

NOWGONG COLLEGE  
(Autonomous)



SYLLABUS

B.Voc. Course

On

Medical Laboratory Technician (MELT)

Learning Outcome-based Curriculum Framework (LOCF) of  
Four Year Undergraduate Programme  
Choice-based Credit System with flexibility

Effective from Academic Year 2023-24

Syllabus is approved in Academic Council, Nowgong College (Autonomous)

Dated: 30<sup>th</sup> June, 2023

### Course and Credit Structure

Semester	Major (Maj)	Minor (Min)	Inter-Disciplinary	AEC	SEC	VAC (Any Two in each Semester)	Research project/ Dissertation/ Internship	Total
I	MELT-MAJ-1014 Basic anatomy & physiology	MELT-MIN-1014 General Microbiology	MELT-IDC-1014 Pharmaceutics (Dispensing and community Pharmacy)	ASSA/HIND/BEN G-AEC-1012 Jugajogmulok Axomiya/ Vyakaran Evam Vyavaharik Hindi/Byowoharic Bangla – I  Business English: Networking  (Online)	MELT-SEC-1014 Community Pharmacy and Management	UNIN-VAC-1012 (Understanding India)  ENSC-VAC-1012 (Environmental Science)  NASS-VAC-1012 (National Service Scheme)  Online Courses: 1. OUFU-VAC-1012 Our Energy Future 2. PHSR-VAC-1012 Philosophy, Science and Religion 3. MOTH-VAC-1012 Model Thinking <b>(Any Two)</b>	Students exiting the program after securing 44 credits will be awarded UG certificate in the relevant discipline/ subject provided they secure additional 4 credits in work based Vocation Courses offering	22

II	MELT-MAJ-2014 Biochemistry-I	MELT-MIN-2014 Clinical Pathology	MELT-IDC-2014 Pharmacology and Phytochemistry	<b>Offline Courses:</b> ENGL-AEC-2012 (English and Mass Communication)  <b>Online Courses:</b> Business English: Management and Leadership (Infosys Springboard)	MELT-SEC-2014 Anatomy, Physiology and Health Education  <b>Online Courses:</b> Fundamental Skills on Python Programming & IoT (Infosys Springboard)	<b>Offline Courses:</b> DITS-VAC-2012 (Digital Technological Solutions)  YOMH-VAC-2012 (Yoga and Mental Health)  NACC-VAC-2012 (National Cadet Corps)  <b>Online Courses:</b> Fundamental of Artificial Intelligence (Infosys Springboard)  <b>(Any Two)</b>	during summer term for internship/apprenticeship in addition to 6 credits from Skill based Courses earned during 1 <sup>st</sup> & 2 <sup>nd</sup> Semester	22
<b>Certificate after 1 year (Total Credit = 44)</b>								
III	MELT-MAJ-3014 Pathology-I  MELT-MAJ-3024 Microbiology-I	MELT-MIN-3014 Advanced Analytical Chemistry	MELT-IDC-3014 Pharmacology- I	ASSA/HIND/BEN G -AEC-3012 Byowoharic Axomiya/ Karyalayi Hindi /Byowoharic Bangla – II		-----	Students exiting the program after securing 88 credits will be awarded UG Diploma in the relevant discipline/	22

								subject provided they secure additional 4 credits in Skill based Vocation Courses offered 2 <sup>nd</sup> year summer term.	
IV	MELT-MAJ-4014 Biochemistry-II  MELT-MAJ-4024 Pathology-II  MELT-MAJ-4034 Microbiology-II  MELT-MAJ-4044 Biochemistry-III	MELT-MIN-4014 Quality in Health care- Documentation and Hospital Infection Control	-----	ENGL-AEC-4012 (Academic Writing)	-----	-	-		22
<b>Diploma after 2 years (Total Credit = 88)</b>									
V	MELT-MAJ-5014 Pathology-III  MELT-MAJ-5024 Microbiology-III  MELT-MAJ-5034	MELT-MIN-5014 Biosafety and Intellectual Property Rights	-----	-----	-----	-----	-----	MELT-INTE-5012 (Internship)	22

	Biochemistry-IV MELT-MAJ-5044 Pathology-IV							
VI	MELT-MAJ-6014 Microbiology-IV  MELT-MAJ-6024 Biochemistry-V  MELT-MAJ-6034 Pathology-V  MELT-MAJ-6044 Microbiology-V  MELT-MAJ-6052 (Dissertation / Project)	MELT-MIN-6014 Bioinstrumentation and computational Biology	-----	---	----		-----	22
<b>Degree after 3 years (with Major/Minor) (Total Credit = 132)</b>								

VII	<p>MELT-MAJ-7014 Biochemistry-VI</p> <p>MELT-MAJ-7024 Pathology-VI</p> <p>MELT-MAJ-7034 Cardiac technology</p>	<p>MELT-MIN-7014 Patient care and laborator y manage ment</p>	-----	-----	-----	<p>REET-VAC-7012 (Research Ethics)</p>	<p>REME-MAJ-7044 (Research Methodology )</p>	22
VIII	<p>MELT-MAJ-8014 Quality in health care - hospital accreditation</p>	<p>MELT-MIN-8014 Pharmac eutical Jurispru dance</p>				<p>INPR-VAC-8012 (Intellectual Property Right)</p>	<p>MELT-DISS-80112 (Dissertation) (Those who are undertaking Research Project or Dissertation)</p> <p>OR</p> <p>MELT-MAJ-8024 Advanced hematology</p> <p>MELT-MAJ-</p>	22

								8034 Clinical microbiology MELT-MAJ- 8044 Clinical biochemistry, analytical techniques and quality assurance (Those who are not undertaking Research Project or Dissertation)	
<b>Degree after 4 years (with Honours/ by Research) (Total Credit = 176)</b>									176

N.B.: 1. 4 credit papers = 100 marks (60T+20IA+20P)

2. 2 credit papers (except AEC) = 50 marks (30T+10IA+10P)

3. 2 credit papers (Only AEC) = 50 marks (40T+10IA)

Question Pattern:

- For 100 marks papers [1 marks x 7 (no option) , 2 marks x 4(no option) , 5 marks x 3 (5 options), 10 marks x 3 ( 5 options) ]
- For 50 marks papers [ 1marks x 4 (no option), 2 marks x 3 (no option), 5 marks x 2 (4 options), 10 marks x 1 ( 2 options ) ]
- For AEC 50 marks papers [ 1 marks x 4 ( no options) , 2 marks x 3 ( no options), 5 marks x 2 ( 4 options), 10 marks x 2 (4 options ) ]



## **Details of Semester-Wise Courses:-**

### **Major Courses (25 papers) (4 Credits):**

MELT-MAJ-1014 BASIC ANATOMY & PHYSIOLOGY (Theory+ Practical)

MELT-MAJ-2014 BIOCHEMISTRY-I (Theory+ Practical)

MELT-MAJ-3014 PATHOLOGY-I (Theory+ Practical)

MELT-MAJ-3024 MICROBIOLOGY-I (Theory+ Practical)

MELT-MAJ-4014 BIOCHEMISTRY-II (Theory+ Practical)

MELT-MAJ-4024 PATHOLOGY-II (Theory+ Practical)

MELT-MAJ-4034 MICROBIOLOGY-II (Theory +Practical)

MELT-MAJ-4044 BIOCHEMISTRY-III (Theory+ Practical)

MELT-MAJ-5014 PATHOLOGY-III (Theory+ Practical)

MELT-MAJ-5024 MICROBIOLOGY-III (Theory+ Practical)

MELT-MAJ-5034 BIOCHEMISTRY-IV (Theory+ Practical)

MELT-MAJ-5044 PATHOLOGY-IV (Theory+ Practical)

MELT-MAJ-6014 MICROBIOLOGY-IV (Theory+ Practical)

MELT-MAJ-6024 BIOCHEMISTRY-V (Theory+ Practical)

MELT-MAJ-6034 PATHOLOGY-V (Theory+ Practical)

MELT-MAJ-6044 MICROBIOLOGY-V (Theory+ Practical)

MELT-MAJ-6052 Project/ Dissertation

MELT-MAJ-7014 BIOCHEMISTRY-VI (Theory+ Practical)

MELT-MAJ-7024 PATHOLOGY-VI (Theory+ Practical)

MELT-MAJ-7034 CARDIAC TECHNOLOGY-I (Theory+ Practical)

REME-MAJ-7044 Research Methodology

MELT-MAJ-8014 QUALITY IN HEALTH CARE - HOSPITAL ACCREDITATION  
(Theory+ Practical)

MELT-DISS-80112 (Dissertation) (Those who are undertaking Research Project or  
Dissertation)

MELT-MAJ-8024ADVANCED HEMATOLOGY (Theory+ Practical) (Those who not  
undertaking Research Project or Dissertation)

MELT-MAJ-8034 CLINICAL MICROBIOLOGY (Theory+ Practical) (Those who not  
undertaking Research Project or Dissertation)

MELT-MAJ-8044 CLINICAL BIOCHEMISTRY, ANALYTICAL TECHNIQUES  
AND QUALITY ASSURANCE (Theory+ Practical) (Those who not undertaking Research  
Project or Dissertation)

## MAJOR COURSES

### SEMESTER-I

Course Code: MELT-MAJ-1014

Course Paper: BASIC ANATOMY & PHYSIOLOGY

PAPER CREDIT: 04 (3T+1P)

Total No. of Lectures: 45L + 15P

Total Marks=100 (T60 + IA20 + P20)

#### Objectives:

To learn about basic human anatomy and physiology

#### Learning Outcome:

Students will learn about basic human anatomy and physiology

#### CONTENTS

##### Theory:

##### UNIT I: Human Anatomy and Physiology:

Definitions and divisions-anatomy and physiology, different anatomical and physiological terms, positions and planes, organization of human body.

##### UNIT II: Respiratory system:

Introduction, structures and functions; respiration; cycle of breathing; lung volumes and capacities, spirometry; brief description of common diseases of respiratory system.

##### Nervous system:

Introduction and classification of nervous system, structure and function of neurons, structure and functions of brain and its parts, peripheral and autonomic nervous system, common disorders and diseases of brain.

##### UNIT III: Digestive system:

Overview, structures and functions, accessory organs of digestion: structures and functions, process of digestion, common diseases of pancreas, stomach and liver.

##### Urinary system:

Overview, anatomy and physiology of the kidney, nephron, composition and formation of urine, micturition, diseases of kidney.

##### UNIT IV: Cardiovascular system:

Overview of CVS, blood vessels and types, anatomy and physiology of heart, conducting system of the heart, cardiac cycle, cardiac output, blood pressure, pulse, different types of blood circulation, common disorders and diseases of CVS.

##### Practical/ Presentation:

1. To study the different types of microscopes- simple, compound and binocular microscope
2. To study the human skeleton through model
3. To study the respiratory system through model

4. To study permanent slides
5. To study the heart and brain through model
6. To study digestive system through model

**Suggested Readings:**

1. Waugh and Grant. *Ross and Wilson Anatomy and Physiology In Health And Illness*, Elsevier.
2. Sembulingam and Sambulingam. *Essentials of Medical Physiology*, Jaypee.
3. *Anatomy and Physiology in Health and Illness* by Kathleen J.W. Wilson, Churchill Livingstone, New York
4. *Physiological basis of Medical Practice*-Best and Taylor. Williams & Wilkins Co, Riverview, MI USA
5. *Text book of Medical Physiology*- Arthur C,Guyton and John.E. Hall. Miamisburg, OH, U.S.A.
6. *Principles of Anatomy and Physiology* by Tortora Grabowski. Palmetto, GA, U.S.A.

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**SEMESTER-II**  
**Course Code: MELT-MAJ-2014**  
**Course Paper: BIOCHEMISTRY-I**  
**PAPER CREDIT: 04 (3T+1P)**  
**Total No. of Lectures: 45L + 15P**                      **Total Marks=100 (T60 + IA20 + P20)**

**Objectives:**

To learn about the introduction of biochemistry, laboratory apparatus, laboratory maintenance with basic laboratory hazards

**Learning Outcome:**

Students will learn about the introduction of biochemistry, duties of phlebotomy technician, laboratory apparatus, and laboratory maintenance with basic laboratory hazards.

**CONTENTS**

**Theory:**

**UNIT I:** Basic introduction to Biochemistry and Clinical Biochemistry:

Introduction to inorganic chemistry, organic chemistry, physical chemistry, analytical chemistry, blood chemistry, urine chemistry

**UNIT II:** Glassware maintenance:

Beakers, measuring cylinders, conical flask, pipettes, burettes and other common glass apparatus. Types of glasses, cleaning of glassware and plastic ware.

**UNIT III:** Laboratory apparatus maintenance:

Sphygmomanometer, digital balance, micropipette, hemoglobinometer, haemocytometer, pH meter, magnetic stirrer with hot plate, glucometer.

Use, care and maintenance of different laboratory instruments:

Auto analyser, colorimeter, spectrophotometer, centrifuge, refrigerator, incubator, autoclave, hot air oven

**UNIT IV:** Basic laboratory hazards and safety procedures, first aid of cut, injury, burns etc.

Phlebotomy technician: Duties and responsibilities of phlebotomy technician.

**Practical/ Presentation:**

1. To study the cleaning and maintenance of laboratory glass wares.
2. To study of some of commonly used laboratory instruments
3. To prepare different normal solutions
4. To prepare different molar solutions
5. To detect uric acid in the supplied samples
6. To detect urea in the supplied samples
7. Estimation of blood sugar

8. To detect monosaccharide (glucose) in the supplied samples
9. To detect disaccharide (sucrose) in the supplied samples

**Suggested Readings:**

1. Satyanaranan and Chakrapani. Biochemistry, Elsevier.
2. Vasudevan and Das. Practical Textbook of Biochemistry for Medical Students, 2<sup>nd</sup> Edition. Jaypee.
3. Albert L. Lehninger, David L. Nelson, and Michael M. Cox, Lehninger Principles of Biochemistry, 8th Edition, MacMillan Learning Pvt. Ltd., 2021
4. Harper's Biochemistry R.K. Murray and Others (Prentice Hall of India, New Delhi)
5. Lehninger Principles of Biochemistry by Michel M. Cox and David L. Nelson
6. Biochemistry by Stryer. (W.H. Freeman, New York)
7. Text Book of Biochemistry by West & Todd (Oxford & IBH Pub., Co., New Delhi)
8. Fundamentals of Biochemistry by Dr. A.C. Deb (New Central Book Agency, Calcutta)
9. Text Book of Biochemistry by Dr. A.V.S.S. Rama Rao (UBS Publishers & Distributors, New Delhi)

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## MINOR COURSES

### SEMESTER- I

Course Code: MELT-MIN-1014

Course Paper: GENERAL MICROBIOLOGY

PAPER CREDIT: 04 (3T+1P)

Total No. of Lectures: 45L + 15P

Total Marks=100 (T60 + IA20 + P20)

#### Objectives:

To learn about microscope, sterilization techniques etc.

#### Learning Outcome:

In this course the students will learn about microscope, sterilization techniques etc.

### CONTENTS

#### Theory

##### UNIT I: Microscope:

Simple & Compound microscope, Binocular microscope, Fluorescence microscope & Dark field microscope, Electron Microscope Handling and maintenance of microscope. Types of Sterilization: Dry Sterilization, Moist Sterilization, Mechanical Sterilization, Chemical Sterilization, Filtration Sterilization, Gas Sterilization.

##### UNIT II: Safety precaution in a Bacteriology laboratory:

Space, Ventilation, Light, Water, Working bench Safety precaution in a Bacteriology laboratory, Staining - Preparation of stains, Simple stain, Special stain, Gram's stain, Albert's stain, ZN stain, Modified ZN stain & Lacto phenol cotton blue.

##### UNIT III: Morphology and distribution of bacteria:

Cocci- Gram's positive Cocci, Cocci – pairs. Chains and clusters arrangement & Gram's negative *Cocci* – kidney shape intracellular, *Bacilli* -Gram's positive Bacilli – *clostridia* species , Gram's negative *Bacilli*, *Enterobacteriaceae* & others Yeast and Molds (fungi) & Virology – cell line.

##### UNIT IV: General properties of Bacteria:

Food, Moisture, Hydrogen ion concentration, Oxygen requirement, Carbon dioxide, Temperature, Light, Symbiosis, Product of Bacterial growth.

Preparation of culture media:

Nutrient broth, Nutrient agar, Blood agar, Chocolate agar, Mac Coney's agar, SSA, XLD, TCBS, Tellurite agar, EMB agar, MHA, RCM, Alkaline peptone water, Thioglycolate, LJ-media, Peptone, Mannitol, TSI, Citrate, Urease & SDA.

#### Practical/ Presentation:

1. To study the cleaning of articles, packing, distribution of articles, loading the articles, hot air oven, Autoclave etc. and sterilization.

2. To study the preparation of different stains: simple stain, differential stain, Albert's stain, ZN stain, Modified ZN stain & Lacto phenol cotton blue.
3. To study the preparation, fixation and staining of smear microscopy.

**Suggested Readings:**

1. Wiley, Sherwood, Woolverton. Prescott,Harley, and Klein's Microbiology, McGraw Hill.
2. Tortora, Funke, Case. Microbiology, Pearson.
3. PelczarJr, Chan, Krieg. Microbiology, McGraw Hill.
4. Prescott and Dunn., Industrial Microbiology, CBS Publishers & Distributors,
5. Delhi.
6. Probisher, Hinsdill et al: Fundamentals of Microbiology, Japan

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**SEMESTER-II**  
**Course Code: MELT-MIN-2014**  
**Course Paper: CLINICAL PATHOLOGY**  
**PAPER CREDIT: 04 (3T+1P)**

**Total No. of Lectures: 45L + 15P**

**Total Marks=100 (T60 + IA20 + P20)**

**Objectives:**

To learn about clinical pathology, blood cells etc.

**Learning Outcome:**

In this course the students will learn about clinical pathology, blood cells etc.

**CONTENTS**

**Theory:**

**UNIT I:** Introduction of Clinical Pathology:

Clinical laboratory diagnosis, laboratory apparatus, lab accidents- cause and prevention, First-Aid, washing of laboratory apparatus.

**UNIT II:** Constituents of blood:

RBC or Erythrocyte – structure and physiology, functions. WBC - structure, physiology and functions. Platelets – structure, physiology and functions. General account of anaemia. Blood collection, Preparation of smear and staining of a blood smear: Thick smear and thin smear, mounting and preservation of smear. RBC count, WBC count, Platelet count, Differential counts.

**UNIT III:** Estimation of haemoglobin:

Definition haemoglobin. Methods of estimation of haemoglobin – Colorimetric method- Tallqvist method, Sahli's or Acid Haematin method, alkaline haematin method, Haldane method, Dare method, Spencer method, Photo electric method, Oxy haemoglobin method, Cyanmethaemoglobin method, preparation of standards, Specific gravity method, and Chemical method.

**UNIT IV:** Estimation of PCV or Haematocrit and erythrocyte indices:

Methods of Estimation of PCV or Haematocrit, Wintrobe's method, Micro haematocrit or capillary method, Mean corpuscular volume (MCV), Mean corpuscular haemoglobin (MCH), Mean corpuscular haemoglobin concentration (MCHC).

**Erythrocyte sedimentation rate (ESR):**

Methods of estimation of ESR, factor influencing sedimentation, laboratory factors which influence ESR, importance, clinical significance.

Urine and faecal examination: Physical & microscopic examinations.

**Practical/ Presentation:**

1. To study the technique of blood sample collection
2. To prepare and staining of blood smear
3. Total count of RBC, WBC and Platelet



4. Estimation of haemoglobin by Sahli's method & Cyanmethaemoglobin
5. To study the blood grouping front and back typing
6. To study the determination of ESR
7. To study the determination the Rh typing and Du test
8. To study the Urine examination and faecal examination

**Suggested Readings:**

1. Kawthalkar. *Essentials of Clinical Pathology*, Jaypee.
2. Maheswari. *Clinical Pathology Hematology and Blood Banking*, Jaypee.
3. Textbook of Pathology - Pathology Quick Review by Harsh Mohan
4. Biochemistry And Clinical Pathology by RAJE V.N, CBS Confident Pharmacy Series
5. Robbins and Cotran Pathologic Basis of Disease, Elsevier

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## SKILL ENHANCEMENT COURSES

### SEMESTER-I

Course Code: MELT-SEC-1014

Course Paper: COMMUNITY PHARMACY AND MANAGEMENT

PAPER CREDIT: 04 (3T+1P)

Total No. of Lectures: 45L + 15P

Total Marks=100 (T60 + IA20 + P20)

#### Objectives:

The course is designed to impart basic knowledge and skills to provide various pharmaceutical care services to patients and general practitioners in the community setup.

#### Learning Outcome:

Upon successful completion of this course, the students will be able to

1. Learn the establishment, legal requirements, and effective administration of a community pharmacy
2. Professionally handle prescriptions and dispense medications
3. Counsel patients about the disease, prescription and or non-prescription medicines
4. Perform basic health screening on patients and interpret the reports in the community pharmacy settings

#### CONTENTS

##### Theory:

##### UNIT I: Community Pharmacy Practice:

Definition, history and development of community pharmacy, International and Indian scenarios, Professional responsibilities of community pharmacists, Introduction to the concept of Good Pharmacy Practice and SOPs

Patient counselling: Role of pharmacist in community health care and education

##### UNIT II: Prescription and prescription handling:

Definition, parts of prescriptions, legality of prescriptions, prescription handling, labelling of dispensed medications (Main label, ancillary label, pictograms), brief instructions on medication usage.

Dispensing process: Good Dispensing Practices, dispensing errors and strategies to minimize them.

##### UNIT III: Classification of food requirements:

Balanced diet, nutritional deficiency disorders, their treatment and prevention.

Communicable diseases: Brief outline, their causative agents, modes of transmission and prevention (Chicken pox, measles, influenza, diphtheria, whooping cough, tuberculosis, poliomyelitis, helminthiasis, malaria, filariasis, rabies, trachoma, tetanus, leprosy, syphilis, gonorrhoea, and AIDS).

##### UNIT IV: Over the Counter (OTC) Medications:

Definition, need and role of Pharmacists in OTC medication dispensing, OTC medications in India, counselling for OTC products, Self-medication and role of pharmacists in promoting the safe practices during self-medication

First Aid: Emergency treatment of shock, snakebites, burns, poisoning, fractures and recitation methods.

### **Practical/ Presentation:**

The students shall be asked to submit written assignments on the following topics (One assignment per student per sessional period).

1. SOPs for various activities in Community Pharmacy (as discussed in Theory and Practical) 2. List out the various abbreviations, short forms used in prescriptions and their interpretation 3. Patient Information Leaflet for a given chronic disease / disorder
2. Patient Information Leaflet for prescription / non-prescription medicines
3. Preparation of window / shelf display materials for the model community pharmacy
4. Overview of Software available for retail pharmacy management including billing, inventory, etc.
5. Dosage / Medication Reminder Aids
6. Overview on the operations and marketing strategies of various online pharmacies
7. Overview on the common fixed dose combinations
8. Overview on the medications requiring special storage conditions
9. Role of Community Pharmacists in preventing Antimicrobial Resistance
10. Jan Aushadhi and other Generic Medicine initiatives in India
11. Global Overview of Online Pharmacies
12. Community Pharmacy Practice Standards: Global Vs. Indian Scenario
13. Overview of pharmacy associations in India

### **Suggested Readings:**

1. Role of Pharmacist in the Health care system, WHO/ PHArm/94.569
2. Remington's sciences and practice of Pharmacy; Lippincott. Williams and Welkens.
3. Medicare scenario in India; Perceptions and Perspectives – Delhi society for promotion of rational use of drugs.

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**SEMESTER-II**  
**Course Code: MELT-SEC-2014**  
**Course Paper: ANATOMY, PHYSIOLOGY & HEALTH EDUCATION**  
**PAPER CREDIT: 04 (3T+1P)**

**Total No. of Lectures: 45L + 15P**

**Total Marks=100 (T60 + IA20 + P20)**

**Objectives:**

To learn about basic human anatomy and physiology

**Learning Outcome:**

Students will learn about basic human anatomy and physiology.

**CONTENTS**

**Theory:**

**UNIT I: Human Anatomy and Physiology:**

Definitions and divisions-anatomy and physiology, Different anatomical and physiological terms, Positions and planes, Organization of human body. Respiratory system: Introduction, Structures and functions, respiration, cycle of breathing, Lung volumes and capacities, spirometry. Brief description of common diseases of respiratory system.

**UNIT II: Digestive system:**

Overview, structures and functions, accessory organs of digestion: structures and functions, process of digestion, common diseases of pancreas, stomach and liver.

**UNIT III: Cardiovascular system:** Overview of CVS, blood vessels and types, anatomy and physiology of heart, conducting system of the heart, cardiac cycle, cardiac output, blood pressure, pulse, different types of blood circulation, common disorders and diseases of CVS.

**UNIT IV: Nervous system:**

Introduction and classification of nervous system, structure and function of neurons, structure and functions of brain and its parts, peripheral and autonomic nervous system, common disorders and diseases of brain. Urinary system: Overview, anatomy and physiology of the kidney, nephron, composition and formation of urine, micturition, diseases of kidney.

**Practical/ Presentation:**

1. To study the different types of microscopes- simple, compound and binocular microscope
2. To study the human skeleton through model
3. To study the respiratory system through model
4. To study permanent slides
5. To study the heart and brain through model
6. To study digestive system through model

**Suggested Readings:**

1. Waugh and Grant. *Ross and Wilson Anatomy and Physiology In Health And Illness*, Elsevier.
2. Sembulingam and Sambulingam. *Essentials of Medical Physiology*, Jaypee.
3. Anatomy and Physiology in Health and Illness by Kathleen J.W. Wilson, Churchill Livingstone, New York
4. Physiological basis of Medical Practice-Best and Taylor. Williams & Wilkins Co, Riverview, MI USA
5. Text book of Medical Physiology- Arthur C,Guyton and John.E. Hall. Miamisburg, OH, U.S.A.
6. Principles of Anatomy and Physiology by Tortora Grabowski. Palmetto, GA, U.S.A.

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## INTERDISCIPLINARY COURSES

### SEMESTER-I

Course Code: MELT-IDC-1014

Course Paper: PHARMACEUTICS (DISPENSING AND COMMUNITY PHARMACY)

PAPER CREDIT: 04 (3T+1P)

Total No. of Lectures: 45L + 15P

Total Marks=100 (T60 + IA20 + P20)

#### Objectives:

This course is designed to impart a fundamental knowledge on the preparatory pharmacy with arts and science of preparing the different conventional dosage forms.

#### Learning Outcome:

Upon completion of this course the student should be able to-

1. Learn the history of profession of pharmacy
2. Learn the basics of different dosage forms, pharmaceutical incompatibilities and pharmaceutical calculations
3. Learn the professional way of handling the prescription
4. Learn and prepare the various conventional dosage forms

#### CONTENTS

##### Theory:

**UNIT I:** Historical background and development of profession of pharmacy:

History of profession of Pharmacy in India in relation to pharmacy education, industry and organization, Pharmacy as a career, Pharmacopoeias: Introduction to IP, BP, USP and Extra Pharmacopoeia.

**UNIT II:** Prescription:

Handling of prescription, source of errors in prescription, General dispensing procedures including labelling of dispensed products, care required in dispensing procedures including labelling of dispensed products. Typical prescriptions like mixtures, solutions, emulsions, creams, ointments, powders, capsules, pastes, jellies, suppositories, ophthalmics, pastilles, lozenges, pills, lotions, liniments, inhalations, paints, sprays, tablet triturates etc.

**UNIT III:** Introduction of Pharmaceutical Dosage Forms:

Brief definition and Classification of solids, semisolids and liquid dosage forms (solutions, mixtures, spirits, aromatic waters, glycerin, paints, syrups, elixirs, mouth washes, mucilage, lotions, liniments, pastes, inhalations, emulsions, suspensions and powders (effervescent powders, bulk powders, dusting powders, insufflations, dentifrices and cachets).

**UNIT IV:** Pharmaceutical aids:

Organoleptic (Colouring, flavoring, and sweetening) agents preservatives: Definition, types with examples and uses.

**Practical/ Presentation:**

1. Preparation of selected pharmacopoeial preparations under the category of aromatic waters, spirits, solutions, infusions, tinctures and extracts.
2. Dispensing procedures involving pharmaceutical calculations, dosage calculations for paediatric patients, etc.
3. Dispensing of prescriptions falling under the categories of mixtures, solutions, emulsions, creams, ointments, powders, suppositories, pastes, jellies, lotions liniments, inhalations and paints etc.
4. Dispensing of prescriptions involving adjustment of tonicity.
5. Identification of various types of incompatibilities in prescriptions, correction and dispensing of such prescriptions.

**Suggested Readings:**

1. Cooper & Gunn's Dispensing for Pharmaceutical students, CBS Publishers, New Delhi
2. Dispensing Pharmacy by R.M.Mehta, (Vallabh Prakashan, Delhi)

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**SEMESTER-II**  
**Course Code: MELT-IDC-2014**  
**Course Paper: PHARMACOGNOSY AND PHYTOCHEMISTRY**  
**PAPER CREDIT: 04 (3T+1P)**  
**Total No. of Lectures: 45L + 15P**                      **Total Marks=100 (T60 + IA20 + P20)**

**Objectives:**

The course involves the fundamentals of Pharmacognosy like scope, classification of crude drugs, their identification and evaluation, phytochemicals present in them and their medicinal properties.

**Learning Outcome:**

Upon completion of the course, the student shall be able

1. To learn the techniques in the cultivation and production of crude drugs
2. To learn the crude drugs, their uses and chemical nature
3. To learn the evaluation techniques for the herbal drugs
4. To learn out the microscopic and morphological evaluation of crude drugs

**CONTENTS**

**Theory:**

**UNIT I:** Definition, history, scope and development of Pharmacognosy, Classification of drugs: Alphabetical, morphological, taxonomical, chemical and pharmacological classification of drugs.

**UNIT II:** Pharmacognosy in various systems of medicine:

Role of Pharmacognosy in allopathy and traditional systems of medicine namely, Ayurveda, Unani, Siddha, Homeopathy and Chinese systems of medicine

**UNIT III:** An introduction to following groups of plant constituents (only definition and brief explanation):

Carbohydrates, Glycosides, Tannins, Volatile oils, Terpenes, Resins, Steroids, Alkaloids, Flavonoids, Anthraquinones, Coumarins, saponins, gums & mucilages.

a) Carbohydrates and derived products: Agar, Guar gum, Gum acacia, Honey, Ispaghula, Pectin, Starch, Sterculia and Tragacanth.

b) Lipids: Bees wax, Castor oil, Cocoa butter, Cod liver oil, Hydnocarpus oil, Kokum butter, Lard, Linseed oil, Rice, Bran oil, Shark liver oil and Wool fat.

**UNIT IV:** Quality control of crude drugs:

Different methods of adulteration of crude drugs, Evaluation of crude drugs, Brief outline of occurrence, distribution, isolation, identification tests, therapeutic activity and pharmaceutical applications of alkaloids, terpenoids, glycosides, volatile oils, tannins and resins.



**Practical/ Presentation:**

1. Morphological Identification of the following drugs: Ispaghula, Senna, Coriander, Fennel, Cardamom, Ginger, Nutmeg, Black Pepper, Cinnamon, Clove, Ephedra, Rauwolfia, Gokhru, Punarnava, Cinchona, Agar.
2. Gross anatomical studies (Transverse Section) of the following drugs: Ajwain, Datura, Cinnamon, Cinchona, Coriander, Ashwagandha, Liquorice, Clove, Curcuma, Nux vomica, Vasaka
3. Physical and chemical tests for evaluation of any five of the following drugs: Asafoetida, Benzoin, Pale catechu, Black catechu, Castor oil, Acacia, Tragacanth, Agar, Guar gum, Gelatine.
4. Preparation of herbarium sheets.

**Suggested Readings:**

1. Text Book of Pharmacognosy by Kokate C K, Purohit A P, Gokhale S B, (NiraliPrakashan, Pune)
2. Pharmacognosy by Trease G.E. and Evans W.C., (Balliene Tindall, Eastbourne), Elsevier.
3. Text Book of Pharmacognosy by T.E.Wallis, (CBS Publishers & Distributors, New Delhi)
4. Pharmacognosy by Tyler V.E., Brady L.R. and Robbers J.E., (Len & Febiger, Philadelphia)
5. Pharmacognosy and Phytochemistry by Vinod D Rangari, (Career Publications, Nashik)

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