enumerate the Drugs and methods used for TDM.)

3. PH1.3- Enumerate and identify drug formulations and drug delivery systems.

Lecture / Practical - 1 Hour. Assessment: Written / Viva voce.

(Define dosage form, formulation and excipient. Enumerate the Drug formulations with Rationale. Enumerate the drug delivery systems and New drug delivery systems with Rationale.)

4. PH1.4- Describe absorption, distribution, metabolism & excretion of drugs.

Lecture / Small Group discussion- 5Hours. Assessment: Written/ Viva voce.

(Define Pharmacokinetics. Define Bioavailability, Bioequivalence. Enumerate the factors affecting drug absorption and Bioavailability. Enumerate the drug distribution in the body.

Define Apparent volume of distribution, Discuss the clinical significance of plasma protein binding, distribution and redistribution of Drugs.

Define Biotransformation. Enumerate the factors affecting Biotransformation and types of Biotransformation. Explain the clinical significance of First pass metabolism.

Enumerate Enzyme induction and inhibition and discuss the clinical significance. Enumerate the different routes of drug excretion and the factors affecting excretion.
Define and explain Plasma half-life and steady state concentration and discuss the clinical significance. Enumerate the various kinetics of elimination with clinical significance. Explain the clinical significance of Clearance, Loading dose and Maintenance dose etc. Explain the role of Pharmacokinetics in selecting appropriate dose, route and frequency for drug administration. Enumerate the methods for prolonging action of drugs. Mention the role of Pharmacokinetics in Rational Prescription.)

5. PH1.5- Describe general principles of mechanism of drug action.
Lecture / Small Group discussion - 5 Hours. Assessment: Written / Viva voce.
(Define Pharmacodynamics. Enumerate the different mechanisms of drug action with suitable examples. Define Receptor.
Describe the different types of Receptor mediated drug action with mechanism and examples. Explain Receptor Regulation- up regulation and down regulation with appropriate examples. Define affinity, intrinsic activity, agonist, partial agonist, inverse agonist, antagonist, potency, efficacy etc. with suitable examples. Enumerate the factors modifying drug action with clinical significance.
Describe synergism and antagonism with clinical significance and examples.
Mention the clinical significance of therapeutic index and therapeutic range.
Explain dose response relationship and dose response curves.)

6. PH1.6- Describe principles of Pharmacovigilance & ADR reporting systems.
Lecture / Practical 1 Hour. Assessment: Written/ Viva voce.
(Describe the Pharmacovigilance programme of India- Goals, functions, history, necessity etc. Define Pharmacovigilance, Adverse drug reaction etc. Discuss causality assessment of ADR. Enumerate the different methods of ADR reporting. Describe the filling of ADR reporting form.

Explain the clinical significance of Pharmacovigilance and Rational prescription.)

7. PH1.7- Define, identify and describe the management of adverse drug reactions (ADR)

Lecture / Practical – 1 Hour. Assessment: Written/ Viva voce.

(Define and Classify ADR with examples. Mention the predisposing factors for ADR. Explain the Detection of ADR and the Management of ADR. Describe the methods for preventing ADR and the importance of ADR documentation.)

8. PH1.8 -Identify and describe the management of Drug interactions.

Lecture / Practical - 1 Hour. Assessment: Written/ Viva voce.

(Define Drug interactions. Enumerate the different types of drug interaction with suitable examples-in vivo, in vitro, useful, harmful, pharmacokinetic and pharmacodynamic, Drug-drug, Drug- food, Drug-alcohol etc. Describe the methods for prevention of drug interaction and the management of drug interaction. Mention the sources of information of drug interaction for rational prescription.)

9. PH1.9- Describe nomenclature of drugs i.e. generic, branded drugs.

Lecture / Practical -1 Hour. Assessment: Written/ Viva voce.

(Enumerate the Chemical name, Generic name and Brand name of a drug. Explain the significance of using Generic names in prescribing.)

10. PH1.10 Describe parts of a correct, complete and legible generic prescription. Identify errors in prescription and correct appropriately.

Lecture / Practical- 1 Hour. Assessment: Written / Viva voce.

(Define Prescription. Enumerate the format of NMC / MCI model prescription. Identify and correct errors in Prescription. Mention the importance of Prescription auditing and documentation.)

11. PH1.11- Describe various routes of drug administration, e.g.., oral, SC, IV, IM, SL

Lecture / Small group discussion- 2 Hours. Assessment: Written/ Viva voce.

(Enumerate the routes of drug Administration-Oral, Parenteral, Topical etc. with suitable examples and advantages and disadvantages of each route. Identify the appropriate route of drug administration in a clinical setting.)

12. PH1.12- Calculate the dosage of drugs using appropriate formulae for an individual patient, including children, elderly and patient with renal dysfunction. Lecture / practical – 1 Hour. Assessment: Written/ Viva voce. (Explain the Formulae for calculating dosage of drug based on Age, Body weight and Surface area. Describe the methods of calculating drug dosage for individualization of therapy. Mention the need for modification of dose and the methods of dose calculation in children, elderly, renal damage, hepatic damage, pregnancy etc.)

**II. Autonomic nervous system.**

PH1.13 Describe mechanism of action, types, doses, side effects, indications and contraindications of adrenergic and anti-adrenergic drugs.

Lecture / Small Group discussion – 4 Hours. Assessment: Written/ Viva voce.

(Explain the function and organization of Autonomic Nervous System.

Enumerate the synthesis, storage, release and fate of Adrenergic neurotransmitters.

Enumerate the steps in neurohumoral transmission.

Classify Adrenergic drugs based on their actions, uses and structure. Enumerate Adrenergic Receptors-Structure, localization and Second messengers. Describe the types, mechanism of action, Pharmacokinetics, doses, adverse effects, indications, precautions, contraindications and drug interactions of Adrenergic Drugs E.g.- Adrenaline, Noradrenaline, Isoprenaline, Dopamine etc. Classify Alpha and Beta blockers. Describe the types, mechanism of action, Pharmacokinetics, doses, adverse effects, indications, precautions, contraindications and drug interactions of Alpha and Beta blockers.

PH1.14 Describe mechanism of action, types, doses, side effects, indications and Contraindications of cholinergic and anticholinergic drugs.

Lecture / Small Group discussion- 4 Hours. Assessment: Written/ Viva voce.

(Enumerate the synthesis, storage, release and fate of Cholinergic neurotransmitters. Enumerate Cholinergic Receptors- Structure, localization and Second messengers. Describe the types, mechanism of action, Pharmacokinetics, doses, adverse effects, indications, Precautions, contraindications and drug interactions of Cholinergic drugs- Choline esters, Cholinomimetic alkaloids, Anticholinesterases-Reversible and irreversible etc. Enumerate the management and treatment of Myasthenia gravis and Organophosphorus poisoning with rationale. Enumerate Anticholinergic drugs- (Muscarinic and Nicotinic blockers). Describe the types, mechanism of action, Pharmacokinetics, doses, adverse effects, indications, precautions, contraindications and drug interactions of Anticholinergic drugs- (Atropine, Hyoscine, Atropine substitutes etc. Explain the clinical significance of Atropine substitutes.)

PH1.15. Describe mechanism/s of action, types, doses, side effects, indications and contraindications of skeletal muscle relaxants.

Lecture- 1Hour. Assessment: Written/ Viva voce.

(Define Skeletal muscle relaxants. Enumerate the Skeletal muscle relaxants with examples.

Describe the types, mechanism of action, Pharmacokinetics, doses, adverse effects, indications, precautions, contraindications and drug interactions of Skeletal muscle relaxants- Centrally acting, Peripherally acting- Competitive, by Persistent depolarization etc.)

**III. Autacoids and related drugs.**

PH1.16 Describe mechanism/s of action, types, doses, side effects, indications and contraindications of the drugs which act by modulating autacoids, including: anti-

histaminics, 5-HT modulating drugs, NSAIDs, drugs for gout, anti-rheumatic drugs, drugs for migraine.

Lecture-5 Hours. Assessment: Written/ Viva voce.

(Mention the role of Histamine and Bradykinin in pathophysiological processes. Enumerate Histamine Receptors. Classify Antihistamines. Describe the types, mechanism of action, Pharmacokinetics, doses, adverse effects, indications, precautions, contraindications and drug interactions of Antihistamines- (First and second generation.) Explain the clinical significance of second generation Antihistamines and the management of Vertigo.

Explain the role of 5-HT in pathophysiological processes and describe its synthesis, storage and destruction. Enumerate the 5-HT Receptors and drugs modulating it. Describe the actions, kinetics, doses, adverse effects, uses, contraindications and drug interactions of 5-HT modulating drugs.

Classify Non- Steroidal Anti-inflammatory drugs. Describe the mechanism of action, pharmacokinetics, doses, adverse effects, indications, precautions, contraindications and drug interactions of NSAIDs. Explain the clinical significance of selective COX-2 inhibitors. Describe the management of Paracetamol and Salicylate poisoning.

Mention the pathophysiology of Gout. Enumerate the types, action, pharmacokinetics, doses, adverse effects, indications, precautions, contraindications and drug interactions of drugs used in Gout. Outline the management of Gout.

Mention the pathophysiology of Rheumatoid arthritis. Enumerate the types, action, pharmacokinetics, doses, adverse effects, indications, precautions, contraindications and drug interactions of Antirheumatic drugs. Outline the management of Rheumatoid arthritis.

Mention the pathophysiology of Migraine. Describe the action, kinetics, doses, adverse effects, uses, contraindications and drug interaction of drugs used for the prophylaxis and treatment of migraine.)

PH1.17 -Describe the mechanism/s of action, types, doses, side effects, indications and contraindications of local anaesthetics.

Lecture –1 hour. Assessment-Written/ Viva voce.

(Define and classify Local anaesthetics. Enumerate the types, action, pharmacokinetics, doses, adverse effects, indications, precautions, contraindications and drug interactions of Local Anaesthetics. Explain the techniques of administration of Local Anaesthetics. Mention the rationale for combining LA with Adrenaline and complications of Spinal anaesthesia.)

**IV. Central Nervous System**

PH1.18. Describe the mechanism/s of action, types, doses, side effects, indications and contraindications of general anaesthetics, and preanesthetic medications.

Lecture – 2 Hours. Assessment: Written/ Viva voce.

(Mention the mechanism and stages of General Anaesthesia. Define General Anaesthesia and Classify General Anaesthetics. Describe the types, mechanism of action, pharmacokinetics, adverse effects, indications, precautions, contraindications and drug interactions of General Anaesthetics. Enumerate the drugs used as preanesthetic medication with rationale.

PH1.19. Describe the mechanism/s of action, types, doses, side effects, indications and contraindications of the drugs which act on CNS, (including anxiolytics, sedatives & hypnotics, anti-psychotic, antidepressant drugs, anti-maniacs, opioid agonists and antagonists, drugs used for neurodegenerative disorders, anti-epileptics drugs)

Lecture- 9 Hours. Assessment: Written/ Viva voce.

(Define and Classify anxiolytics. Describe the types, mechanism of action, Pharmacokinetics, doses, adverse effects, indications, precautions, contraindications and drug interactions of Anxiolytics.

Define and Classify Sedative and Hypnotics. Mention the phases of sleep and management of Insomnia. Describe the types, mechanism of action, Pharmacokinetics, doses, adverse effects, indications, precautions, contraindications and drug interactions of sedative and hypnotics.

Mention the examples of psychosis and neurosis. Classify Psychotropic and Antipsychotic drugs. Explain the types, mechanism of action, Pharmacokinetics, doses, adverse effects, indications, precautions, contraindications and drug interactions of Antipsychotic drugs.

Mention the clinical significance of second generation / atypical Antipsychotics.
Classify Antidepressant drugs. Describe the types, mechanism of action, Pharmacokinetics, doses, adverse effects, indications, precautions, contraindications and drug interactions of Antidepressant drugs. Mention the clinical significance of selective serotonin reuptake inhibitors. Classify drugs used in Mania. Explain the types, mechanism of action, Pharmacokinetics, doses, adverse effects, indications, precautions, contraindications and drug interactions of drugs used in mania- Lithium and newer drugs. Enumerate Psychotomimetic drugs.

Define Analgesic. Mention the pain pathway. Classify Opioid Analgesics / agonists.
Describe the types, mechanism of action, Pharmacokinetics, doses, adverse effects, indications, precautions, contraindications and drug interactions of opioid analgesics. Enumerate opioid receptors and endogenous opioid peptides. Mention the WHO pain ladder.

Classify opioid antagonists. Explain the types, action, kinetics, doses, adverse effects, uses and contraindications of opioid antagonists. Describe the management of morphine poisoning and opioid addiction.

Classify drugs used in Parkinsonism. Describe the types, mechanism of action, Pharmacokinetics, doses, adverse effects, indications, precautions, contraindications and drug interactions of drugs used in parkinsonism. Mention the pathophysiology of parkinsonism.

Classify Cognition enhancers and drugs used in Alzheimer's disease. Mention the management and pathophysiology of Alzheimer's disease.

Classify Antiepileptic Drugs-Clinical and chemical classification. Describe the types, mechanism of action, Pharmacokinetics, doses, adverse effects, indications, precautions, contraindications and drug interactions of Antiepileptic drugs. Enumerate the types of Epilepsy and management of Epilepsy and Status epilepticus.

PH1.20. Describe the effects of acute and chronic ethanol intake.
Lecture / Small group discussion- 2 Hours. Assessment: Written/ Viva voce.
(Explain the action, effects, pharmacokinetics, adverse effects, drug interactions,
Contraindications and uses of ethyl alcohol- acute and chronic intake.
Mention the symptoms of alcohol dependence and Enumerate the drugs used in the management of alcohol dependence and de addiction.)
PH1.21 Describe the symptoms and management of methanol and ethanol poisonings.
Lecture /Small group discussion- 2 Hour. Assessment: Written/ Viva voce.
(Explain the symptoms and signs of methanol poisoning. Describe the drugs used with rationale in the treatment of methanol poisoning. Outline the management of methanol poisoning. Mention the symptoms and signs of ethanol poisoning. Describe the drugs used with rationale in the treatment of ethanol poisoning. Outline the management of ethanol poisoning.)

PH1.22 Describe drugs of abuse (dependence, addiction, stimulants, depressants, psychedelics, drugs used for criminal offences).

Lecture / Small group discussion- 2 Hours. Assessment: Written/ Viva voce.

(Define drug dependence and addiction. Classify drugs of abuse. Describe the source, action, adverse effects, withdrawal symptoms and the management of addiction of morphine, barbiturate, cocaine, cannabis etc. Discuss the drugs used for criminal offences.)

PH1.23. Describe the process and mechanism of drug de addiction.

Lecture / Small group discussion- 2 Hour. Assessment: Written/ Viva voce.

(Explain the mechanism of dependence and addiction of drugs of abuse. Describe the effects, mechanism of action, doses, uses, adverse effects etc. of the drugs used for de addiction.)

**V. Drugs acting on Kidney**

PH1.24 Describe the mechanism/s of action, types, doses, side effects, indications and contraindications of the drugs affecting renal systems including diuretics, antidiuretics-vasopressin and analogues.

Lecture-3 hours. Assessment: Written/ Viva voce.

(Mention the electrolyte transport in the renal system and the site of action of diuretics. Classify diuretics. Describe the types, mechanism of action, Pharmacokinetics, doses, adverse effects, indications, precautions, contraindications and drug interactions of Loop diuretics, Thiazides, Osmotic diuretics, carbonic anhydrase inhibitors, potassium sparing diuretics etc.

Enumerate Vasopressin receptors and mention the physiological effects of vasopressin.

Classify Antidiuretic drugs. Explain the types, action, effects, adverse effects and uses of Vasopressin, vasopressin analogues and vasopressin antagonists.)

**VI. Drugs acting on Blood**

PH1.25. Describe the mechanism/s of action, types, doses, side effects, indications and contraindications of the drugs acting on blood, like anticoagulants, antiplatelets, fibrinolytics, plasma expanders.

Lecture - 3 Hours. Assessment: Written/ Viva voce.

(Mention the mechanism of coagulation. Explain the coagulants used clinically with rationale. Classify Anticoagulants. Describe the types, mechanism of action, Pharmacokinetics, doses, adverse effects, indications, precautions, contraindications and drug interactions of Anticoagulants and the management of overdose of anticoagulants – Heparin, Warfarin etc.

Explain the clinical significance of low molecular weight heparin and direct factor Xa inhibitors. Explain the monitoring of anticoagulant treatment and dose regulation. Mention the therapeutic uses of Vitamin K.

Classify Antiplatelet drugs. Describe the action, types, pharmacokinetics, doses, adverse effects, drug interactions, contraindications and uses of antiplatelet drugs with rationale.

Mention the mechanism of fibrinolysis. Describe the action, types, pharmacokinetics, doses, adverse effects, drug interactions, contraindications and uses of Fibrinolytic drugs with Rationale-Tissue plasminogen activator, Streptokinase, Urokinase etc. Describe the action, pharmacokinetics, adverse effects and uses of Antifibrinolytic drugs with rationale- Tranexamic acid, EACA etc.

Define plasma expanders. Enumerate plasma expanders. Describe the types, action, adverse effects, precaution and uses of plasma expanders- crystalloids and colloids.)

**VII. <u>Cardiovascular system.</u>**

PH1.26 Describe mechanisms of action, types, doses, side effects, indications and contraindications of the drugs modulating the renin angiotensin and aldosterone system

Lecture- 1 Hour. Assessment: Written/ Viva voce.

(Mention the function of renin angiotensin aldosterone system. Enumerate the drugs modulating renin angiotensin aldosterone system. Describe the mechanism of action, Pharmacokinetics, doses, adverse effects, indications, precautions, contraindications and drug interactions of the drugs modulating the renin angiotensin and aldosterone system- Angiotensin converting enzyme inhibitors (ACEIs), Angiotensin receptor blockers (ARBs) and direct renin inhibitors- Aliskiren etc.)

PH1.27 Describe the mechanisms of action, types, doses, side effects, indications and contraindications of antihypertensive drugs and drugs used in shock

Lecture- 2 Hours. Assessment: Written/ Viva voce.

(Mention the types and pathophysiology of hypertension. Classify antihypertensive drugs. Describe the mechanism of action, Pharmacokinetics, doses, adverse effects, indications, precautions, contraindications and drug interactions of antihypertensive drugs-RAAS inhibitors, Calcium channel blockers, Sympatholytic drugs- (alpha and beta blockers, Central sympatholytics, adrenergic neurone blockers and ganglion blockers), vasodilators, Potassium channel activators, diuretics etc. Explain the antihypertensive drugs which are used and which are contraindicated in the following conditions- Pregnancy, diabetes mellitus, renal damage, hepatic damage, cardiac failure etc. Explain the principles of drug therapy in hypertension- Stepwise management, Drug combinations used and not used, Treatment of hypertensive emergencies, Treatment of pulmonary hypertension and orthostatic hypotension, Treatment of hypertension in elderly and pregnancy etc.

Define shock. Mention the pathophysiology of shock. Describe the types of shock.

Describe the drugs used with rationale in the treatment of anaphylactic shock, septic shock, hypovolemic shock, cardiogenic and neurogenic shock.)

PH1.28. Describe the mechanisms of action, types, doses, side effects, indications and

contraindications of the drugs used in ischemic heart disease (stable, unstable angina and myocardial infarction), peripheral vascular disease.

Lecture- 2 Hours. Assessment: Written/ Viva voce.

(Mention the types of angina pectoris. Classify antianginal drugs. Describe the mechanism of action, Pharmacokinetics, doses, adverse effects, indications, precautions, contraindications and drug interactions of antianginal drugs -Nitrates, Calcium channel blockers, Beta blockers, Potassium channel openers, Cytoprotectives- (Trimetazidine, Ranolazine), Ivabradine etc.

Outline the management of different types of angina-exertional angina, variant angina, unstable angina etc.

Mention the pathophysiology of myocardial infarction. Describe the mechanism of action, Pharmacokinetics, doses, adverse effects, indications, precautions, contraindications and drug interactions of drugs used in the treatment of myocardial infarction with rationale.

Enumerate the drugs used in peripheral vascular disease with rationale. Explain the mechanism of action adverse effects and uses of Pentoxifylline and Cilostazol.

PH1.29 Describe the mechanisms of action, types, doses, side effects, indications and contraindications of the drugs used in congestive heart failure.

Lecture- 1 Hour. Assessment: Written/ Viva voce.

(Mention the pathophysiology of cardiac failure. Enumerate the drugs used in cardiac failure with rationale. Describe the mechanism of action, Pharmacokinetics, doses, adverse effects, indications, precautions, contraindications and drug interactions of the drugs used in cardiac failure- Inotropic drugs (Digoxin, Dopamine, Dobutamine, Amrinone, Milrinone), Diuretics- (Furosemide, Thiazides), RAAS inhibitors (ACEIs, ARBs), Vasodilators- (Hydralazine, Nitroprusside, Nitrates), Beta blockers, Aldosterone antagonists, BNP-(Nesiritide), Neprilysin inhibitor-(Sacubitril) etc.

PH1.30. Describe the mechanisms of action, types, doses, side effects, indications and contraindications of the anti arrhythmics- (Non-Core)

Lecture- 1Hour. Assessment: Written / Viva voce.

(Mention the mechanism of cardiac arrythmias and the types of cardiac arrhythmias. Classify antiarrhythmic drugs. Describe action, types, doses, adverse effects, indications, precautions, contraindications and drug interactions of antiarrhythmic drugs.)

**VIII. Hypolipidemic drugs.**

PH1.31 Describe the mechanisms of action, types, doses, side effects, indications and contraindications of the drugs used in the management of dyslipidemias.

Lecture / Small group discussion- 2 Hour. Assessment: Written / Viva voce.

(Mention lipid metabolism and the pathophysiology of dyslipidaemias/ hyperlipidaemias.

Classify drugs used in hyperlipidaemias / dyslipidaemias. Describe the mechanism of action, Pharmacokinetics, doses, adverse effects, indications, precautions, contraindications and drug interactions of the drugs used in hyperlipidaemias-Statins, Resins, Ezetimibe, Fibrates, Nicotinic acid etc. Explain the management of hyperlipidaemias with the rationale of drugs used. Mention the non-pharmacological management of hyperlipidaemias.)

**IX. Respiratory system.**

PH1.32 Describe the mechanism/s of action, types, doses, side effects, indications and contraindications of drugs used in bronchial asthma and COPD

Lecture / Small Group discussion- 2 Hours. Assessment: Written/ Viva voce.

(Mention the pathophysiology of Bronchial Asthma. Classify drugs used in Bronchial Asthma.

Describe the mechanism of action, Pharmacokinetics, doses, adverse effects, indications, precautions, contraindications and drug interactions of the drugs used in bronchial asthma- beta adrenergic agonists, methyl xanthines, anticholinergics, glucocorticoids, mast cell stabilizers, Leukotriene modifiers, anti-IgE antibodies, PAF antagonists etc. Explain the role of inhaled drugs in bronchial asthma and explain the types of inhalational devices- spacer, nebulizer, MDI, rotahaler etc. Enumerate the stepwise management of bronchial asthma. Outline the management of Status asthmaticus, acute asthma, allergic asthma, chronic asthma and COPD.

PH1.33 Describe the mechanism of action, types, doses, side effects, indications and contraindications of the drugs used in cough (antitussives, expectorants/ mucolytics)
Lecture/ Small Group discussion- 1 Hour. Assessment: Written/ Viva voce.
(Mention the causes and types of cough. Classify the drugs used in cough.
Describe the mechanism of action, adverse effects and uses of the drugs used in cough- antitussives, pharyngeal demulcents, expectorants, mucolytics etc. Mention the drugs causing cough and bronchospasm.)

**X. <u>Gastrointestinal tract</u>**

PH1.34 Describe the mechanism/s of action, types, doses, side effects, indications and contraindications of the drugs used as below:

1. Acid-peptic disease and GERD
2. Antiemetics and prokinetics
3. Antidiarrhoeals
4. Laxatives
5. Inflammatory Bowel Disease
6. Irritable Bowel Disorders, biliary and pancreatic diseases

Lecture / Small Group discussion- 5 Hours. Assessment: Written/ Viva voce
(Mention the pathophysiology of gastric acid secretion. Classify drugs used in peptic ulcer.

Describe the mechanism of action, Pharmacokinetics, doses, adverse effects, indications, precautions, contraindications and drug interactions of the drugs used in peptic ulcer- Antacids, Proton pump inhibitors, $H_2$ Receptor blockers, anticholinergics, prostaglandin analogues, Mucosal ulcer protective drugs, Anti helicobacter pylori drugs etc. Outline the management of peptic ulcer with rationale of drugs used. Enumerate the drugs used in GERD with rationale.

Mention the physiology of vomiting. Classify Antiemetics. Describe the mechanism of action, Pharmacokinetics, doses, adverse effects, indications, precautions, contraindications and drug interactions of the drugs used in vomiting- prokinetic drugs, antihistamines, $5HT_3$ antagonists, anticholinergics, $NK_1$ antagonists, cannabinoids, steroids, neuroleptics etc. Explain the antiemetic drugs used with rationale in vomiting due to pregnancy, motion sickness, postoperative vomiting, cancer chemotherapy etc. Mention the drugs causing vomiting-(Emetics).

Mention the pathophysiology of diarrhoea. Classify Antidiarrheal drugs. Describe the mechanism of action, Pharmacokinetics, doses, adverse effects, indications, precautions, contraindications and drug interactions of the drugs used in diarrhoea-
Antisecretory drugs- (Racecadotril, Anticholinergics, Opioids, Octreotide, Bismuth),
Antimotility drugs- (Codeine, Diphenoxylate, Loperamide), PG inhibitors, Chloride channel inhibitors, Probiotics, Astringents, Adsorbents, Protectives etc. Explain the importance of oral rehydration therapy- WHO modified ORS, Cereal based and Zinc supplemented ORS etc.
Outline the management of different types of diarrhoea. Mention the drugs causing diarrhoea.

Mention the pathophysiology of constipation. Classify laxatives / purgatives. Describe the mechanism of action, Pharmacokinetics, doses, adverse effects, indications, precautions, contraindications and drug interactions of the drugs used in constipation-

Stimulant / irritant laxatives, Osmotic laxatives, Bulk laxatives, Emollient laxatives, Chloride channel activators, $5HT_4$ receptor agonists etc. Outline the management of constipation with rationale of drugs used- in pregnancy, functional constipation, bedridden, postoperative patients etc.

Mention the pathophysiology and treatment of inflammatory bowel diseases-anti-inflammatory (Sulfasalazine, Prednisolone) immunosuppressants- (Azathioprine, Methotrexate, Cyclosporine) Infliximab etc.

Mention the pathophysiology of irritable bowel syndrome. Outline the treatment of irritable bowel disorders- Laxatives, Antidiarrheals, Secretagogues/Prosecretory agents, Retainagogues, Antispasmodics, Anticholinergics, Direct smooth muscle relaxants, Antidepressants, Antibiotics –(Rifaximin), 5HT agonists and antagonists - etc. Mention the drugs used in the treatment of pancreatitis, drugs used to reduce gall stones etc.

**XI. <u>Drugs acting on blood formation.</u>**

PH1.35. Describe the mechanism/s of action, types, doses, side effects, indications and contraindications of drugs used in haematological disorders like:

1. Drugs used in anaemias
2. Colony Stimulating factors

Lecture- 2 Hours. Assessment: Written/ Viva voce.

(Define anaemia and mention the causes and types of Anaemia. Mention the metabolism of Iron. Enumerate the oral and parenteral iron preparations. Describe the kinetics, adverse effects, precautions, drug interactions and uses of oral and parenteral iron preparations. Outline the management of iron poisoning.

Mention the pathophysiology of megaloblastic anaemia. Mention the physiological functions of vit. B12 and Folic acid. Describe the kinetics, adverse effects and uses of Vit. B12 and Folic acid. Describe the action, kinetics, adverse effects, precautions, drug interactions and uses of Erythropoietin and Colony stimulating factors.

**XII. <u>Drugs acting on Endocrine system</u>**

PH1.36 Describe the mechanism of action, types, doses, side effects, indications and contraindications of drugs used in endocrine disorders (diabetes mellitus, thyroid disorders and osteoporosis).

Lecture- 4 Hours. Assessment: Written/ Viva voce.

(Mention the pathophysiology of diabetes mellitus. Classify the drugs used in diabetes mellitus.

Enumerate the types of insulin- insulin, human insulin, insulin analogues etc. Mention the causes and management of insulin resistance. Describe the mechanism of action, Pharmacokinetics, doses, adverse effects, indications, precautions, contraindications and drug interactions of the drugs used in diabetes mellitus-Insulin, Insulin analogues, Amylinomimetics, GLP-1 agonists, Oral antidiabetic drugs etc. Outline the management with rationale of drugs used in- type 1 and type 2 diabetes mellitus, diabetic ketoacidosis and hyperosmolar non ketotic coma. Mention the nonpharmacological management of diabetes mellitus. Mention the uses of glucagon and management of hypoglycaemia.

Mention the physiology of thyroid hormones. Classify antithyroid drugs. Describe the mechanism of action, Pharmacokinetics, doses, adverse effects, indications, precautions, contraindications and drug interactions of antithyroid drugs. Outline the management of hyperthyroidism, thyrotoxic crisis and hypothyroidism with rationale of drugs used.

Mention the physiological role and functions of Calcium, Phosphorous, Calcitonin, Vit. D, PTH etc. Outline the management of hypocalcaemia and hypercalcaemia with rationale of drugs used. Describe the actions, adverse effects, uses and drug interactions of Bisphosphonates

Outline the drugs used in osteoporosis with rationale. -Bisphosphonates, SERM, Calcitonin, PTH, Estrogen (HRT), Denosumab, Strontium ranelate etc.

PH1.37 Describe the mechanisms of action, types, doses, side effects, indications and contraindications of the drugs used as sex hormones, their analogues and anterior Pituitary hormones.

Lecture- 2 Hours. Assessment: Written/ Viva voce.

(Mention the regulation of secretion of Estrogen and Progesterone. Explain the actions uses and adverse effects of Estrogen and Progestins. Enumerate the drugs used in HRT with rationale. Describe the actions, adverse effects, precautions and uses of Antiestrogens- SERMs, Aromatase inhibitors, Clomiphene, Fulvestrant etc. Describe the actions, adverse effects, precautions and uses of Antiprogestins-Mifepristone, Ulipristal etc.

Mention the regulation of androgen secretion. Explain the mechanism of action, adverse effects and uses of Androgens and Anabolic steroids. Describe the action, uses and adverse effects of Antiandrogens-Flutamide, Cyproterone, Finasteride etc.

Mention the physiological role of anterior pituitary hormones, regulation of the release of anterior pituitary hormones and the significance of Hypothalamic pituitary axis.

Enumerate the drugs inhibiting /antagonists and releasing / agonists anterior pituitary hormones and mention their actions, uses and adverse effects. - growth hormone (Somatostatin, Octreotide, Lanreotide, Pegvisomant, Somatorelin, sermorelin) prolactin (Bromocriptine, Apomorphine, Neuroleptics, Metoclopramide,) gonadotropins- (agonists-Leuprolide, Leuprorelin, Buserelin, Goserelin, antagonists-Ganirelix, Cetrorelix.) Explain the action uses and adverse effects of GnRH agonists and antagonists.

PH1.38 Describe the mechanism of action, types, doses, side effects, indications and contraindications of corticosteroids.

Lecture- 2 hours. Assessment: Written/ Viva voce.

(Mention the biosynthesis and physiological role of corticosteroids. Classify Corticosteroids. Describe the mechanism of action, types, doses, side effects, indications, precautions, contraindications and drug interactions of corticosteroids. Mention the clinical significance of gradual withdrawal of glucocorticoid treatment.)

PH1.39. Describe mechanism of action, types, doses, side effects, indications and contraindications of the drugs used for contraception.

Lecture- 1 Hour. Assessment: Written/ Viva voce.

(Classify the drugs used for contraception. Describe mechanism of action, types, doses, side effects, indications, contraindications and practical considerations of the drugs used for contraception.)

PH1.40. Describe mechanism of action, types, doses, side effects, indications and contraindications of 1. Drugs used in the treatment of infertility, and

2. Drugs used in erectile dysfunction

Lecture- 1 Hour. Assessment: Written / Viva voce.

(Mention the causes of infertility. Classify the drugs used in the treatment of infertility. Describe mechanism of action, types, doses, side effects, indications, contraindications and drug interactions of the drugs used in the treatment of infertility.

Mention the causes of erectile dysfunction. Enumerate the drugs used in the treatment of erectile dysfunction. Describe mechanism of action, types, doses, side effects, indications, contraindications and drug interactions of the drugs used in the treatment of erectile dysfunction.)

**XIII. <u>Drugs acting on uterus</u>**

PH1.41. Describe the mechanisms of action, types, doses, side effects, indications and contraindications of uterine relaxants and stimulants.

Lecture- 1 Hour. Assessment: Written/ Viva voce

(Classify uterine relaxants. Describe the mechanisms of action, types, doses, side effects, indications, contraindications and drug interactions of uterine relaxants- Nifedipine, Indomethacin, Salbutamol, Terbutaline, Ritodrine, Atosiban, Nitroglycerine, Magnesium sulfate etc. Classify uterine stimulants. Describe the mechanisms of action, types, doses, side effects, indications, contraindications and drug interactions of uterine stimulants- Oxytocin, Ergot alkaloids, Prostaglandins, etc.)

**XIV. Chemotherapy**

PH1.42 Describe general principles of chemotherapy

Lecture- 4 hours. Assessment: Written/ Viva voce.

(Define Antibiotic. Classify Chemotherapeutic agents /Antimicrobial drugs- (based on chemical structure, mechanism of action, source, activity/spectrum/type of action. etc.). Enumerate the problems with use of antimicrobial Drugs-Resistance, superinfection etc.

Explain the factors considered for choice of antimicrobial Drug-Patient factors, drug factors- (MIC, MBC, CDK, TDK, PAE), microbe related factors etc. Enumerate the advantages and disadvantages of antimicrobial combinations. Mention the role of Antimicrobial prophylaxis.

Describe the mechanisms of action, types, doses, side effects, indications, precautions, contraindications, drug interaction, antimicrobial spectrum and resistance of Sulfonamides, Trimethoprim, Quinolones, Beta Lactams, Aminoglycosides, Macrolides, Tetracyclines, Chloramphenicol, Vancomycin. Linezolid, Clindamycin, Polymyxin, Furazolidone, Daptomycin, Quinupristin /Dalfopristin etc.

Mention the drugs used in the treatment of Methicillin resistance, Vancomycin resistance etc.

PH1.43 Describe and discuss the rational use of antimicrobials including antibiotic stewardship program.

Lecture - 1Hour. Assessment: Written/ Viva voce.

(Describe the factors considered for the choice of an antimicrobial drug, dose and duration of treatment - Patient factors, drug factors - (MIC, MBC, CDK, TDK, PAE) microbe related factors etc. Explain the importance of Right - (Drug, Dose, Duration, Route, Frequency, Time, Patient, Cost, Formulation, Storage and Documentation) in rational antimicrobial use. Describe the methods to reduce and prevent resistance - Use the right drug, dose, route and duration, use narrow spectrum and less potent drugs if possible and treat resistant strains actively and use antibiotics only if essential. Enumerate the mechanisms of antimicrobial resistance and its management. Describe the principles of antibiotic stewardship program - To Prevent bacterial resistance - by Optimal diagnosis, drug selection, drug dosage, drug duration and drug Route, WHO global programs, antibiotic policies and guidelines, steps to reduce toxicity, resistance, superinfection and cost of treatment, monitor antibiotic prescription - prescription audit, educate prescribers for rational prescription to reduce resistance, need for hospital Antibiogram and hospital Antibiotic policy, importance of culture and sensitivity before giving antimicrobials etc.

PH1.44 Describe the first line antitubercular dugs, their mechanisms of action, side effects and doses.

Lecture - 2 Hours. Assessment: Written/ Viva voce.

(Mention the pathophysiology of Tuberculosis. Classify Antitubercular drugs. Describe the mechanism of action, doses, side effects, indications, contraindications, drug interaction and resistance of Antitubercular drugs - Rifampicin, Rifapentine, Rifabutin, Isonicotinic acid hydrazide, Pyrazinamide, Streptomycin, Ethambutol, Thiacetazone, Paraaminosalicylic acid, Bedaquilline, Delamanid, Terizidone etc. Mention the role of the following drugs in tuberculosis - Quinolones, Macroldes, Aminoglycosides,

Ethionamide, Cycloserine, Linezolid, Clofazimine etc. Explain the advantages of drug combinations in treatment of tuberculosis. Explain the NTEP and RNTCP regimen.)

PH1.45. Describe the drugs used in MDR and XDR Tuberculosis.

Lecture - 1 Hour. Assessment: Written/ Viva voce

(Define MDR and XDR Tuberculosis. Describe the mechanism of action, doses, side effects, indications, contraindications and drug interaction of drugs used in MDR and XDR tuberculosis - Kanamycin. Levofloxacin, Pyrazinamide, Ethambutol, Ethionamide, Cycloserine, Capreomycin. PAS, Moxifloxacin, INH, Clofazimine, Linezolid, Amoxicillin & Clavulanic acid, Rifampicin etc.

Mention the regimen in the intensive phase and continuation phase of MDR and XDR tuberculosis. Mention the treatment of Atypical mycobacteria / MAC.)

PH1.46. Describe the mechanisms of action, types, doses, side effects, indications and contraindications of antileprotic drugs.

Lecture - 1 Hour. Assessment: Written/ Viva voce

(Mention the types of leprosy. Classify antileprotic drugs. Describe the mechanism of action, doses, side effects, indications contraindications drug interactions and resistance of antileprotic drugs - Dapsone, Rifampicin. Clofazimine, Ethionamide, Quinolones, Minocycline, Clarithromycin etc. Describe the management of leprosy and lepra reactions.)

PH1.47. Describe the mechanisms of action, types, doses, side effects, indications and contraindications of the drugs used in malaria, KALA - AZAR, amebiasis and intestinal helminthiasis.

Lecture - 4 Hours. Assessment: Written/ Viva voce.

(Mention the life cycle of malarial parasite. Mention the clinical classification and chemical classification of antimalarial drugs. Describe the mechanism of action, doses, side effects, indications, contraindications, drug interactions and resistance of the

drugs used in malaria - Chloroquine, Primaquine, Mefloquine, Artemisinin compounds, Quinine, Halofantrine, Pyrimethamine, Proguanil, Sulfadoxine, Doxycycline, Clindamycin etc. Explain the management of malaria - Acute attack, radical cure, cerebral malaria, chloroquine resistant malaria, MDR malaria etc. Mention the chemoprophylaxis of malaria. Mention the drug combinations used in malaria.
Mention the pathophysiology of Kala - Azar. Classify the drugs used in Kala - Azar. Describe the mechanism of action, doses, side effects, indications, contraindications, drug interactions and resistance of the drugs used in Kala - azar - Sodium stibogluconate, Pentamidine, Paromomycin, Amphotericin B, Miltefosine etc. Mention the management of Kala - azar.

Mention the pathophysiology of Amoebiasis. Classify the drugs used in Amebiasis - Clinical and Chemical classification. Describe the mechanism of action, doses, side effects, indications, contraindications, drug interactions and resistance of the drugs used in amoebiasis - Metronidazole, Tinidazole, Secnidazole, Chloroquine, Hydroxy quinolines, Emetine, Diloxanide furoate, Nitazoxanide, Tetracycline. Paromomycin. etc. Outline the management of amoebiasis.

Mention the common helminth infections with symptoms and mention the drug of choice -
Tapeworm, Hookworm, Roundworm, Whip worm, Pinworm, Threadworm, Filariasis, Hydatid disease, Guinea worm, Strongyloidiasis, Schistosomiasis etc. Explain the action, adverse effects use and contraindications of the drugs used in helminthiasis - Albendazole, Mebendazole, Levamisole, Pyrantel pamoate, Piperazine, Praziquantel, Niclosamide, Diethylcarbamazine, Ivermectin, Bephenium. Metrifonate etc.)

PH1.48 Describe the mechanisms of action, types, doses, side effects, indications and contraindications of the drugs used in UTI/ STD and viral diseases including HIV & Antifungal drugs.

Lecture - 3 Hours. Assessment: Written/Viva voce

(Mention the pathophysiology of UTI. Classify drugs used for UTI. Describe the mechanism of action, doses, side effects, indications, contraindications, drug interactions and resistance of the drugs used in UTI - Cotrimoxazole, Ampicillin, Aminoglycosides, quinolones, Cephalosporins, Azithromycin, Carbenicillin, Piperacillin, Doxycycline, Sulfonamides, Nitrofurantoin etc. Mention the management of UTI.

Mention the common STDs. Classify the drugs used in STDs. Describe the mechanism of action, doses, side effects, indications, contraindications, drug interactions and resistance of the drugs used in STDs - Penicillins, Quinolones, Cephalosporins, Aminglycosides, Tetracycline, Doxycycline, Azithromycin, Cotrimoxazole, Metronidazole etc.

Mention the management of STDs. - Syphilis, Gonorrhea, Lymphogranuloma venereum, Chancroid, Granuloma inguinale, Vaginitis - (Trichomonas, Candida) etc.

Classify drugs used for nonretroviral viral infections. Describe the mechanism of action, doses, side effects, indications, contraindications, drug interactions and resistance of the drugs used in non - HIV viral infections - Acyclovir, Idoxuridine, Trifluridine, Famciclovir, Docosanol, Ganciclovir, Foscarnet, Fomivirsen, Lamivudine, Adefovir, Tenofovir, Interferon, Amantadine, Ribavirin, Oseltamivir, Zanamivir, Sofosbuvir, Gamma globulin etc. Mention the management of viral infections - Herpes, Hepatitis B and C, Influenza, Cytomegalovirus, H1N1 etc.

Mention the pathophysiology of HIV infection. Classify Antiretroviral drugs. Describe the mechanism of action, doses, side effects, indications, contraindications, drug interactions and resistance of the drugs used in HIV infection - Zidovudine, Didanosine, Lamivudine, Nevirapine, Etravirine, Efavirenz, Ritonavir, Indinavir, Saquinavir, Enfuvirtide, Maraviroc, Raltegravir, Elvitegravir, Tenofovir etc. Explain the management of HIV infection as per national guidelines and HAART regimen.

Classify Antifungal drugs. Describe the mechanism of action, doses, side effects, indications, contraindications, drug interactions and resistance of the drugs used in fungal infections.)

PH1.49. Describe mechanism of action, classes, side effects, indications and contraindications of anticancer drugs.

Lecture - 3 Hours. Assessment: Written/Viva voce.

(Enumerate the general principles in the chemotherapy of cancer. Classify Anticancer drugs - based on action/source/structure/cell cycle etc. Explain the general toxicity of cytotoxic drugs. Describe the mechanism of action, doses, side effects, indications, contraindications, drug interactions and resistance of the drugs used in cancer - Alkylating agents, Antimetabolites, Antibiotics, Natural and plant products, Targeted drugs, Biological response modifiers, Hormones and antagonists, Radioactive isotopes, Proteasome inhibitors etc. Describe the action, doses, adverse effects and uses of the drugs used for the toxicity amelioration of anticancer drugs. Mention the combined modality therapy in cancer.)

**XV. <u>Miscellaneous</u>**

PH1.50. Describe mechanisms of action, types, doses, side effects, indications and contraindications of immunomodulators and management of organ transplant rejection

Lecture - 1 Hour. Assessment: Written/ Viva voce.

(Classify Immunosuppressants. Describe mechanisms of action, types, doses, side effects, indications, contraindications and drug interactions of Immunosuppressants - Calcineurin inhibitors, m - TOR inhibitors, Glucocorticoids, Cytotoxic / antiproliferative drugs, Antibodies (Muromonab, Basiliximab, Daclizumab), Anakinra, TNF alpha inhibitors etc.

Mention the management of organ transplant rejection. Enumerate the drugs used as Immunostimulants. Describe mechanisms of action, types, doses, side effects, indications, contraindications and drug interactions of Immunostimulants - Amantadine, Tilorane, Thalidomide, Lenalidomide, Levamisole, Interferon, Glatiramer, BCG vaccine etc.)

PH1.51. Describe occupational and environmental pesticides, food adulterants, pollutants and insect repellents.

Lecture - 1 Hour. Assessment: Written/ Viva voce.

(Mention the occupational pesticides and its management - Herbicide, Insecticide, Fungicide, Bactericide, Rodenticide, Fumigant etc.

Mention environmental pesticides and its management - aldrin, chlordane, DDT, dieldrin, endrin, heptachlor, hexachlorobenzene, mirex, toxaphene etc.

Mention the food adulterants - Fruits and vegetables - Chemical dyes, Malachite green, calcium carbide, copper sulphate and oxytocin saccharin wax. Sugar - Chalk powder, Washing soda, Urea. Edible Oils - Mineral oil, Karanja oil, castor oil and artificial colours. Mention the management of food adulterants.

Mention the pollutants - Air Pollutants - Carbon Monoxide, Lead, Nitrogen Oxides. Ozone, Particulate Matter, Sulfur Dioxide. Water pollutants - insecticides, herbicides, food processing waste, chemical waste, heavy metals etc. Mention the management of pollutants.

Mention the insect repellents - DEET, picaridin, IR3535, and oil of lemon eucalyptus etc.)

PH1.52. Describe management of common poisoning, insecticides, common sting and bites

Lecture - 1 Hour. Assessment: Written/ Viva voce.

(Describe the management of drug and insecticide poisoning - Emesis, Gastric lavage, by reducing absorption, increasing urinary elimination, dialysis, Specific antidotes,

symptomatic and supportive treatment etc. Describe the management of snake bite, scorpion bite, bee sting other bites etc.)

PH1.53. Describe heavy metal poisoning and chelating agents.

Lecture - 1Hour. Assessment: Written/ Viva voce

(Mention the symptoms of heavy metal poisoning. Define chelating agent. Classify chelating agents used in heavy metal poisoning. Describe mechanisms of action, doses, side effects, indications, precautions, contraindications and drug interactions of chelating agents - Desferrioxamine, Deferiprone, Deferasirox, Dimercaprol, Succimer, Calcium disodium edetate, Penicillamine, Trientine, Dithiocarb etc.)

PH1.54. Describe vaccines and their uses.

Lecture - 1Hour. Assessment: Written/ Viva voce.

(Define vaccine. Classify vaccines. Explain passive and active immunity. Describe the uses and side effects of vaccines - Bacterial, viral, toxoid, antisera, immunoglobulins etc. Mention the routine pediatric immunization schedule with reference to IAP guidelines.)

PH1.55. Describe and discuss the following National Health Programmes including Immunisation, Tuberculosis, Leprosy, Malaria, HIV, Filaria, Kala Azar, Diarrhoeal diseases, Anaemia & nutritional disorders, Blindness, Non - communicable diseases, cancer and Iodine deficiency.

Lecture - 1 Hour. Assessment: Written/ Viva voce.

(Describe/explain the following national health programmes - Universal immunization program in India, Revised national tuberculosis elimination program, National leprosy eradication program, National vector borne disease control program, National HIV control program, Diarrhoeal diseases control program, National nutritional anaemia control program, National program for control of blindness and visual impairment, National program for prevention and control of cancer, diabetes, cardiovascular diseases and stroke, Iodine deficiency disorders control program etc.)

PH1.56. Describe basic aspects of Geriatric and Pediatric pharmacology.

Lecture - 1 Hour. Assessment: Written/ Viva voce.

(Explain the physiological alterations in elderly and children and its effects on the pharmacokinetic and pharmacodynamic factors of drugs. Mention the drugs to be avoided or needing dose reduction and mention the principles for rational prescription in elderly and children.)

PH1.57. Describe drugs used in skin disorders.

Lecture - 1 hour. Assessment: Written/ Viva voce

(Mention the absorption of drugs through the skin. Mention the topical glucocorticoids. Describe the action, adverse effects and uses of glucocorticoids used in skin disorders. Explain the action, adverse effects and uses of drugs used in the treatment of Acne vulgaris, Psoriasis, vitiligo, Dermatitis etc. Define and describe the action uses and adverse effects of - astringents, adsorbents, protectives, demulcents, emollients, keratolytics, melanising agents, irritants and counter irritants.

Mention the sunscreen agents.)

PH1.58. Describe drugs used in Ocular disorders.

Lecture - 1 Hour. Assessment: Written/ Viva voce.

(Mention the principles of drug therapy in ocular disorders. Mention the pathophysiology of glaucoma. Classify drugs used for glaucoma. Explain the action uses and adverse effects of drugs used in glaucoma. Describe the action uses and adverse effects of ophthalmic drugs. Mention the drugs causing ocular toxicity).

PH1.59. Describe and discuss the following: Essential medicines, Fixed dose combinations, Over the counter drugs, Herbal medicines.

Lecture - 1 Hour. Assessment: Written/ Viva voce.

(Define essential medicines / drugs. Mention the guidelines / criteria for selection of essential medicine. Explain the relevance / significance of separate essential medicine list at various levels of healthcare. Mention about NLEM and WHO EML.

Define fixed dose combination. Mention the advantages and disadvantages of fixed dose combinations. Mention examples of CDSCO approved and banned FDC. Mention the importance of pharmacokinetic and pharmacodynamic factors for combining drugs in FDC.

Define over the counter (OTC) drugs. Mention the advantages and disadvantages of OTC. Describe the principles for selecting OTC drugs and educating the patient regarding use of OTC drugs.

Mention the examples of Herbal medicines and explain the advantages and disadvantages of Herbal medicines.)

PH1.60. Describe and discuss Pharmacogenomics and Pharmacoeconomics.

Lecture - 1 Hour. Assessment - Written/ Viva voce.

(Define Pharmacogenomics. Explain the importance of pharmacogenomics and Pharmacogenetics in the pharmacokinetic and pharmacodynamic effects of drugs. Mention the examples of pharmacogenetics. Explain the clinical significance of pharmacogenetics.

Define Pharmacoeconomics. Mention the clinical significance of Pharmacoeconomics. Mention the methods of cost containment and the role of cost effective, cost benefit and cost utility analysis.)

PH1.61. Describe and discuss dietary supplements and nutraceuticals.

Lecture - 1 Hour. Assessment: Written/ Viva voce.

Mention the advantages and disadvantages of dietary supplements and nutraceuticals.

Enumerate vitamins and minerals. Mention the action uses and adverse effects of Vitamins and Minerals. Mention the rationale for vitamin / dietary supplements in - pregnancy and lactation, convalescence, HIV infection, alcoholism, drug addiction etc.)

PH1.62. Describe and discuss antiseptics and disinfectants.

Lecture - 1 Hour. Assessment: Written / Viva voce.

Define antiseptics and Disinfectants. Classify antiseptics and disinfectants. Describe the Action, adverse effects and uses of antiseptics and disinfectants. Mention the Ecto parasiticides. Mention the action, adverse effects and uses of ecto parasiticides. Mention the role of hand hygiene. Enumerate hand sanitizers.)

PH1.63. Describe Drug Regulations, acts and other legal aspects.

Lecture - 1Hour. Assessment - Written/ Viva voce.

(Explain the legal, regulatory and ethical aspects of prescribing and using drugs. Mention the official drug regulatory authorities in India and mention the drug regulations and acts in India with examples of drug schedules. Mention the prescription only drugs. Mention the precaution while prescribing psychotropic drugs etc. Mention the principles of rational prescription and rational use of drugs.)

PH1.64 Describe overview of drug development, Phases of clinical trials and Good Clinical Practice.

Lecture - 1 Hour. Assessment: Written/ Viva voce.

(Explain the steps in new drug development and discovery. Mention the animal toxicity studies /Preclinical studies done before clinical trial in humans. Define clinical trial. Explain the phases of clinical trial. Define placebo. Mention the principles of using placebo. Explain the principles of Ethics in human research and Clinical trial. Explain the principles of Good clinical practice.)

**Clinical Pharmacy Number of competencies: (04) Number of procedures**

**that require certification: (NIL)**

**Practical /DOAP sessions/Skill station/Skill lab etc.**

PH2.1 Demonstrate understanding of the use of various dosage forms (oral/local/parenteral; solid/liquid).

DOAP sessions / practical - 14 Hours. Assessment: Skills assessment.

(Enumerate and identify the various dosage forms - (oral/local/parenteral; solid/liquid). Explain the different types and advantages and disadvantages of solid and liquid oral dosage forms, solid and liquid topical dosage forms and solid and liquid parenteral dosage forms.

Explain the proper usage of the various dosage forms. Explain the parameters included in the Commercial label of the dosage forms with rationale.)

PH2.2. Prepare oral rehydration solution from ORS packet and explain its use.

DOAP sessions / practical - 4 Hours. Assessment: Skills assessment.

(Explain the different types of ORS with composition. Describe the actions of ingredients, uses, advantages and disadvantages of New WHO ORS, Cereal based ORS, Home based ORS, Super ORS and Super super ORS etc. Mention the calculation of quantity of ORS to be used in children with dehydration. Demonstrate the preparation of Oral rehydration solution from ORS packet. Mention the clinical assessment of dehydration and the causes of dehydration.)

PH2.3. Demonstrate the appropriate setting up of an intravenous drip in a simulated environment

DOAP sessions / practical - 4 Hours. Assessment: Skills assessment.

(Explain the precautions and techniques and methods for setting up of an intravenous drip -

Verify the patient details, drug details, expiry date etc. Aseptic measures - All materials must be Sterile, wash hands / use sanitizer, disinfect skin at injection site. Check for

visible impurities in the IV fluid. Correct positioning of the patient. Select the vein. The cannula is inserted at an angle of around 35 degrees. The cannula is secured to the skin surface with adhesive tape. The IV tubing relates to cannula hub. Remove air bubble from the tubing and IV fluid is started. The area surrounding the cannula is checked for pain or swelling - (if present remove the cannula), Otherwise set the drop rate of medication using the roller clamp of drip chamber. The patient is communicated about the completion of the procedure.)

PH2.4. Demonstrate the correct method of calculation of drug dosage in patients including those used in special situations

DOAP sessions / practical - 4 Hours. Assessment: Skills assessment.

(Explain the formula and method of calculation of drug dosage for a patient based on age, bodyweight and surface area. Explain the correct method for dose calculation in children, elderly, patients with renal damage, patients with hepatic damage etc. Explain the need for modification of dose in children, elderly and in patients with hepatic and renal damage. Mention the calculation of flow rate, drop factor, infusion time etc.)

**(Pandemic module 2.5)**

PH2.5. Therapeutic strategies including new drug development.

Lecture - 1 Hour. Assessment: Written/Viva voce.

(Explain the Phases of clinical trials of drugs with relevance to pandemic. Explain the steps of new drug development of drugs with relevance to pandemics. Explain the Ethical / regulatory aspects of clinical trials in pandemics. Mention the significance, advantages and disadvantages of off label use of drugs. Mention the significance of pharmacovigilance activities during pandemic.)

Small group discussion - 2 Hours. Assessment: Written/Viva voce.

(Challenges and solutions in new drug development during pandemic. Need for speeding up / urgencies in procedures during pandemic. Need for Regulatory monitoring - Pharmacovigilance and ethical / regulatory monitoring of drugs approved for emergency use in pandemics.)

**Topic: Clinical Pharmacology Number of competencies: (08) Number of procedures that require certification: (04)**

PH3.1. Write a rational, correct and legible generic prescription for a given condition and communicate the same to the patient.
Skill station - 6 hours. Assessment: Skill Assessment / station and Certification.

(Define rational drug use. Explain the steps for rational prescription. Mention the importance of - Right drug, Right dose, Right route, Right frequency, Right time, Right duration, Right patient, Right cost, Right Formulation, Right storage and Right documentation of drugs in prescription. Define prescription. Identify the parts of Prescription. Write rational prescription in the right format (NMC/MCI). Mention the significance of standard treatment guidelines / protocols. Mention the importance of adequate and appropriate communication to the patient regarding the prescription. Write rational and appropriate prescriptions for various diseases and conditions. Mention the legal implications of Prescription. Mention the parameters for good prescription - correctness. Legibility etc.)

PH3.2. Perform and interpret a critical appraisal (audit) of a given prescription.
Skill Lab. 6 Hours. Assessment: Skill Assessment and Certification/ logbook.
(Mention the common errors in prescription. Explain the importance of Rational prescription - Rational use of drugs - Right drug, dose, route, duration, frequency etc., Correct format(NMC/MCI), Correct Clinical diagnosis, Legibility and correctness of prescription, precaution of drug interactions, Pharmacoeconomics, dangers of

polypharmacy etc. Identify the errors in the given prescription. Correct all the discrepancies and Rewrite the prescription.)

PH3.3 Perform a critical evaluation of the drug promotional literature.

Skill Lab - 6 Hours. Assessment: Skill station / Assessment and Certification/ logbook.

(Mention the need for awareness of drug advertising concepts and Identification of unethical methods in drug advertisement. Explain the steps in critical evaluation of drug promotional literature - Evaluation of the Content of scientific information, Validity of Scientific claims, Relevance of References cited and appropriateness of Illustrations etc. Enumerate the sources of drug information.)

PH3.4. To recognize and report an adverse drug reaction.

Skill station - 4 Hours. Assessment: Skill station / logbook.

(Define and Identify Adverse drug reactions. Mention the types of ADR. Mention the classification of ADR based on severity. Explain the predisposing factors for ADR. Mention the criteria for detection of ADR. Describe the management of ADR. Enumerate the steps for prevention of ADR. Mention the principles of ADR reporting - Filling of the CDSCO ADR form and reporting to the pharmacovigilance centre. Explain the steps in the causality assessment of ADR using WHO UMC scale and Naranjo scale. Explain the importance of ADR documentation and reporting.)

PH3.5. To prepare and explain a list of P - drugs for a given case/condition.

Skill station – 6 Hours. Assessment: Skill Assessment and Certification/ logbook.

(Define P drug. Describe the steps in selection of P drug - Define the diagnosis, specify the therapeutic objective, make an inventory of effective groups of drugs, Choose an effective group of drug according to the criteria of Efficacy, Safety, Suitability and cost. Select a P - drug based on the above criteria and finally the selected P drug is prescribed to the patient with correct dose, route, duration & dosage form etc. Prepare P drugs for given conditions.)

PH3.6. Demonstrate how to optimize interaction with pharmaceutical representative to get authentic information on drugs.

Skill station - 2 Hours. Assessment - Skill Assessment/ logbook.

(Mention the importance of taking control of the discussion to get essential and adequate information from the representative about the new drug regarding efficacy, safety, adverse effects, contraindications, precautions, drug interactions, cost effectiveness etc. Mention the need for comparing the new drug with existing drugs available for efficacy, suitable dosage form, lesser adverse effects, usefulness in pregnancy, lactation, hepatic or renal damage and in pediatric or geriatric age group etc. Enquire about Published References for Safety & Efficacy. Mention the parameters in WHO ethical criteria for drug promotion.)

PH3.7 Prepare a list of essential medicines for a healthcare facility.

Skill station - 4 Hours. Assessment: Skill Assessment/ logbook.

(Define essential drugs. Mention the core and complimentary drug lists. Mention the concept and significance of essential drugs. Explain the parameters for selection of essential medicine list. Mention the relevance of essential medicine lists at various levels of health care. Prepare a list of essential medicines for various levels of health care.)

PH3.8. Communicate effectively with a patient on the proper use of prescribed medication.

Skill Lab - 4 Hours. Assessment: Skill station / assessment.

(Explain the need for proper communication to the patient for patient compliance and adherence to therapy. Inform the patient regarding the following - Dosage schedule of drug - Dose, frequency, time of administration, duration etc. Route of administration, indications, adverse effects, precautions, contraindications, food and drug interactions, storage of drug, techniques for use of devices, need for regular monitoring of essential parameters - sugar, blood pressure etc., need for stopping the

drug and informing the prescriber if adverse effects occur, need for adherence to regime etc.)

**Topic: Experimental Pharmacology Number of competencies: (02) Number of procedures that require certification :(NIL)**

PH4.1 Administer drugs through various routes in a simulated environment using mannequins

DOAP sessions - 10 Hours. Assessment - Skill assessment.

(Explain and use Checklist for assessment of drug administration through each route. Mention and identify the various routes of drug administration. Enumerate the various dosage forms. Administer the drugs through various routes in a simulated environment using mannequins. Mention the advantages of using simulations.

Oral route - Mention the advantages and disadvantages of oral route of drug administration. Mention and identify the various dosage forms given orally. Demonstrate the drug administration through oral route with instructions to patients - Use check list - Verify patient details, expiry date of drug and check prescription etc. Mention the position of patient during insertion of nasogastric tube and the steps for its insertion etc.

Sublingual / Buccal route - Mention the advantages and disadvantages of this route. Mention the dosage forms and drugs used by this route. Mention the instructions for terminating drug action by this route. Demonstrate the drug administration through this route.

Trans rectal route - Mention the advantages and disadvantages of this route. Mention the drugs used by this route. Explain the instructions to patient for this route. Demonstrate the administration of suppositories / enema with checklist.

Parenteral route - Explain the Selection of appropriate needle gauge, volume to be injected etc. for each parenteral route. Subcutaneous injection - Mention the advantages and disadvantages.

Mention the drugs used by this route. Identify the devices and sites for subcutaneous injection. Demonstrate subcutaneous injection with checklist - Verify patient details, expiry date of drug and check prescription etc. Wash hands. Wear gloves, Reassure the patient, explain the procedure, Disinfect the injection site, remove air bubbles and insert needle at appropriate angle, after the procedure is over inform the patient etc.

Intramuscular injection - Mention the advantages and disadvantages. Identify the devices used and sites for Intramuscular injection. Mention the precautions and contraindications of IM route.

Mention the drugs used by this route. Demonstrate the technique of IM injection with checklist - Verify patient details, expiry date of drug and check prescription etc. Wash hands, Wear gloves, Reassure the patient, explain the procedure, Disinfect the injection site, remove air bubbles and insert needle at appropriate angle, after the procedure is over inform the patient etc.

Intravenous route - Mention the advantages and disadvantages. Identify the devices and sites for Intravenous injection. Mention the types of IV injections. Mention the drugs used by this route. Demonstrate IV injection with checklist - Verify patient details, expiry date of drug and check prescription etc. Wash hands, Wear gloves, Reassure the patient, explain the procedure, Disinfect the injection site, remove air bubbles and insert needle at appropriate angle, after the procedure is over inform the patient etc.

Intradermal route - Mention the advantages and disadvantages. Identify the devices and sites for Intradermal injection. Mention the drugs used by this route. Demonstrate intradermal injection with checklist - Verify patient details, expiry date of drug and check prescription etc. Wash hands. Wear gloves, Reassure the patient, explain the

procedure, Disinfect the injection site, remove air bubbles and insert needle at appropriate angle, after the procedure is over inform the patient etc.

Local / Topical routes -

Inhalational - Identify the devices used for inhalational dosage forms - Metered dose inhaler, Rotahaler, Nebuliser, Spinhaler etc. Mention the advantages and disadvantages of each device. Mention the drugs used by this route. Describe the instructions to the patient for using these devices. Demonstrate the administration of inhalational dosage forms with checklist.

Trans nasal - Mention the dosage forms and devices for trans nasal route of drug administration. Explain the advantages and disadvantages of this route. Explain the instructions to patient for use of drug by this route.

Eyes/Ear - Mention the dosage forms given through these routes. Explain the instructions to patient for using these routes.

Transcutaneous – (Iontophoresis, Inunction, Jet Injection, Transdermal delivery system) Mention the devices used for transcutaneous route of drug administration. Mention the drugs used and advantages and disadvantages of each route. Explain the instructions to patient regarding this route of drug administration. Demonstrate the administration of drugs by iontophoresis, inunction, jet injection, trans dermally etc. with checklist.

Transvaginal route - Mention the drugs used by this route. Explain instructions to patient regarding this route. Demonstrate the administration of douche, pessary, cream, foam etc. by this route. Mention the different types of intrauterine contraception. Explain the instructions to patients regarding intrauterine contraception and demonstrate its placement.)

PH4.2. Demonstrate the effects of drugs on blood pressure (vasopressor and vaso - depressors with appropriate blockers) using computer aided learning.

Skill lab - 6 Hours. Assessment: Skill station.

(Mention the advantages of computer aided learning. Select the appropriate animal experiment to study the effect of drugs on blood pressure. Describe the actions of Adrenaline, Noradrenaline, Isoprenaline, Tyramine, Acetyl choline, Physostigmine, Atropine, Histamine, Anti histamine etc. on blood pressure. Identify the difference in action of these drugs on blood pressure. Mention the blocking action of some drugs. Mention the steps for Analysing and interpreting the graph. Describe the uses of vasopressors and vasodepressors.)

**Communication Topic: Pharmacology Number of competencies: (07) Number of procedures that require certification: (NIL)**

PH5.1. Communicate with the patient with empathy and ethics on all aspects of drug use.

Small group discussion - 6 Hours Assessment: skill station / assessment.

(Mention the principles of appropriate communication to the patient for compliance and adherence to drug therapy - Motivation, Emotional content, Physical and mental status and insight of patient, Doctor patient relationship with empathy and support etc.

Checklist for communication to the patient includes - Greet patient, ensure privacy and comfort, maintain eye contact and appropriate body posture, speak softly and slowly, open the discussion ask about complaints, use simple and local language, listen and observe, inform about treatment options, prescribed drugs, devices etc., Encourage patient to talk and clear doubts, finally motivate patient for adherence to the prescribed treatment.

Checklist for proper use of the prescribed drugs to the patient includes - Indications and dosage schedule of drug, route of administration, relation with food, food and drug interactions, tapering/ stoppage of drug, precautions and contraindications, time of drug administration, storage of drug, technique of use of devices, adherence to therapy, to inform doctor of adverse effects, regular monitoring of parameters - blood pressure, sugar, cholesterol etc., periodic reviews etc.)

PH5.2 Communicate with the patient regarding optimal use of a) drug therapy, b) devices and c) storage of medicines.
Small group discussion - 6 Hours. Assessment: Skill Assessment / station.
(Checklist for communication to the patient includes - Greet patient, ensure privacy and comfort, maintain eye contact and appropriate body posture, speak softly and slowly, open the discussion ask about complaints, use simple and local language, listen and observe, inform about treatment options, prescribed drugs, devices etc., Encourage patient to talk and clear doubts, finally motivate patient for adherence to the prescribed treatment.

Checklist for proper use of the prescribed drugs to the patient includes - Indications and dosage schedule of drug, route of administration, relation with food, food and drug interactions, tapering/ stoppage of drug, precautions and contraindications, time of drug administration, storage of drug, technique of use of devices, need for adherence to therapy, to inform doctor of adverse effects, regular monitoring of parameters - blood pressure, sugar, cholesterol etc., periodic reviews etc.

Steps in communication of use of devices include, Identifying the device, instructions for proper use of the device and for handling, cleaning and storage of the device. Mention the importance of keeping devices away from children and to note the manufacturer details for contacting in case of malfunction of the device etc.

Communication regarding storage of medicine - importance of the adherence to the storage conditions of the drug or device as mentioned on the label by the manufacturers. Explain the role of factors in optimal storage of medicines - proper temperature, light, moisture, humidity, conditions of sanitation, ventilation, and segregation etc.

Explain the effects of incorrect storage - loss or alteration of - Potency, Efficacy, Safety, Stability etc. Mention the need for storing drugs away from children. Mention about the expired drugs disposal.)

PH5.3. Motivate patients with chronic diseases to adhere to the prescribed management by the health care provider.

Small group discussion - 6 Hours. Assessment: skill station / short note

(Mention the significance of adherence to treatment. Mention the problems of noncompliance of the prescribed management - Therapeutic failure, negative health outcome - with increased cost of healthcare due to increase in comorbid conditions, resulting in physician consultation, drug therapy, diagnostic testing, hospital admissions etc.

Describe the factors reducing compliance - Patient factors - multiple/severe/ psychiatric diseases, Elderly patients, lack of motivation and information, inadequate education, inability to understand instructions etc.

Drug factors - Polypharmacy, unpleasant effects, complex regimen, prolonged duration,

Physician factors - poor communication, poor patient doctor relationship etc.

Financial factors - cannot afford the drug etc.

Methods to motivate patient for adherence to prescribed management - Good patient doctor communication and relationship, Appropriate prescription with adequate instructions, Adequate information to patient regarding drug use, adverse effects, precautions. Drug reminders - Electronic, diary etc. Inform regarding lifestyle changes and regular follow up. Inform the complications of non - adherence - morbidity, complications, need for additional treatment and additional expenditure etc.

Mention the evaluation of patient compliance - Therapeutic drug monitoring - estimate drug level in plasma, saliva, urine etc. e.g. for antiepileptic drugs, antipsychotics etc. and Physiological markers - measuring BP for hypertension, blood sugar for diabetes etc.)

PH5.4 Explain to the patient the relationship between cost of treatment and patient compliance.

Small group discussion - 6 Hours. Assessment: short note/ viva voce

(Define Pharmaco economics. Communicate to the patient the relationship between cost of treatment and patient compliance. Enumerate the Various costs in drug treatment -

Direct medical costs - cost of medicines, tests, counseling, administration.

Direct non - medical costs - cost of travel, stay, childcare etc.

Indirect costs - due to loss of pay or productivity etc.

Intangible costs - cost related to anxiety, pain etc.

Explain the methods for cost containment - (Best treatment with minimum cost) -

Cost Minimization analysis - Cost variation between different generic drugs - There is wide variation in the cost of generic drugs. Cost of the drug and quality of the drug must be considered. Prefer the cheapest drug with adequate quality - (economical treatment). Costly drugs are used only if the quality of cheaper drugs is not adequate or if the patient is not tolerating the cheaper drug. Cost variation between various

brands of the drug - Prefer the cheapest drug with quality. Cost of treatment of different therapeutic modalities - Prefer the best treatment modality with minimum cost.

Cost Effective analysis - Evaluate the cost for drugs, treatment procedures, hospitalization, investigations etc. and select the economical or cost - effective methods and procedures.

Cost Benefit analysis - Costs and benefits are compared and expressed as cost benefit ratio.

Cost Utility analysis - is the comparison between health programmes. There is comparison of the outcome of the treatment (quality of life of patient) and cost effectiveness.)

PH5.5. Demonstrate an understanding of the caution in prescribing drugs likely to produce dependence and recommend the line of management.
Small group discussion - 6 Hours. Assessment: short note/ Viva voce
(Define drug dependence. Classify drugs causing dependence. Describe the mechanisms of drug dependence. Mention the Indian rules and regulations for the manufacture, marketing, distribution, sales, import and export of drugs and cosmetics and for prescribing drugs producing dependence - Drugs and Cosmetics Act 1940 (D & C Act) and the Drugs and Cosmetics Rules 1945(D & C Rules) and their periodic amendments, Narcotic Drugs and Psychotropic Substances Act, 1985 etc. Mention the rules for labelling medicine - Rule 96(Manner of Labelling), Rule 97 (Labelling of

Medicines) etc. Explain the Drug Schedules - as per the Drugs and Cosmetics Act (1940) and amended in 2001 - Schedule A to Schedule Y. Mention the new drugs and clinical trial rules in 2019. Explain the rules of Schedule H and X for prescription of dependence

causing drugs. Mention the significance of prescription documentation and periodic review of prescription.

Describe the treatment and management of drug dependence - gradual withdrawal of drug, substitution therapy, antidote, nutritional therapy, psychotherapy, Occupational therapy. Community treatment and Rehabilitation therapy, Patient motivation and Education etc.)

PH5.6. Demonstrate ability to educate public & patients about various aspects of drug use including drug dependence and OTC drugs.

Small group discussion - 6 Hours. Assessment: Skill station

(Explain the principles of education of public and patients regarding drug use - Adequate/optimal information given to patient regarding the disease, its progression, prognosis etc. Adequate/optimal information given to patient regarding the dosage form of drugs including dose, route, frequency, duration of treatment etc. Adequate/optimal information given to patient regarding the adverse effects, precautions, contraindications, food and drug interactions, drug dependence etc. of the drugs prescribed and inform them how to recognize the side effects and the measures to be taken to manage the adverse effects. Inform about proper storage of the drug and the lag period if present.

Inform the patient and public about the drugs causing dependence, special rules for the prescription of these drugs, dangers of drug dependence - morbidity, difficulty in treating, addiction, withdrawal symptoms etc. and motivate the patient to avoid misuse of dependence causing drugs.

Explain OTC drugs and self - medication. Mention the disadvantages and advantages of OTC drugs and self - medication. Education of patient and public regarding OTC

drugs - inform about hidden ingredients, drug dependence and abuse, adverse reactions, precautions. food and drug interactions, contraindications, storage of drug etc. and inform them how to recognize the side effects and the measures to be taken to manage the adverse effects. Advise and motivate the patient to use only prescribed drugs.)

PH5.7. Demonstrate an understanding of the legal and ethical aspects of prescribing drugs.

Small group discussion - 4 Hours. Assessment: short note/ Viva voce.

(Explain the principles of legal and ethical aspects of prescribing drugs - Only Qualified (adequately & appropriately) and registered medical practitioner should prescribe drugs

Define accurate diagnosis, Specify the therapeutic objective, and select the optimal drug according to the criteria of Efficacy, Safety, Suitability & Economy/cost.

Drug parameters - Rational drug use by Rule of Right - (Right drug, Right dose, Right route, Right frequency, Right time, Right duration, Right patient, Right cost, Right Formulation, Right storage and Right documentation. Awareness of Adverse effects, Precautions, contraindications, warnings, interactions, allergies etc. Adequate and appropriate instructions, information and warning to patients regarding drug use.

Verify or check the format of prescription - Physician details - name, qualification, address, contact number etc., Patient details - name, age, sex, weight (if applicable), address, Symbol of prescription etc. Generic name of drugs preferred.

Each ingredient in separate line. Most active ingredient first followed by others/adjuvants. Each line begins with capital letter. Abbreviations used must be approved and appropriate. Electronic tools (prescribing software & electronic drug references) may be used if possible, to reduce prescription errors.

Own your prescription and take up the responsibility by signing it.

Legal aspects - Mention the Indian rules and regulations for the manufacture, marketing, distribution, sales, import and export of drugs and cosmetics and for prescribing drugs producing dependence - Drugs and Cosmetics Act 1940 (D & C Act) and the Drugs and Cosmetics Rules 1945(D & C Rules) and their periodic amendments, Narcotic Drugs and Psychotropic Substances Act, 1985 etc. Mention the rules for labelling medicine - Rule 96(Manner of Labelling), Rule 97 (Labelling of Medicines) etc. Explain the Drug Schedules - as per the Drugs and Cosmetics Act (1940) and amended in 2001 - Schedule A to Schedule Y.

Mention the significance of rational prescription, need for prescribers to update knowledge, and the necessity for following treatment guidelines / formularies / protocols etc. Mention the legal implications of irrational prescription.)

**Professional Development including Attitude, Ethics and Communication Module**

**(AETCOM)**

**Objectives**

- Understand and apply principles of bioethics and law as they apply to medical practice and research, understand and apply the principles of clinical reasoning as they apply to the care of the patients.
- Understand and apply the principles of system - based care as they relate to the care of the patient.
- Understand and apply empathy and other human values to the care of the patient.
- Communicate effectively with patients. families, colleagues and other health care professionals.
- Understand the strengths and limitations of alternative systems of medicine.
- Respond to events and issues in a professional considerate and humane fashion.
- Translate learning from the humanities to further his professional and personal growth.

**Learning experiences:**

This will be a longitudinal programme spread across the continuum of the MBBS programme including intern ship,

Learning experiences shall include small group discussions, patient care scenarios. workshops. seminars, role plays, lectures etc.

Attitude, Ethics & Communication Module (AETCOM module) developed by the erstwhile Medical Council of India should be used longitudinally for purposes of instruction.

75% of attendance in Professional Development Programme (AETCOM Module) shall be mandatory for eligibility to appear for final examination in each professional year.

**Internal Assessment** shall include Written' tests comprising of short notes and creative writing experiences.

OSCE based clinical scenarios /viva voce.

At least one question in each paper of each clinical specialty in the University examination shall test knowledge competencies acquired during the professional development programme.

Skill competencies acquired during the Professional Development Programme must be tested during the clinical, practical and viva voce.

**Attitude, Ethics and Communication (AETCOM) Competencies**

AETCOM module has been prepared as a guide to facilitate institutions and faculty in implementing a longitudinal program that will help students acquire necessary competence in the attitudinal, ethical and communication domains. It offers framework of competencies that students must achieve. It also offers approaches to teaching learning methods.

***This is a suggested format and institutions can develop their own approaches to impart these competencies***.

**AETCOM competencies** -

Suggested departments - Pharmacology / Pathology / Microbiology / Community medicine / Forensic medicine.

**Pharmacology - AETCOM Competencies** -

1. Module 2.1: *The foundations of communication – 2*.

Competency - Demonstrate ability to communicate to patients in a patient, respectful, non - threatening, non - judgmental and empathetic manner.

Hours:5. Assessment: Formative/summative.

i. Introductory small group session - 1 hour

ii. Focused small group session - 2 hours

iii. Skills lab session – 1 hour

iv. Discussion and closure – 1 hour.

2. Module 2.8: *What does it mean to be family member of a sick patient?*

Competency - Demonstrate empathy in patient encounters.

Hours: 6 Assessment: Formative & summative.

i. Hospital visit & interviews - 2 hours

ii. Large Group Discussions with patients' relatives - 1 hour

iii. Self - directed Learning - 2 hours

iv. Discussion and closure - 1 hour

**Certifiable Skills** - Procedures that require certification -

1. Competency - PH 3.1. Write a rational, correct and legible generic prescription for a given condition and communicate the same to the patient.

Number required to certify - 5.

2. Competency - PH 3.2. Perform and interpret a critical appraisal (audit) of a given prescription.

Number required to certify – 3.

3. Competency - PH 3.3. Perform a critical evaluation of the drug promotional literature. Number required to certify - 3.

4. Competency - PH 3.5 To prepare and explain a list of P - drugs for a given case/condition. Number required to certify - 3.

**Integration** - is a learning experience that allows the learner to perceive relationships from blocks of knowledge and develop a unified view of its basis and its application. The GMR 2018 applies these principles to the extent that will retain the strengths of silo - based education and assessment while providing experiences that will allow learners to integrate concepts.

The teaching should be aligned and integrated horizontally and vertically in organ systems recognizing the interaction between drug, host and disease to provide an overall understanding of the context of therapy.

Practical knowledge of use of drugs in Clinical Practice will be acquired through Integrated Teaching vertically with Preclinical and Clinical subjects and horizontally with other Para clinical subjects.

***These are suggestions and institutions can select their own set of topics which can run across phases***.

**Horizontal Integration - Topics** -

1. PH1.21 Describe the symptoms and management of methanol and ethanol poisonings -

Forensic medicine.

2. PH1.22 Describe drugs of abuse (dependence, addiction, stimulants, depressants, psychedelics, drugs used for criminal offences) - Forensic Medicine

3. PH1.34 - Describe the mechanism/s of action, types, doses, side effects, indications and contraindications of the drugs used as below: Acid - peptic disease and GERD - Pathology. Microbiology.

4. PH1.43 Describe and discuss the rational use of antimicrobials including antibiotic

stewardship programme - Microbiology.

5. PH1.45 Describe the drugs used in MDR and XDR Tuberculosis - Microbiology

6. PH1.46 Describe the mechanisms of action, types, doses, side effects, indications and contraindications of antileprotic drugs - Microbiology.

7. PH1.47 Describe the mechanisms of action, types, doses, side effects, indications and

contraindications of the drugs used in malaria, KALA - AZAR, amebiasis and intestinal helminthiasis - Microbiology.

8. PH1.48 Describe the mechanisms of action, types, doses, side effects, indications and

contraindications of the drugs used in UTI/ STD and viral diseases including HIV - Microbiology.

9. PH1.50 Describe mechanisms of action, types, doses, side effects, indications and contraindications of immunomodulators and management of organ transplant rejection – Microbiology.

10. PH1.51 Describe occupational and environmental pesticides, food adulterants, pollutants and insect repellents - Community medicine

11. PH1.52 Describe management of common poisoning, insecticides, common sting and bites - Forensic medicine.

12. PH1.55 Describe and discuss the following National Health Programmes including Immunisation, Tuberculosis, Leprosy, Malaria, HIV, Filaria, Kala Azar, Diarrhoeal diseases, Anaemia & nutritional disorders, Blindness, Non - communicable diseases, cancer and Iodine deficiency - Community Medicine.

13. PH3.7 Prepare a list of essential medicines for a healthcare facility - community medicine.

14. PH5.7 Demonstrate an understanding of the legal and ethical aspects of prescribing drugs - Forensic Medicine.

**Vertical Integration - Topics** -

1. PH 1.15 - Describe mechanism/s of action, types, doses, side effects, indications and contraindications of skeletal muscle relaxants - Anaesthesiology.

2. PH 1.16 - Describe mechanism/s of action, types, doses, side effects, indications and contraindications of the drugs which act by modulating autacoids, including: anti - histaminic,5 - HT modulating drugs, NSAIDs, drugs for gout, anti - rheumatic drugs, drugs for migraine - General Medicine.

3. PH 1.17 - Describe the mechanism/s of action, types, doses, side effects, indications and contraindications of local anaesthetics - Anaesthesiology.

4. PH1.18 - Describe the mechanism/s of action, types, doses, side effects, indications and contraindications of general anaesthetics, and pre - anaesthetic medications - Anaesthesiology.

5. PH1.19 - Describe the mechanism/s of action, types, doses, side effects, indications and contraindications of the drugs which act on CNS, (including anxiolytics, sedatives & hypnotics, anti - psychotic, anti - depressant drugs, anti - maniacs, opioid agonists and antagonists, drugs used for neurodegenerative disorders, anti - epileptics drugs) - Psychiatry.

6. PH1.20 - Describe the effects of acute and chronic ethanol intake - Psychiatry.

7. PH1.21 - Describe the symptoms and management of methanol and ethanol poisonings - General Medicine.

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8. PH1.22 - Describe drugs of abuse (dependence, addiction, stimulants, depressants, psychedelics, drugs used for criminal offences) - Psychiatry.

9. PH1.23 - Describe the process and mechanism of drug de addiction - Psychiatry.

10. PH1.25 - Describe the mechanism/s of action, types, doses, side effects, indications and contraindications of the drugs acting on blood, like anticoagulants, antiplatelets, fibrinolytics, plasma expanders - General Medicine.

11. PH1.26 - Describe mechanisms of action, types, doses, side effects, indications and contraindications of the drugs modulating the renin - angiotensin and aldosterone system - General Medicine.
12. PH1.27 - Describe the mechanisms of action, types, doses, side effects, indications and contraindications of antihypertensive drugs and drugs used in shock - General Medicine.

13. PH1.28 - Describe the mechanisms of action, types, doses, side effects, indications and contraindications of the drugs used in ischemic heart disease (stable, unstable angina and myocardial infarction), peripheral vascular disease - General Medicine.

14. PH1.29 - Describe the mechanisms of action, types, doses, side effects, indications and contraindications of the drugs used in congestive heart failure - General Medicine.

15. PH1.30 - Describe the mechanisms of action, types, doses, side effects, indications and contraindications of the antiarrhythmics - General Medicine.

16. PH1.31 - Describe the mechanisms of action, types, doses, side effects, indications and contraindications of the drugs used in the management of dyslipidaemias - General Medicine.

17. PH1.32 - Describe the mechanism/s of action, types, doses, side effects, indications and contraindications of drugs used in bronchial asthma and COPD - Respiratory Medicine.

18. PH1.33 - Describe the mechanism of action, types, doses, side effects, indications and contraindications of the drugs used in cough (antitussives, expectorants/ mucolytics) - Respiratory Medicine.
19. PH1.34 - Describe the mechanism/s of action, types, doses, side effects, indications and contraindications of the drugs used as below:

    i. Acid - peptic disease and GERD
    ii. Antiemetics and prokinetics
    iii. Antidiarrhoeals
    iv. Laxatives
    v. Inflammatory Bowel Disease
    vi. Irritable Bowel Disorders, biliary and pancreatic diseases - General Medicine.

20. PH1.35 - Describe the mechanism/s of action, types, doses, side effects, indications and contraindications of drugs used in haematological disorders like:
    i. Drugs used in anaemias.
    ii. Colony Stimulating factors - General Medicine.

21. PH1.36 - Describe the mechanism of action, types, doses, side effects, indications and contraindications of drugs used in endocrine disorders (diabetes mellitus, thyroid disorders and osteoporosis) - General Medicine.

22. PH1.39 - Describe mechanism of action, types, doses, side effects, indications and contraindications the drugs used for contraception - Obstetrics & Gynaecology.

23. PH1.40 - Describe mechanism of action, types, doses, side effects, indications and contraindications of 1. Drugs used in the treatment of infertility, and 2. Drugs used in erectile dysfunction - Obstetrics & Gynaecology.

24. PH1.41 - Describe the mechanisms of action, types, doses, side effects, indications and contraindications of uterine relaxants and stimulants - Obstetrics & Gynaecology.

25. PH1.43 - Describe and discuss the rational use of antimicrobials including antibiotic stewardship program - General Medicine, Paediatrics.

26. PH1.44 - Describe the first line antitubercular dugs, their mechanisms of action, side effects and doses - Respiratory Medicine.

27. PH1.45 - Describe the drugs used in MDR and XDR Tuberculosis - Respiratory Medicine.

28. PH1.46 - Describe the mechanisms of action, types, doses, side effects, indications and contraindications of antileprotic drugs & Leprosy - Dermatology, Venereology.

29. PH1.47 - Describe the mechanisms of action, types, doses, side effects, indications and contraindications of the drugs used in malaria, KALA - AZAR, amebiasis and intestinal helminthiasis - General Medicine.

30. PH1.52 - Describe management of common poisoning, insecticides, common sting and bites - General Medicine.

31. PH1.56 - Describe basic aspects of Geriatric and Paediatric pharmacology - Paediatrics.

32. PH1.57 - Describe drugs used in skin disorders - Dermatology & Venereology.

33. PH1.58 - Describe drugs used in Ocular disorders - Ophthalmology.

34. PH2.4 - Demonstrate the correct method of calculation of drug dosage in patients including those used in special situations - Paediatrics, General Medicine.

35. PH3.1 - Write a rational, correct and legible generic prescription for a given condition and communicate the same to the patient - General Medicine.

36. PH3.3 - Perform a critical evaluation of the drug promotional literature - General Medicine.

37. PH3.5 - To prepare and explain a list of P - drugs for a given case/condition - General Medicine.

38. PH5.1 - Communicate with the patient with empathy and ethics on all aspects of drug use - General Medicine**.**

39. PH5.4 - Explain to the patient the relationship between cost of treatment and patient compliance - General Medicine.

40. PH5.5 - Demonstrate an understanding of the caution in prescribing drugs likely to produce dependence and recommend the line of management - Psychiatry.

41. PH5.6 - Demonstrate ability to educate public & patients about various aspects of drug use including drug dependence and OTC drugs - Psychiatry.

**Self - Directed Learning - Topics**

***These are suggestions and institutions can select their own set of topics***

1. PH1.13 - Steps in Adrenergic neurotransmission. Synthesis, storage, release and fate of Adrenergic neurotransmitters - 1 Hour.

2. PH1.14 - Steps in Cholinergic Neurotransmission Synthesis, storage, release and fate of Cholinergic neurotransmitters - 1 Hour.

3. PH1.16 - Pathophysiological role of Histamine and 5HT - 1 Hour.

4. PH1.20 - Effects of acute and chronic ethanol intake - 1 Hour.

5. PH1.22 - Drugs of abuse - 1 Hour.

6. PH1.33 - Drugs used in cough - 1 Hour.

7. PH1.53 - Chelating agents - 1 Hour.

8. PH1.54 - Vaccines - 1 Hour.

9. PH1.61 - Dietary supplements and Nutraceuticals - 1 Hour.

10. PH1.62 - Antiseptics and disinfectants - 1 Hour.

Total Hours: 10 hours.

**Scheme of examination - Pharmacology**

**Practical examination** - Total marks - 100 – (Practical - 80 marks & Viva voce - 20 marks)

**Practical - Topics**

I. **OSPE** - (40marks) -

1. Spotters - Drugs. /Devices. /Plants. /ADR charts. /Clinical pharmacology Charts. / Experimental pharmacology charts. /Drug Formulations. / Drug delivery systems.

2. Clinical Pharmacology - Prescription writing. / Drug interactions. /CCR. / Dose calculation. / Percentage calculation.

II. **Interactive Stations** (40 marks) -

Demonstrate Routes of drug administration (IV/IM/SC etc.) using Mannequins. /Demonstrate Proper Use of dosage forms or devices. / Prepare ORS solution. / Demonstrate setting up of IV Drip. / Discuss Rational Prescription for a given condition or Prescription Audit (Critical appraisal of given prescription). / Critical evaluation of drug promotional literature. / Select & Discuss P drugs /Essential Drugs for a given condition. /ADR reporting & Pharmacovigilance system (Demonstrate / Discuss). / Discuss/ Identify Management of ADR / Drug interactions. /Demonstrate Effect of drugs on blood pressure (agonists & blockers) - using computer aided learning.

**Viva voce** - 20 Marks - (Preferably problem solving or application type Questions and minimum of recall type questions.)

**Internal Assessment**

Internal assessment considered only for eligibility to write the university examination. Maximum marks - Theory - 500 marks; Practical– 500 marks; Total - 1000marks.

**Eligibility Criteria**

Minimum marks required for eligibility - Theory – 200marks (40% separate); practical – 200 marks (40% separate) total - 500 marks (50%).

Minimum of Three theory exams to be Conducted in a year. The Final internal assessment exam(prelims)must follow the University exam pattern.

Additional exams, tests and Remedial exams may be conducted.

**University Theory Exam** - Total marks 200 (Two papers of 100marks each)

- Paper I topics (General pharmacology, ANS, CNS, CVS, Blood, Diuretics, Autacoids, Respiratory system).

- Paper II Topics (GIT, Hormones, Antibiotics, Chemotherapy & Miscellaneous).

**University Practical examination** - Total marks - 100.

Practical - 80marks & Viva voce - 20 marks.

Pass criteria - University Exam – 50% aggregate in both theory and practical and minimum of 40% separately for Theory and practical. (practical = practical +viva).

Templates for calculation of Internal Assessments
I[st] and 2[nd] Professional MBBS (Theory)

| Name of the Institution | | | CIN | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Internal Assessment Theory | | | | | | | | | | | | | |
| MBBS | Year / Phase | | Department | | Anat/Bioc/Phys/Path/Micro/Pharmac | | | | | Date | | | |
| | | | Formative Assessment | | | Continuous Internal Assessment | | | | | | | Total |
| Sl. No. | KUHS Reg. no. | Name of the student | PCT 1 | PCT 2 | Prelims Theory (Paper I & II) | Home Assignment | Continouus Class Test | Seminar | Museum Study | Library Assignments | Attendance | | |
| | | | | | | | | Self Directed Learning | | | | | |
| | | | 100 | 100 | 200 | 15 | 30 | 15 | 15 | 15 | 10 | | 500 |
| | | | | | | | | | | | | | |
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| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| Signature & Name of the Head of the Department | | | | | | | | | | Signature & Name of the Principal / HOI | | | |

Templates for calculation of Internal Assessments

1st and 2nd Professional MBBS (Practical)

| Name of the Institution | | | CIN | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Internal Assessment | | | Practical | | | | | | |
| MBBS | Year / Phase | | Department | | | Anat/Bioc/Phys/Path/Micro/Pharmac | | | | Date | | |
| | | | Formative Assessment | | | Continuous Internal Assessment | | | | | | |
| | | | | | | Log book (150) | | | | | | |
| Sl. No. | KUHS Reg. no. | Name of the student | PCT 1 | PCT 2 | Prelims Practical | Certifiable skill based competensics | AETCOM Competencies | SVL Lab activity | Research | Journal (Record book / portifolio) | Attendance | Total |
| | | | 100 | 100 | 100 | 60 | 30 | 40 | 20 | 40 | 10 | 500 |
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Signature & Name of the Head of the Department

Signature & Name of the Principal / HOI

# Model Question Papers

**QP code: Reg No:.....**

**SECOND PROFESSIONAL MBBS EXAMINATION**

**MICROBIOLOGY PAPER I**

**Time: 3 hours. Maximum Marks: 100**

***(Draw diagrams wherever necessary)***

**1. MCQ. (20x1= 20 marks)**

**Read the following clinical history and select the most appropriate response for questions (i) -(v)**

A 45 years old male patient complains of intermittent high-grade fever which was cyclical and associated with rigor and chills. On examination he has hepatosplenomegaly. A thin peripheral smear was taken for diagnosis.

i. What is the probable diagnosis?
   A. Kala azar. B. Malaria. C. Trypanosomiasis. D. Babesiosis.

ii. Which of the following is used for staining the thin smear?
   A. Leishman's stain. B. Gram's stain. C. Albert's stain. D. Gomoris Methanamine Silver stain.

iii. The stage of organism responsible for relapse is
   A. Schizont. B. Gametocyte. C. Hypnozoite. D. Amastigote

iv. The infective form of the organism to man is.
   A. Gametocyte. B. Hypnozoite. C. Amastigote. D. Sporozoite.

v. All of the following can be done for its diagnosis **EXCEPT**
   A. QBC. B .P2. C. DEC provocation test. D. Peripheral smear.

**Question numbers (vi)-(x) are multiple response type questions. Read the statements & mark the answers appropriately.**

vi. Risk factors for Infective endocarditis are
   i. Cardiac defect. 2. Intravenous catheter. 3. Tooth extraction. 4. Prosthetic valve

A. 1, 2, 3 are correct. B. 1, 3, 4 are correct. C. 2, 3, 4 are correct. D. 1,2, 4 are correct.

vii. Non-gonococcal urethritis can be caused by all of the following

1. Mycoplasma pneumoniae. 2. Chlamydia trachomatis. 3. Escherichia coli. 4. Herpes simplex virus.

A. 1,2,3 are correct. B. 1,2, 4 are correct. C. 1, 3, 4 are correct. D. 2, 3, 4 are correct.

viii. All the following are tube agglutination tests.

1. ASO. 2. CRP. 3. Weil felix 4. Paul Bunnel

A. 1,2,3, 4 are correct. B. 2, 3, 4 are correct. C. 3,4 are correct. D. 2, 4 are correct.

ix. 23. Characteristics of Rickettsiae are

1. Obligate intracellular organism. 2. Cultivable in ordinary culture media. 3. Transmitted by arthropod vectors 4. They infect vascular endothelial cells

A. . A. 2,3,4 are correct. B. 1,2,3 are correct. C. 1,3, 4 are correct. D. 1,2, 3, 4 are correct.

x. Infections produced by Streptococcus pyogenes are

1. Osteomyelitis. 2. Endocarditis. 3. Cellulitis. 4. Necrotising fasciitis.

A. 1,2,3,4 are correct. B. 1,3,4 are correct. C. 2,3,4 are correct. D. 1, 2. 3 are correct.

**Question numbers (xi) – (xv)are single response types**

xi. 25. Cutaneous larva migrans is caused by

A. Ancyclostoma caninum. B. Ancyclostoma duodenale. C. Necator americanus. D. Ascaris lumbricoides.

xii. 26. A 45-year-old male patient was admitted with high fever, chills, headache, cough, shortness of breath and fatigue. His respiratory system was normal. An echocardiogram showed echodense mass implanted on his prosthetic valve. Three sets of blood cultures were taken for a diagnosis. What is the probable diagnosis?

A. Rheumatic fever. B. Infective endocarditis. C. Endotoxic shock. D. Brucellosis

xiii. Fc receptors for IgE are present on the surfaces of

A. Monocytes. B. Mast cells. C. Macrophages. D. Eosinophils.

xiv. Tinea Versicolor is caused by

4. Candida albicans. B. Trichophyton mentagrophytes. C. Malassezia furfur. D. Trichosporon beigelii.

xv. Drug of choice for Dermatophytosis is

5. Amphotericin B. Nystatin. C. Flucytosin. D. Itraconazole.

**Question numbers (xvi) – (xx) consists of two Statements-Assertion (A) and reason (R). Answer these questions by selecting the appropriate options given below.**

**A. Both A and R are true, and R is the correct explanation of A**
**B. Both A and R are true, and R is not the correct explanation of A**
**C. A is true but R is false**
**D. A is false but R is true**

xvi. A. Endoscopes are ideally disinfected using 2% Gluteraldehyde
R. Endoscopes are heat stable

xvii. A. Linezolid is not prescribed for MSSA infections
R. MSSA are susceptible to all beta lactams

xviii. A. Urine samples for culture should not be refrigerated if delay occurs.
R. The bacteria are not allowed to multiply in the container before inoculation.

xix. A. Transposons are also called as 'jumping' genes.
R. They jump from one bacteria to another.

xx. A. Blood for blood culture is always added to an appropriate broth.
R. The number of bacteria in a whole blood sample is very low.

**Essays. (2x 10=20 marks)**

2. A 30-year-old man visited dermatology OPD with complaints of a painless genital ulcer.

On examination it was hard and indurated. He gives history of multiple sexual contacts.

(1+1+1+3+4 =10 marks)

a) What is the clinical diagnosis?
b) Name the aetiological agent.
c) Name TWO other agents causing genital ulcer.
d) Briefly discuss the clinical stages of this condition.
e) Describe the laboratory diagnosis.

3. Define sterilisation.
    a) Classify moist heat sterilisation methods with examples
    b) Discuss the principle and clinical applications of autoclave
    c) Add a note on sterilisation controls. (1+3+3+3=10 marks)

**Short Essays. (6X6 = 36 marks)**

4. Type IV hypersensitivity.
5. Enumerate the transmission-based precautions. Give TWO examples each for the diseases prevented by these precautions. List the functions of Hospital Infection Control Committee (HICC). (2+2+2)
6. Briefly describe the pathogenesis, clinical manifestations, and treatment of Varicella zoster infections. (2+3+1)
7. Pathogenesis and laboratory diagnosis of Dengue haemorragic fever. (2+4)
8. What are dimorphic fungi? Give TWO examples. Write briefly about the mode of transmission and clinical features and lab diagnosis of any one of them. (1+1+4)
9. Describe the mechanisms of autoimmunity. List FOUR organ specific autoimmune diseases. (4+2)

**Short Answers. (6x4 = 24 marks)**

10. Segregation of Biomedical waste.
11. Transduction
12. Name the causative agents of filariasis. Mention the definitive and intermediate host.
13. NACO Strategy III for HIV diagnosis
14. Anaerobic culture methods
15. A sample sent for HIV testing as part of screening for surgery was wrongly reported as positive. Discuss the corrective actions adopted in this situation.

**QP Code:** **Reg. No**.

**SECOND PROFESSIONAL MBBS EXAMINATION**

**MICROBIOLOGY PAPER II**

**Time: 3 hours.** ***(Draw diagrams wherever necessary)*** **Maximum Marks:100**

**1. MCQ.** **(1X20=20 marks)**

**Read the following clinical history and select the most appropriate response for questions (i) – (v)**

A 45-year-old farmer presented to Emergency Department with a 10 days history of fever, headache and maculopapular rashes all over the body with an eschar on right lower limb.

i. What is the most probable clinical diagnosis?
A. Q fever. B. Epidemic typhus. C. Scrub typhus. D. Endemic typhus

ii. Name the etiological agent causing the above disease.
A. Coxiella burnetii. B. Orientia tsutsugamushi. C. Rickettsia prowazekii. D. Rickettsia typhi

iii. Mode of transmission of the disease is by
A. Tick B. Rat flea C. Louse D. Trombiculid mite

iv. The diagnostic test for this condition is
A. Weil Felix B. Cold agglutination. C. Widal. D. Paul Bunnel.

v. The drug of choice for above disease is
A. Penicillin. B. Doxycycline. C. Ceftriaxone. D. Gentamicin.

**Question numbers (vi) – (x) are multiple response type questions. Read the statements & mark the answers appropriately.**

vi. Hemophilus influenzae causes
1. Sinusitis 2. Otitis media 3. Pneumonia 4. Dental caries

A. 1,2,3 are correct. B. 1,2, 4 are correct. C. 2,3, 4 are correct D. 1, 3, 4 are correct

vii. Heart lung migration is seen in the following

1. Schistosoma mansoni 2. Ancylostoma duodenale 3. Necator americanus 4. Ascaris lumbricoides

A. 1,2,3 are correct B. 2,3,4 are correct C. 1,4 are correct D. 2,3 are correct

viii. Methods of stool examination are
1.Saline wet mount 2. Iodine wet mount 3. Enterotest 4. Modified ZN stain

A. 1,2 are correct. B. 1,2,3 are correct C. 1,2,4 are correct. D.2,3 are correct

ix. Dimorphic fungi which can cause pulmonary lesions
1.Paragonimus westermani 2. Coccidioides immitis 3. Aspergillus terreus 4.Histoplasma capsulatum

A. 1,2,3 are correct. B. 2,3,4 are correct. C. 1,3 are correct D. 2,4 are correct

x. Halophilic Vibro include the following.
1. V. vulnificus. 2. O139 V.cholerae 3.V. parahaemolyticus. 4. V.alginolyticus

A. 1, 2, 3 are correct. B. 2,3, 4 are correct. C. 1,3, 4 are correct. D. 1, 2, 3, 4 are correct.

**Question numbers (xi) – (v) are single response type questions.**

xi. A 30-year-old antenatal woman presented with jaundice and was diagnosed as fulminant hepatitis complicating pregnancy. The probable cause is
A. HEV B. HBV C. HCV D. HAV

xii. A two-year-old child was brought with fever, vomiting and headache. On examination he had nuchal rigidity and non-blanching purpuric rash over the body. CSF Gram stain showed presence of Gram negative intracellular diplococci. What is the probable diagnosis?
A. Pneumococcal meningitis B. Tuberculous meningitis C. Meningococcal meningitis. D. Group B Streptococcal meningitis

xiii. Toxin mediated infection
A. Tetanus B. Tuberculosis. C. Polio D. Rabies

xiv. Which is the nematode inhabiting large intestine.
A. Trichinella B. Ancylostoma C. Ascaris D. Trichuris

xv. A 30-year-old man presented with fever and pain in the right hypochondrium. On examination liver was enlarged and tender. The aspirate from the liver abscess revealed presence of characteristic trophozoites. What is the diagnosis?
A. Hydatid cyst of the liver. B. Amoebic liver abscess C. HAV infection. D. Bacterial cholangitis

**Question numbers (xvi) – (xx) consists of two Statements-Assertion (A) and reason (R).**

**Answer these questions by selecting the appropriate options given below.**

**A. Both A and R are true, and R is the correct explanation of A**
**B. Both A and R are true, and R is not the correct explanation of A**
**C. A is true but R is false**
**D. A is false but R is true**

xvi. A. Antibiotics have an important role in the management of Common cold
R. Common cold is predominantly caused by viruses

xvii. A. HBV vaccine is protective against HDV also
R. HDV is a defective virus and HBsAg surrounds its genome

xviii. A. Multi drug therapy is the standard practice in treatment of TB
R. Incidence of resistance to one is independent of resistance to the other

xix. A. Rabies is an enveloped virus.
R. Rabies virus is destroyed by washing with soap and water.

xx. A. HPV vaccine prevents genital warts, an important lesion that can lead to cancer
R. HPV vaccine is ideally given at birth

**Essays.** **(2x 10=20 marks)**

2. A 40-year-old male presented with history of loss of appetite, malaise and jaundice of 2 months' duration. On examination there was icterus and

hepatomegaly. He gave a history of blood transfusion in the past. On laboratory examination, he was found to be positive for HBsAg. (1+3+2+1+3=10 marks)

a. What is the most probable diagnosis?
b. Discuss in detail the laboratory diagnosis.
c. What are the other modes of transmission?
d. Name two other viruses transmitted similarly.
e. Write briefly on the post exposure prophylaxis.

3. An 8-year boy was brought to emergency department with complaints of difficulty in breathing. O/E there was membrane over the tonsils. Immunization history was not available. (1+1+2+4+2=10 marks)
    a. What is the most probable diagnosis?
    b. Name the causative agent.
    c. Describe the pathogenesis.
    d. Describe the laboratory diagnosis.
    e. Describe briefly about the prophylaxis of this disease.

**Short Essays. (6x6 = 36 marks)**

4. Neurocysticercosis
5. Post exposure prophylaxis of Rabies
6. Polio vaccines and the current vaccination schedule.
7. Laboratory diagnosis of pulmonary tuberculosis
8. Diarrheagenic E.coli
9. Extra intestinal amoebiasis

**Short Answers. (6x4 = 24 marks)**

10. List 4 bile-stained ova seen in stool. Draw and label any one of them.
11. Antigenic variations of influenza virus
12. A CSF Sample for culture was refrigerated and sent to the lab. Discuss the correct decision and the appropriate action to be taken.
13. Cryptococcus neoformans
14. Pathogenesis and laboratory diagnosis of Nipah virus infection
15. List 4 zoonotic diseases and mention the etiological agent and mode of transmission of each.

**QP code:** **Reg no.....**

**SECOND PROFESSIONAL MBBS EXAMINATION**

## Pathology –Paper I

## (General Pathology and Haematology including Clinical Pathology)

**Time: 3 Hours** **Max.marks: 100**

**1.MCQ** **(1x20=20 Marks)**

**Single response type**

i. Commonest fixative of biopsy specimen is
A) Ethyl alcohol B) Formalin C) Gluteraldehyde D) Methyl alcohol

ii. RAS is
A) Growth factor B) Growth factor receptor
C) Signal transducing factor D) Nuclear transcription factor

iii. The translocation seen in acute promyelocytic leukemia is
A) t(8:21) B) t(9:22) C) t(14:18) D) t(15:17)

iv. The typical karyotype of Klinefelter syndrome is
A) 45,XO B) 46,XY C) 47,XXY D) 47,XYY

v. The test used to monitor the therapeutic use of heparin is
A) Bleeding time B) Clotting time C) PT D) APTT

**Multiple response type**

vi. Granulomas are seen in
1. Impetigo 2. Leprosy 3.Sarcoidosis 4.Tuberculosis
A) 1, 2 and 3 B) 2, 3 and 4 C) 1, 3 and 4 D) 1, 2 and 4

vii. Staging of a tumor include
1. Differentiation of the tumour 2. Distant metastasis
3. LN involvement 4. Size of the tumour
A) 1, 2 and 3 B) 2, 3 and 4 C) 1, 3 and 4 D) 1, 2 and 4

viii. Type II hypersensitivity reaction occurs in
1. Graves' disease 2. Haemolytic disease of newborn
3. Myasthenia gravis 4. Tuberculosis
A) 1, 2 and 3 B) 2, 3 and 4 C) 1, 3 and 4 D) 1, 2 and 4

ix. Dry tap on BM aspiration is seen in
1. Aplastic anemia 2. CLL 3.Myelofibrosis 4.Megakaryoblastic leukemia

A) 1, 2 and 3 B) 2, 3 and 4 C) 1, 3 and 4 D) 1, 2 and 4

x. Classical features of Down syndrome include

1. Epicanthic fold 2. Cardiac anomaly
3. Predisposition to acute leukemia 4. Streak ovary

A) 1, 2 and 3 B) 2, 3 and 4 C) 1, 3 and 4 D) 1, 2 and 4

**For Questions 11-15, there are 2 statements marked as Assertion (A) and Reason (R). Mark your answer as per the options provided**

**A) Both A & R are correct and R is the reason for A**
**B) Both A& R are correct but R is not reason for A**
**C) A is correct R is incorrect**
**D) A is incorrect R is correct**
**E) Both A & R are incorrect**

xi. (A) In familial retinoblastoma patients, all retinal cells carry one mutant Rb gene
(R) Familial retinoblastoma occurs due to germ line mutation of Rb gene

xii. (A) Dystrophic calcification is deposition of calcium salts in dead tissues
(R) There is derangement in the calcium metabolism in dystrophic calcification

xiii. (A) Bleeding time is prolonged in von Williebrand disease
(R) von Williebrand factor is a carrier protein for factor VIII

xiv. (A) Benedict's test detects presence of glucose in urine
(R) Benedict's solution contains glucose oxidase

xv. (A) CVC liver has a nutmeg appearance grossly
(R) There is marked congestion in the portal tract in CVC liver

**Read the following case scenario and answer subsequent questions based on this**

35 year old female presented with fever, skin rashes and pain in the joints for the past 2 years. She noticed hematuria one month back. On examination she had a 'butterfly' rash in the face. Investigations revealed a strong ANA positivity.

xvi. 16. The commonest hypersensitivity reaction in this condition is

A) Type I B) Type II C) Type III D) Type IV

xvii. 17. The specific antibody in this condition is against

A) dsDNA B) Jo-1 C) Scl-70 D) SS-A

xviii. 18. The expected pattern of nuclear fluorescence in indirect immunofluorescence is

A) Centromeric B) Nucleolar
C) Rim staining D) Speckled pattern

xix. 19. The typical endocarditis seen in this condition is

A) Infective endocarditis B) Libman-Sacks endocarditis
C) Nonbacterial thrombotic endocarditis D) Subacute bacterial endocarditis

xx. 20. The characteristic vascular lesion is

A) Atherosclerosis B) Fibrinoid necrosis
C) Leucocytoclastic vasculitis D) Obstructive vasculopathy

**II Long essays (2x10=20 marks)**

1. 11-year-old boy presented with fever, tiredness, purpuric spots over the body and generalised lymphadenopathy. Blood investigations showed Hb 6gm%; WBC count 95,000 cells/cmm; platelet count 40,000 cells/cmm.

I. What is your provisional diagnosis?
II. Describe the peripheral smear and bone marrow findings
III. Mention 2 special stains helpful in the diagnosis
IV. List 4 prognostic factors of this condition
(1+5+2+2=10)

2. Explain the vascular events in acute inflammation. Describe the sequence of cellular events that follow. Enumerate the differences between transudate and exudate. (4+4+2=10)
3.

**III Short essays (6x6=36 marks)**

4. Pathogenesis of thrombus formation

5. Chemical mediators

6. Morphology of chronic myeloid leukemia

7. Viral oncogenesis

8. Septic shock

9. Differences between benign and malignant lesions

**IV Short answers (4x6=24 marks)**

10. Pathogenesis of Disseminated intravascular coagulation

11. Lab diagnosis of ITP
12. RBC parameters and histogram of iron deficiency anaemia
13. Biochemical findings in pyogenic, tuberculous and viral meningitis.
14. Processing of tissue for histopathological examination
15. Enumerate the situations in which informed consent is taken

**QP code:** **Reg no.....**

**SECOND PROFESSIONAL MBBS EXAMINATION**

## Pathology –Paper II

## (Systemic Pathology)

**Time: 3 Hours** **Max.marks: 100**

**1. MCQ** **(1x20=20 Marks)**

**Single response type**

i. Causes of cirrhosis liver include all, EXCEPT

A) Alcoholism B) Hemochromatosis C) Hepatitis A infection D) Wilson's disease

ii. Which of the following is true regarding carcinoma breast?

A) Disease of old age B) Mucinous carcinoma is the commonest type C) Majority express estrogen receptor D) Chemotherapy is the treatment of choice

iii. Emphysema is due to

A) Mucous plugs in bronchioles B) Protease-antiprotease imbalance
C) Squamous metaplasia D) Type I hypersensitivity reaction

iv. Nephrotic syndrome includes all, EXCEPT

A) Hypoalbuminemia B) Hyperlipidemia C) Hematuria D) Massive proteinuria

v. Staghorn calculus of kidney is formed by

A) Calcium oxalate B) Calcium phosphate
C) Magnesium ammonium phosphate D) Uric acid

**Multiple response type**

vi. . Small round cell tumours include

1. Adenocarcinoma 2. Ewing's sarcoma
3. Neuroblastoma 4. Rhabdomyosarcoma

A) 1, 2 and 3 B) 2, 3 and 4 C) 1, 3 and 4 D) 1, 2 and 4

vii. 7. Prostate cancer

1. Occurs in transitional zone 2. Gleason score has therapeutic implications
3. Is adenocarcinoma 4. PSA will be increased

A) 1, 2 and 3 B) 2, 3 and 4 C) 1, 3 and 4 D) 1, 2 and 4

viii. 8. Carcinoma of endometrium is

1. Due to persistent estrogen stimulation 2. Depth of myometrial invasion is important

3. Has very bad prognosis 4. Shows squamous differentiation

A) 1, 2 and 3 B) 2, 3 and 4 C) 1, 3 and 4 D) 1, 2 and 4

ix. Diabetic nephropathy shows

1. Basement membrane thickening 2. Kimmelstiel Wilson lesions

3. Fibrinoid necrosis of arteriole 4. Papillary necrosis

A) 1, 2 and 3 B) 2, 3 and 4 C) 1, 3 and 4 D) 1, 2 and 4

x. Features of osteosarcoma include

1. Affects <20 years of age 2. X-ray shows sunburst appearance

3. Osteoid formation 4. Small round cells

A) 1, 2 and 3 B) 2, 3 and 4 C) 1, 3 and 4 D) 1, 2 and 4

**For Questions 11-15, there are 2 statements marked as Assertion (A) and Reason (R). Mark your answer as per the options provided**

**A) Both A & R are correct and R is the reason for A**
**B) Both A& R are correct but R is not reason for A**
**C) A is correct R is incorrect**
**D) A is incorrect R is correct**
**E) Both A & R are incorrect**

xi. (A) Rituximab is given in B cell lymphomas
(R) B cell lymphomas express CD20

xii. (A) Diffuse gastric cancer shows sheets of signet ring cells
(R) There is loss of E-cadherin in diffuse gastric cancer

xiii. (A) In autosomal dominant polycystic kidney disease, cysts arise from tubules
(R) The mutation is in cilia-centrosome complex of tubular epithelium

xiv. (A) Paroxysmal hypertension Is a symptom of pheochromocytoma
(R) Pheochromocytoma secretes catecholamines

xv. (A) Nephroblastoma has an excellent prognosis
(R) Anaplastic cells are seen in nephroblastoma

**Read the following case scenario and answer subsequent questions based on this**

A 60-year-old male presented with painless haematuria and dull flank pain. On examination he was found to have an abdominal mass. CT scan revealed a mass in the right kidney. Nephrectomy was done.

xvi. The gross appearance of the lesion is likely to show

A) Caseous necrosis B) Fish flesh appearance
C) Uniform yellow colour D) Variegated appearance

xvii. The microscopy will most likely show

A) Clear cells B) Oncocytic cells
C) Papillae D) Spindle cells

xviii. The commonest paraneoplastic manifestation in this patient will be

A) Cushing syndrome B) Feminisation
C) Hypercalcemia D) Polycythemia

xix. The gene involved in this lesion is

A) BRAF B) MET C) RAS D) VHL

xx. Commonest mode of spread is

A) Direct renal vein invasion B) Hematogenous
C) Lymphatic D) Transcoelomic

**II Long essays (2x10=20 marks)**

2. 45-year-old male was brought to the casualty with sudden onset of chest pain with radiation to the left arm. While on treatment, on the fifth day, he developed hypotension and died.

I. What is your provisional diagnosis?
II. Mention 4 risk factors of this condition
III. Describe the gross and microscopic features expected in the autopsy specimen
IV. Mention 2 lab investigations helpful in the diagnosis during admission

(1+2+5+2=10)

3. Classify ovarian tumours. Describe the gross and microscopy of dysgerminoma. Name the markers of germ cell tumours of ovary.

(3+5+2=10)

**III Short essays** **(6x6=36 marks)**

4. Basal cell carcinoma
5. Morphology and clinical significance of fibrocystic disease of breast
6. Pathogenesis and morphology of emphysema
7. Risk factors, gross and microscopy of carcinoma cervix
8. Gross and microscopic features of peptic ulcer
9. Gross and microscopic features of papillary carcinoma thyroid

**IV Short answers** **(4x6=24 marks)**

10. Glioblatoma multiforme
11. Pleomorphic adenoma
12. Cardiomyopathies
13. Hodgkin lymphoma
14. Osteoclastoma
15. Explain the option of 'do not resuscitate'

**QP code:** **Reg no.....**

**SECOND PROFESSIONAL MBBS EXAMINATION**

## Pathology –Paper II

## (Systemic Pathology)

**Time: 3 Hours** **Max.marks: 100**

**2. MCQ** **(1x20=20 Marks)**

**Single response type**

xxi. Causes of cirrhosis liver include all, EXCEPT

A) Alcoholism B) Hemochromatosis C) Hepatitis A infection D) Wilson's disease

xxii. Which of the following is true regarding carcinoma breast?

A) Disease of old age B) Mucinous carcinoma is the commonest type C) Majority express estrogen receptor D) Chemotherapy is the treatment of choice

xxiii. Emphysema is due to

A) Mucous plugs in bronchioles B) Protease-antiprotease imbalance
C) Squamous metaplasia D) Type I hypersensitivity reaction

xxiv. Nephrotic syndrome includes all, EXCEPT

A) Hypoalbuminemia B) Hyperlipidemia C) Hematuria D) Massive proteinuria

xxv. Staghorn calculus of kidney is formed by

A) Calcium oxalate B) Calcium phosphate
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**Multiple response type**

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(R) Anaplastic cells are seen in nephroblastoma

**Read the following case scenario and answer subsequent questions based on this**

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A) BRAF B) MET C) RAS D) VHL

xl. Commonest mode of spread is

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C) Lymphatic D) Transcoelomic

**II Long essays (2x10=20 marks)**

2. 45-year-old male was brought to the casualty with sudden onset of chest pain with radiation to the left arm. While on treatment, on the fifth day, he developed hypotension and died.

V. What is your provisional diagnosis?
VI. Mention 4 risk factors of this condition
VII. Describe the gross and microscopic features expected in the autopsy specimen
VIII. Mention 2 lab investigations helpful in the diagnosis during admission

(1+2+5+2=10)

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**III Short essays** **(6x6=36 marks)**

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5. Morphology and clinical significance of fibrocystic disease of breast
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9. Gross and microscopic features of papillary carcinoma thyroid

**IV Short answers** **(4x6=24 marks)**

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11. Pleomorphic adenoma
12. Cardiomyopathies
13. Hodgkin lymphoma
14. Osteoclastoma
15. Explain the option of 'do not resuscitate'

**Q.P.Code :** **Reg.No: .....**

**SECOND PROFESSIONAL MBBS EXAMINATION**

**Pharmacology –Paper I (General pharmacology, ANS, CNS, CVS, Blood, Diuretics, Autacoids, Respiratory system).**

**Time: 3 Hours** **Maximum Marks: 100**

***Answer all Questions.***

***Draw diagrams wherever necessary.***

1. **MCQ** **(1x20=20marks)**

**Question Numbers (i) – (v) are Single Response Type**.

i. Which of the following Drugs is an Inverse agonist?

   a. Adrenaline. b) Bromocriptine. c) Betacarbolines. d) Fentanyl.

ii. Bleeding due to Tenecteplase is treated with:

   a. Tranexamic acid. b) Protamine. c) Vit. K. d) Clopidogrel.

iii. The Antidote of Morphine poisoning given orally is:

   a. Naltrexone. b) Nalorphine. c) Nalbuphine. d) Naloxone.

iv. Which of the following statements is NOT True about Lithium?

   a. Used in Mania & Bipolar disorder.
   b. Stimulates the action of ADH.
   c. Can be used orally.
   d. Contraindicated in Pregnancy.

v. Which of the following is NOT a Prodrug?

   a. Levodopa b. Enalapril c. Prednisone. d. Amitriptyline.

**Question Numbers (vi) – (x) are Multiple Response Type. Read the statements and mark the answers appropriately**.

vi. Which of the following are the Uses of Alpha blockers?

1. Benign hypertrophy of Prostate.
2. Hypotension.
3. Peripheral vascular diseases.
4. Nasal decongestant.

a. 1 & 4. b. 2 & 3. c. 1 & 3. d. 3 & 4.

vii. Which of the following Statements are NOT True about Plasma protein binding?

5. Makes the drug short acting.
6. Makes the Volume of distribution small.
7. Delays Metabolism & Excretion.
8. Makes the drug active.

a. 1 & 4. b. 3 & 4. c. 2 & 4. d. 2 & 3.

viii. Which of the following statements are Not True about Furosemide?

1. Causes Hypokalemia
2. Causes Hypercalcemia.
3. Can cause Ototoxicity.
4. Mainly acts at the Distal tubule.

a. 3 & 4 b 1 & 2. c. 2 & 4 d. 1 & 3.

ix. Which of the following statements are True about Halothane?

1. Cause Bronchodilatation.
2. Non - irritant & Non inflammable
3. Good Analgesic.
4. Good muscle relaxant.

a. 1 & 2. b. 2 & 4 c.1 & 3. d. 2 & 3.

x. Which of the following statements are NOT True about Intravenous route of drug administration?

1. Bioavailability is 100 %.
2. Suspensions can be used.
3. Large volume may be used.
4. Irritant drugs cannot be used.

a. 2 & 3. b. 1 & 2. c. 3 & 4. d. 2 & 4.

**Question Numbers (xi) – (xv) are based on Case scenario. Read the statements and mark the answer appropriately.**

Sixty one year lady had symptoms and signs of dyspnoea, tachycardia, peripheral oedema and hepatomegaly. The diagnosis was Cardiac Failure.

xi. Which of the following statements is NOT true about Digoxin?

a. Inhibits Na+K+ATPase b. Decreases heart rate

c. Hypokalemia decreases its toxicity d. Can be used orally.

xii. The Correct Statement about Nesiritide is:

a. Iis a Natriuretic peptide b. Causes vasoconstriction

c. Used orally d. Not used in Cardiac failure..

xiii. Which of the following drugs do not reverse disease progression in Cardiac failure?

a. ACEI b. Thiazides c. Beta blockers d. Spironolactone.

xiv. Which of the following statements is NOT true about Diuretics in Cardiac failure?

a. do not increase cardiac output
b. Furosemide is used in Pulmonary edema
c. Remove peripheral edema
d. Do not cause Hypokalemia.

xv. The Antiplatelet dose of Aspirin is :

a. 75 to 150mg daily b. 4 to 6 Grams daily.

e. c. 2 to 3 Grams daily d. 700 to 900 mg daily.

**Question numbers (xvi) – (xx) consists of two statements - Assertion (A) and reason (R). Answer these questions by selecting the appropriate options given below.**

**A. Both A and R are true, and R is the correct explanation of A**

**B. Both A and R are true, and R is not the correct explanation of A**

**C. A is true, but R is false**

**D. A is false, but R is true**

xvi. Assertion (A): Desloratadine is prescribed for Allergic Rhinitis in a Driver.

Reason(R): Desloratadine is highly sedative.

a. Both A and R are true, and R is the correct explanation of A
b. Both A and R are true, and R is not the correct explanation of A
c. A is true but R is false
d. A is false but R is true

xvii. Assertion (A): Ethyl alcohol is used in Methyl alcohol poisoning.

Reason(R): Ethyl Alcohol inhibits the metabolism of Methyl alcohol.

a. Both A and R are true, and R is the correct explanation of A
b. Both A and R are true, and R is not the correct explanation of A
c. A is true but R is false
d. A is false but R is true

xviii. Assertion (A): Clozapine is an Atypical Antipsychotic.

Reason(R): Clozapine causes Hyperprolactinemia and severe Extrapyramidal Reactions.

a. Both A and R are true, and R is the correct explanation of A
b. Both A and R are true, and R is not the correct explanation of A
c. A is true but R is false

d. A is false but R is true

xix. Assertion (A): Nicorandil blocks Potassium channels.

Reason(R): Nicorandil is used in Angina Pectoris.

a. Both A and R are true, and R is the correct explanation of A
b. Both A and R are true, and R is not the correct explanation of A
c. A is true but R is false
d. A is false but R is true

xx. Assertion (A): Verapamil is combined with Betablockers.

Reason(R): This combination causes Heart block.

a. A. Both A and R are true, and R is the correct explanation of A
b. B. Both A and R are true, and R is not the correct explanation of A
c. C. A is true, but R is false
d. D. A is false, but R is true

**Long Essays: (2 x10 = 20 Marks)**

2. Enumerate Anti - Hypertensive drugs. Describe the Mechanism of Action, Uses and Adverse effects of Lisinopril. Discuss the mechanism of action and Uses of Vasodilators. (3+5+2=10)

3. Sruti, 49 Years was admitted to the hospital with Signs & Symptoms of Rigidity, Tremor and reduced mobility. The Diagnosis was Parkinsonism.

- Name Three different groups of drugs used for this patient and Describe the Mechanism of Action and One Adverse Effect of each group.
- Mention Three advantages of using Peripheral Decarboxylase Inhibitors.
- Name Two drugs causing Parkinsonism.
- Discuss the Treatment of Drug induced Parkinsonism. (4 +3+ 1 +2 =10)

**Short Essays:** **(6x6 =36 Marks)**

4. Describe the Mechanism of Receptor mediated drug action. Discuss the factors modifying Bioavailability and the clinical significance. (3+3 marks)
5. Discuss the Treatment of Morphine poisoning and Organophosphorus Poisoning with rationale. (3+3marks)
6. Discuss the pharmacological management of Acute Bronchial asthma. Discuss the treatment of Glaucoma. (4+2marks)
7. Describe the drugs used in Preanesthetic medication. Discuss the mechanism of Action and Uses of peripherally acting Skeletal Muscle Relaxants (3+3marks)
8. Compare and contrast Heparin and Warfarin. Discuss the clinical uses of Anticoagulants. (3+3 marks)
9. Describe the Mechanism of Action, Uses and Adverse effects of Sodium Valproate. Discuss the Pharmacological management of Status Epilepticus. (4+2marks).

**Short answers:** **(6x4=24 Marks)**

10. Pharmacological basis of drugs used in Angina.
11. Treatment of Anaphylaxis.
12. Uses of Betablockers.
13. Pharmacological basis of drugs used in Cardiac failure.
14. Therapeutic uses of Aspirin.
15. Discuss the types of Communication and its importance in Health care settings.

**Q.P.Code :** **Reg.No:.....**

**SECOND PROFESSIONAL MBBS EXAMINATION**

**Pharmacology –Paper II (GIT, Hormones, Antibiotics, Chemotherapy & Miscellaneous)**

**(Model Question Paper)**

**Time : 3 Hours** **Maximum Marks : 100**

***Answer all Questions.***

***Draw diagrams wherever necessary.***

**1. MCQ** **(1x20=20marks)**

**Question Numbers (i) – (v) are Single Response Type**.

i. Which of the following Drugs is preferred in Peptic ulcer due to NSAID?

a. Carboprost. b. Dinoprost. c. Misoprostol. d. Travoprost.

ii. Which of the following drugs is NOT used in Pregnancy?

a. Tetracycline. b. Amoxicillin. c. Cephalexin. d. Chloroquine.

iii. Which of the following drugs is preferred in the treatment of Pseudomembranous Enterocolitis?

a. Clindamycin b. Metronidazole. c. Tetracycline. d. Gentamicin.

iv. Which of the following statements is NOT True about Mifepristone?

a. can be used orally.
b. Used in Termination of pregnancy.
c. Used for Post Coital Contraception.
d. No progesterone antagonist action.

v. Which of the following statements is NOT true about Amphotericin B?

a. Polyene Antibiotic.
b. can cause Nephrotoxicity

c. Acts by inhibiting Mitosis.

d. Used in Systemic Mycoses.

**Question Numbers (vi) – (x) are Multiple Response Type. Read the statements and mark the answers appropriately**.

vi. Which of the following Statements are Not true about Antibiotic combinations?

1. Useful in Tuberculosis & Leprosy.
2. Increases cost of Treatment.
3. Reduces Superinfection.
4. Penicillin is combined with Tetracyclines.

a. 1 & 2. B. 2 & 4. c. 3 & 4. d.1 & 3

vii. Which of the following Statements are True about Prednisolone?

1. Intermediate duration of action.
2. Not used parenterally.
3. Given at night to reduce pituitary adrenal suppression.
4. Withdrawal must be gradual after prolonged treatment.

a. 1 & 4. b. 2 & 4. c. 1 & 3. d. 2 & 3

viii. Which of the following statements are Not True about Granisetron?

1. Used in Chemotherapy induced vomiting.
2. Blocks Dopamine receptors.
3. Less potent than Ondansetron.
4. Used in postoperative vomiting.

a. 1 & 3. b. 2 & 3. c. 2 & 4. d. 1 & 4

ix. Which of the following are the preferred uses of Clomiphene?

1. Female Infertility.
2. Senile vaginitis.

3. Oligozoospermia.
4. Osteoporosis.

a. 1 & 3 b. 2 & 4. c. 2 & 3. d. 3 & 4

x. Which of the following statements are Not true about Ciprofloxacin?

1. Inhibits DNA Gyrase.
2. can cause Tendonitis.
3. Used in Pregnancy.
4. Bacteriostatic.

a. 2 & 3. b. 3 & 4. c. 1 & 4. D. 2 & 4.

**Question Numbers (xi) – (xv) are based on Case scenario. Read the statements and mark the answer appropriately.**

Twenty one year old female patient had symptoms of Fever, Cough with Yellow coloured sputum. After Consultation and Investigations the Diagnosis was Upper Respiratory Tract infection and appropriate Antibiotic was Prescribed.

xi. Which of the following statements is NOT true about Amoxicillin?.

a. Amoxicillin is absorbed more orally than Ampicillin.
b. Amoxicillin can be combined with Clavulanic acid
c. Procaine penicillin is used Intravenously.
d. Benzyl penicillin is inactivated by gastric acid.

xii. Which of the Following is Broad Spectrum Antibiotic?

a. Tetracycline
b. Erythromycin
c. Gentamicin
d. Procaine Penicillin.

xiii. Linezolid acts by-

a. Inhibiting cell wall synthesis
b. Inhibiting protein synthesis

c. Inhibiting intermediary metabolism

d. Causing cell membrane leakage.

xiv. Which of the following is NOT true about Gentamicin?

a. Used in Gram positive infections

b. Not used orally

c. Causes Ototoxicity

d. Causes Nephrotoxicity

xv. The Drug inhibiting 50S Ribosomes is:

a. Ampicillin

b. Sulfonamides

c. Doxycycline

d. Azithromycin.

**Question numbers (xvi) – (xx) consists of two statements - Assertion (A) and reason (R). Answer these questions by selecting the appropriate options given below.**

**A. Both A and R are true, and R is the correct explanation of A**

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**C. A is true, but R is false**

**D. A is false, but R is true**

xvi. Assertion (A): Vancomycin inhibits bacterial cell wall synthesis.

Reason(R): Vancomycin is not used in MRSA.

a. Both A and R are true, and R is the correct explanation of A

b. Both A and R are true, and R is not the correct explanation of A

c. A is true but R is false

d. A is false but R is true

xvii. Assertion (A): Cyclophosphamide is an Antimetabolite.

Reason(R): Cyclophosphamide causes Cystitis which is treated with MESNA.

a. Both A and R are true, and R is the correct explanation of A

b. Both A and R are true, and R is not the correct explanation of A
c. A is true but R is false
d. A is false but R is true

xviii. Assertion (A): Imipenem is combined with Cilastatin.

Reason(R): Cilastatin prevents inactivation of Imipenem.

a. Both A and R are true, and R is the correct explanation of A
b. Both A and R are true, and R is not the correct explanation of A
c. A is true but R is false
d. A is false but R is true

xix. Assertion (A): Propylthiouracil inhibits coupling of Iodotyrosine.

Reason(R): Propylthiouracil is contraindicated in hyperthyroidism in pregnancy.

a. Both A and R are true, and R is the correct explanation of A
b. Both A and R are true, and R is not the correct explanation of A
c. A is true but R is false
d. A is false but R is true

xx. Assertion (A): Sodium bicarbonate is a Non systemic Antacid.

Reason(R): Sodium bicarbonate is used in the treatment of acidosis.

a. Both A and R are true, and R is the correct explanation of A
b. Both A and R are true, and R is not the correct explanation of A
c. A is true but R is false
d. A is false but R is true

**Long Essays**: **(2 x10 = 20 Marks)**

2. Enumerate Anticancer drugs. Describe the mechanism of Action, Uses and Adverse effects of Methotrexate. Discuss the rationale of using Glucocorticoids in Malignancy. (3+4+3=10)

3. Rini, 39 Years was admitted to the hospital with signs & symptoms of Fatigue, Thirst, Polyuria. The Blood sugar was 250mg. The diagnosis was Type II

Diabetes mellitus.

a. Name Three different groups of drugs used for this patient and Describe the Mechanism of Action and One Adverse Effect of each group.
b. Describe the Treatment of Diabetic Ketoacidosis.
c. Describe the Management of Insulin Resistance.
d. Discuss the advantages and Uses of Insulin analogues. (4+2+2+2 =10)

**Short Essays (6x6=36 Marks)**

4. Describe the Rational use of Antibiotics. Discuss the mechanisms of Antibiotic Resistance and its management. (3+3marks)

5. Describe the mechanism of Action, Uses and Adverse effects of Rifampicin. Discuss the pharmacological management of MDR Tuberculosis. (3+3marks)

6. Describe the mechanism of Action, Uses and Adverse effects of Zidovudine. Discuss the drug combinations used in HIV infection and the management of HIV in pregnancy. (3+3marks)

7. Describe the mechanism of Action, Uses and Adverse effects of Lansoprazole Discuss the pharmacological management of Helicobacter Pylori infection (4+2marks)

8. Describe the mechanism of Action, Uses and Adverse effects of Atorvastatin. Discuss the pharmacological management of Hypertriglyceridemia. (4+2 marks)

9. Describe the mechanism of Action, Uses and Adverse effects of Tinidazole. Discuss the pharmacological management of Filariasis. (4+2marks)

**Short answers:** **(6x4=24 Marks)**

10. Pharmacological basis of drugs used in Leprosy.
11. Uses of Selective Estrogen Receptor Modulators.
12. Pharmacological basis of drugs used in Malaria.
13. Action and Uses of Metoclopramide.
14. Adverse effects of Glucocorticoids.
15. Discuss the role of Empathy in patient care.