Histopathology and Cytopathology (Theory)

Total: 14 hours /week
Lecture: 8 hours/week
Tutorial: 0 hour/week
Practical: 6 hours/week
Lab: 0 hours/week

Course Description
This course is designed to provide basic knowledge and skills on diagnostic histopathological and Cytopathological techniques performed on biopsy, autopsy, exfoliated and aspirated materials. It also helps learners to establish and conduct an organized histopathology and cytopathology laboratory with minimum risks and hazards as well as allows learners for troubleshooting on frequent faults and instrumental errors.

Course Objectives
After the completion of this course, the students will be able to:

- Develop the concept on histopathology and Cytopathology techniques.
- Perform proper reception, fixation and storage of histological and cytological specimens.
- Prepare solid tissue blocks through tissue processing of gross sections and their molding.
- Orient on decalcification techniques for calcified tissue materials.
- Familiarize with microtome procedures, its types and importance of each with major troubleshooting.
- Stain tissue sections and cytological smears for microscopy.

Course Contents

Unit 1: Histopathology **8 hrs**

- Introduction
- General concept of Histology, Histopathology. Common terminologies (Autopsy, Excisional biopsy, Incisional biopsy)
- Role of Histopathology in the diagnosis of disease.
- Basic requirement of Histopathology Laboratory.
- General organization of Histopathology laboratory.
- Receiving and Labeling the specimens
- Grossing technique and Specimen management
- Hazards of biological specimen and disposal of specimen.

Unit 2: Fixation **6 hrs**

- Introduction
- Properties of fixatives
- Classification of fixatives.
- Modes of actions.
- Indications
- Preparation of various fixatives (10 % formalin , 10 % formal-saline, Neutral Buffered Formalin, Zenker's fluid , Bouin's Fluid, Clark's Fluid, Carnoy’s fluid)

Unit 3: Tissue Processing **10 hrs**

- Fixation
  - Factors affecting Fixation.
- Dehydration and common dehydrating agents.
- Clearing and common Clearing agents
- Infiltration and Impregnation
- Embedding: Different types of embedding media, Advantage and Disadvantage
- Automated Tissue Processor
  - Types
  - Working Principle
  - Components
  - **Procedure**
  - Operation and Maintenance

Unit 4: Decalcification **10 hrs**

- Introduction and importance
- Examples and composition of common decalcifying agents
- Decalcification methods
- Factors affecting decalcification
- Assessment of decalcification
- Neutralization of acid

Unit 5: Microtomy **12 hrs**

- Introduction
- Use of Microtome
- Types of Microtome
- Advantage and Disadvantage
- Tissue section cutting using rotary microtome
- Care and maintenance
- Microtome knives
  - Selections of knives
  - Honing and stropping of microtome knives
  - Automatic Knife sharpener
  - Care and Maintenance

Unit 6: Frozen Sections / Cryostat **6 hrs**

- Define cryostat and write its clinical importance.
- Technique of Frozen section using cryostat
- Staining of frozen section (Rapid Staining)

Unit 7: Staining Technique **12 hrs**

- Introduction and Terminology (Mordant, Dye, blueing, differentiation, accelerator)
- Hematoxylin and its types.
- Eosin and its types.

- H & E staining: Principle, reagent preparation, procedure, observation
- Principle, requirements, procedure and results of :
    - PAS
    - Alcian blue
    - Zeihl Nelson
    - Congo Red
    - Sudan Black
    - Perl's Stain
    - MPO stain

Unit 8: Mounting Media **4 hrs**

- Introduction and importance
- Types of mounting media
- Mounting of specimen.

Unit 9: Basic concept of Immuno-histochemistry. **8 hrs**

- Introduction
- Principle
- Steps/Procedure
- Clinical significance
- examples

Unit 10: Cyto-pathology **12 hrs**

- Introduction
- Scope and importance of Cytopathology
- Cytopathology Technique
    - Exfoliative cytology
    - Specimen collection of Gyanecological and Non -Gyanecologicalspecimen.
    - Preparation of Cytosmear (Viscid secretion,Cerebro Spinal Fluid (CSF) and other body fluids, Sputum, urine, Bronchial aspiration)
    - Fixation of cytology specimen − various fixatives, Advantage and Disadvantages.
    - Principle, requirements, procedure and results of :
        - Papanicolaou (PAP) stain
        - Giemsa stain
        - May Grunwald-Giemsa (MGG) stain
    - Fine Needle Aspiration Cytology (FNAC):Importance, requirement, Procedure, advantage and disadvantage
- Sampling, staining and Demonstration of Barr body.

Reference Books

1. Theory and Practice of Histological Techniques. 5th Edition.John D. Bancroft, Alans Stevens and David R. Turner
2. Diagnostic Cytology and its histologic bases L.G. Koss, Fourth Edition.
3. Cytology Technical Manual Cytology Research Center ICMR (India)
4. The "Pap Smear" M.E. Boon
5. Practical Cytology Ron Bowdich
6. Comprehensive Cytopathology Marluce Bibbo, Second Edition
7. Basic and Advanced Laboratory Techniques in Histopathology and Cytology Pranab Dey

Unit	1	2	3	4	5	6	7	8	9	10	Total
Unit Hours	8	6	10	10	12	6	12	4	8	12	88
Marks	7	5	9	9	11	5	11	5	7	11	80

Histopathology and Cytopathology(Practical)

Practical: 66hrs

Perform the following tasks:

- Handle microscope.
- Prepare fixatives and fixation of tissues.
- Collect, transport & fix samples for histological & cytological studies.
- Process the grossed tissues.
- Cut sections using rotary microtome to get ribbons of tissue sections.
- Prepare reagents & stains used for Hematoxylin & Eosin stain, PAS stain, Alcian Blue stain and Ziehl-Neelsen stain.
- Prepare reagents & stains used for Giemsa and Papanicolaou stains.
- Stain sections by H/E stain, PAS stain, Alcian Blue stain and Ziehl-Neelsen stain.
- Prepare cytological fixatives and fixation of cells.
- Prepare cytological smears and stain with pap method.
- Stain FNAC smears by Giemsa and Papanicolaou methods.
- Mount stained smears/section.
- Demonstrate Barr body by Aceto-Orcein staining method.