**DMLT**

**Histology & Cytology (475)**

**Training Schedule**

| S. No. | Schedule | | Theory | | Practical | | Instructions to the trainer | Learning outcomes |
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| | Week | Day | Topic | HRS | Topic | HRS | | |
| | Week 1 | Day 1 | Instruction to Histopathology Laboratory organization<br><br>Laboratory equipment, uses and maintenances<br><br>Laboratory hazards and safety precautions | 2 | Observation of Histopathology lab and its organization<br><br>Understanding of equipment | 3 | Visit with learner to the Histopathology lab.<br><br>Explain the use and maintenance of histopathology laboratory equipment<br><br>Explain the laboratory hazards and safety precaution to be filled in histopathology laboratory | Familiarity with the Histopathology lab organization<br><br>Enumerates the functioning of histopathology lab equipment<br><br>Recall the laboratory hazards and safety precaution to be followed |
| | | Day 2 | Compound microscope optical system and working principle<br><br>Magnifications and maintenance of compound microscope<br><br>Applications of microscopes like<br>Polarizing microscope<br>Immunofluorescence | 2 | Demonstration of the use of microscope and maintenance of microscope<br><br>Observation of histopathology slides under the microscope | 3 | Demonstrate the use of compound microscope show the histopathology slides under compound microscope | Defines the principle and different parts of light microscope<br><br>Defines the principle of polarizing and Immuno-fluorescence microscope<br><br>Demonstrates the compound microscope and analyses histopathology slides under compound microscope |

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| | | | microscope | | | | | |
| | Week 2 | Day 1 | Receiving of surgical specimens<br><br>Recording and labelling of histology specimens<br><br>Storage of surgical specimens | 2 | Receiving and Numbering of specimen and requisition form<br><br>Recording of the specimen with date and organ in the register<br>Storage of specimen after grossing | 3 | Explain preparation of gross room in detail<br><br>Demonstratereceiving, numbering of specimen and requisition form through video | Creates receiving, numbering and recording of specimen in the histopathology receiving register<br><br>Stores and arranges the specimen after grossing receive label and record the surgical specimen in histopathology register<br><br>Stores the specimen after grossing |
| | | Day 2 | Fixation of tissue air and principle<br><br>Types of fixatives | 2 | Preparation 10% buffered formations<br><br>Preparation of bouin's solution<br><br>Care of the instruments used for grossing<br><br>Making the gross table ready for grossing | 3 | Explain the aim and principle of fixation of tissue<br><br>Description of properties of fixatives and factors affecting fixation<br><br>Familiarise the learners with the grossing equipment<br>& its care | Describes the principle of fixation of tissues, factors affecting fixation<br><br>Differentiates the types of fixation and analyses the different types of fixatives<br><br>Prepares 10% buffered formation and bouin's solution |

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| | Week 3 | Day 1 | Decalcification:<br>• Aim<br>• Different methods of decalcification<br>• Methodsof Decalcification<br><br>Optimum Decalcification | 2 | Preparation of decalcification solution<br><br>Demonstration of decalcification by different magnets.<br><br>Testing of decalcification tissue for end points/optimum decalcification | 3 | Explain the uses of decalcification | Familiarity with the Decalcification<br><br>Analyse the methods of decalcified<br><br>Identifies the testing of decalcified tissue<br><br>Prepares the decalcifying solution |
| | | Day 2 | Tissue processing<br><br>Steps involved in processing of histological tissue for paraffin embedding | 2 | Demonstration of routine processing of tissue<br><br>Cleaning of Cassettes<br><br>Numbering of tissue block<br><br>Making the cassette ready for processing | 3 | Explain the aim and methods of tissue processing<br><br>Explain the procedure of cleaning of cassettes, numbering of tissue block and making the cassettes ready for processing through video | Explains the methods of time processing<br><br>Enumerates the steps involved in tissue processing<br><br>Prepares the numbering in tissue blocks, clean cassettes and makes the cassettes ready for tissue processing |
| | Week4 | Day 1 | Types of tissue processor | 2 | Putting the cassettes in the Bucket | 3 | Demonstrate the procedure for putting the cassettes in the tissue | Identifies the types of tissue processor |

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| | | | | | Putting the reagents in the Automated tissue processor. | | processor bucket and filling the different jars of tissue processor with reagents through video/ visit to a histopathology laboratory | Processes the tissue in tissue processor<br><br>Operates the automated tissue processor |
| | | Day 2 | Embedding types of embedding media<br><br>Type of moulds used for embedding | 2 | Display charts of various types of moulds used for embedding though diagram<br><br>Tissue embedding by moulds And in steel cassettes with molten wax | 3 | Show the examples of Embedding | Familiarity with the embedding and types of embedding media<br><br>Explains the types of moulds<br><br>Embeds the steel cassettes with molten wax |
| | Week 5 | Day 1 | Tissue embedding centre<br>• Components<br>• Uses<br>• Maintenance | 2 | Demonstration of use of tissue embedding centre<br><br>Maintenance of tissue embedding centre<br><br>Making blocks of different tissue | 3 | Demonstrate the use of tissue embedding centre through video | Identifie the use of tissue embedding centre<br>Operates tissue embedding centre and prepares blocks of tissue |
| | | Day 2 | Microtomes of various types<br><br>Working principle and maintenance of microtomes<br><br>Types of microtomes knife | 2 | Pictorial representation of different types of microtomes<br><br>Maintenance of microtomes<br><br>Demonstration of use of tissue microtome | 3 | Description of microtome knives and their types | Explains the working principle and maintenance of different microtomes<br><br>Enumerates the types of microtomes<br><br>Identifies the different types of microtomes and knows |

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| | Week 6 | Day 1 | Section cutting on microtomes<br><br>Cutting artefact and remedies | 2 | Cutting of section<br>And different tissue blocks<br><br>Lifting of sections from tissue floatation bath<br><br>Fixing of section on hot plate<br><br>Labelling of sections with diamond pencil | 3 | Explain the procedure fixation of section and labelling of section with diamond pencil<br><br>Describe various cutting artefacts and their remedies | Demonstrate the procedure of section cutting on microtomes<br><br>Demonstrates the procedure of lifting of section for tissue floatation bath<br><br>Cuts the section on tissue microtomes |
| | | Day 2 | Haematoxylin<br><br>Properties of Haematoxylin<br><br>Preparation of Haematoxylin Eosin | 2 | Preparation of haematoxylin<br><br>Preparation of Eosin | 3 | Explain the properties by examples | Familiarity with the haematoxylin and eosin and their proportion<br><br>Maintains different microtomes<br><br>Prepares haematoxylin and eosin |
| | Week 7 | Day 1 | Method of haematoxylin and eosin staining of a tissue section | 2 | Perform the haematoxylin and Eosin staining with preparation of all reagents<br><br>Prepare a flow chart | 3 | Discuss the procedure for haematoxylin and eosin staining<br><br>Discuss the precautions to | Lists the steps of haematoxylin eosin Staining<br><br>Performs the H&E staining on tissue sections |

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| | | | | | depicting the steps involved along with tissue in H&E Staining | | be taken while H&E staining | Takes precautions to be taken will H&E Staining |
| | | Day 2 | Automated slide stainer<br><br>Components<br>Use<br>Maintenance<br>Mounting and mounting media<br>Technique of Mounting | 2 | Demonstrate the use of automated slide stainer through video<br><br>Perform mounting of tissue section using DPX | 3 | Explain in detail mounting and mounting media<br><br>Demonstrate the technique of mounting | Familiarity with the components, use and maintenance of automated slide stainer<br><br>Identifies the mounting media<br><br>Mounts the tissue section with DPX |
| | Week 8 | Day 1 | Connective tissues, Trichome staining and other special stains for muscle fibres, elastic, reticulin and collagen fibres<br>Aim<br>Principle<br>Control<br>Interpretation | 2 | Performing special stain<br>Trichome stain<br>Verhoeff's stain<br>Phosphotungstin and hematoxylin stain<br>Reticulin stain<br>Interpretation of results | 3 | Explain the difference in special stain | Prepares the reagents<br><br>Performs the trichome stain, verhoeff's stain, Phosphotungsticacid & haematoxylin reticulin stain |
| | | Day 2 | Special stain for Iron, calcium and argentaffin granules | 2 | Learning of special stains by performing | 3 | Describe the interpretation of their special stains | Prepares the reagents |

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| | | | Principle<br>Control<br>Interpretation | | Prussian blue stain<br>Von- Kossa stain<br>Masson Fontana silver stain<br>Interpretation of result | | | Perform the special as Prussian blue stain, Von-Kossa stain & Masson Fontana silver stain<br><br>Interprets the results of Special stains |
| | Week 9 | Day 1 | Metachromatic staining<br><br>Metachromasia and metachromatic staining<br><br>Crystal violet for amyloid<br>Congo red for amyloid | 2 | Preparation of reagents of crystal violet and Congo red stain<br><br>Perform crystal violet and Congo red stain | 3 | Explain the application of the stains | Familiarity with the metachromatic and metachromasia staining<br><br>Enlists the steps of crystal violet and Congo red stain<br><br>Prepares reagents and performs the procedure for crystal violet and Congo red stain |
| | | Day 2 | Morphology of various body tissues<br><br>Epithelial tissue, bone cartilage, muscle tissue, nervous tissue and endocrine tissue | 2 | Demonstration of various body tissue in mannequins for medical teaching<br><br>Identification of histology of Epithelial tissue,bone, cartilage, muscle, nervous tissue and endocrine tissue under microscope and draw labelled diagrams | 3 | Explain the morphology of various body tissue, nervous tissue, bone cartilage, muscle nervous tissue and endocrine tissue with the help of PPT. | Familiarity with the histopathology of body tissue like Epithelial tissue, bone cartilage, muscle tissue and, nervous tissue and endocrine tissue<br><br>Identifies the body tissues under microscope |

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| | Week 10 | Day 1 | Morphology and histology of cardiac muscle, intestine, liver, kidney, lung, breast, thyroid, uterus | 2 | Demonstrate the location of different visceral organs in mannequins for medical teaching.<br>Identification of histology and cardiac muscle, intestine, liver, kidney, lung, breast, thyroid uterus under microscope and draw labelled diagram | 3 | Demonstrate the histopathology of their tissues under microscope | Defines the morphology and histopathology cardiac muscle, intestine, liver, kidney, lung, breast, thyroid uterus tissue<br><br>Identifies these body tissues under microscope |
| | | Day 2 | Cryostat<br><br>Components of cryostat<br><br>Uses of frozen section | 2 | Handling of cryostat | 3 | Explain the detail of handling of cryostat | Defines the cryostat and its components<br><br>Enumerates the various uses of frozen section<br><br>Handles the Cryostat with care |
| | Week 11 | Day 1 | Functioning of cryostat Section cutting<br><br>Staining of frozen sections | 2 | Demonstrate the cutting of frozen section on cryostat<br><br>Staining of frozen section | 3 | Explain the precautions to be taken while handling the frozen sections | Defines the functioning of cryostat<br>Performs the staining of cryostat<br>Cuts the frozen section on cryostat<br>Stains the frozen section |
| | | Day 2 | Lipid stain:<br>Principle<br>Reagents required<br>Procedure<br>Interpretation<br>Control | 2 | Preparation of reagents for Oil red O stain | 3 | Explain to the learners the lipid staining by performing oil red O | Prepares the reagents required for Lipid stain<br><br>Performs the Oil red O staining on tissue section |

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| | Week 12 | Day 1 | Staining technique for demonstration and identification of bacteria<br>Gram staining:<br>Reagents<br>Procedure and<br>Interpretation<br>Stain to demonstrate glycogen in tissues like Mucicarmine stain | 2 | Preparation of reagents for grams stain and perform gram stain and interpret<br><br>Preparation of reagents for mucicarmine stain<br><br>Perform mucicarmine stain and interpret the results | 3 | Draw labelled diagram of stains showing staining result | Prepares the reagents for Gram stain &Mucicarmine stain<br><br>Performs the grams stain and mucicarmine stain and its interpretation |
| | | Day 2 | Staining technique for demonstrate and identification of acid-fast bacilli<br><br>Ziehl- neelsen stain<br>Fite faraco stain<br>preparation of reagents<br>procedure<br>interpretation | 2 | Preparation of reagents for Z-N stain and Fite faraco stain<br><br>Perform Z- N stain and fite-faraco stain and interpret | 3 | Draw labelled diagram of sections showing the staining results | Prepares the reagents<br><br>Perform Z-N stain and Fite faraco stain and their interpretation |
| | Week 13 | Day 1 | Staining technique for demonstration and identification of fungal organisms periodic acid Schiff (PAS) stain<br>Grocottgomori<br>Methenamine silver stain | 2 | Preparation of regents for PAS stain and Grocottgomori'smethenamine stain<br><br>Staining procedure & interpretation | 3 | Explain the staining technique for demonstrate and identification of fungal organisms | Prepares the reagents<br><br>Performs the PAS and GMS stain and interpret the results |
| | | Day 2 | Procedures for DNA, RNA and | 2 | Preparation of reagents for | 3 | Explain the difference in | Prepares the reagents and |

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| | | | mitochondria demonstration<br><br>- Feulgen technique for DNA<br>- Methyl green pyronine technique for RNA<br>- Altman's technique for mitochondria | | Feulgen Technique for DNA staining<br><br>Methyl green pyronine technique for RNA staining | | DNA, RNA and Mitochondria morphology and its staining | performs the procedure for Feulgen technique and Methyl green pyronine and its interpretation |
| | Week 14 | Day 1 | Tissue requiring special processing E.g. Eye ball, bone marrow, biopsy, under calcified bones | 2 | Demonstration of fixation of eye ball through video<br><br>Processing of bone marrow biopsy | 3 | Explain the special processing with examples to learn | Familiarity with the special processing procedures<br><br>Processes the eye ball and bone marrow biopsy |
| | | Day 2 | Immunohistochemistry:<br>Basic terms and reagents used in IHC<br>- Antigen retrieval<br>- Preparation of buffer<br>- Sodium citrate buffer<br>- Tris buffer | 2 | Performs the antigen retrieval<br><br>Preparation of buffer solutions and setting of pH | 3 | Explain the importance of pH in solutions | Defines the antigen retrieval procedure<br><br>Prepares the sodium citrate buffer and tris buffer<br><br>Prepares buffer solutions and can adjust pH of buffer |
| | Week 15 | Day 1 | IHC staining procedure | 2 | Perform IHC staining along with control<br><br>Interpretation of the results | 3 | Demonstrate the entire IHC procedure through video | Defines IHC staining procedure<br><br>Performs the IHC procedure and interprets the results |

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| | | Day 2 | Electron microscope<br>- Principle<br>- Types of electron microscope<br>- Tissue processing for electron microscope<br>- Uses of electron microscope | 2 | Draw labelled diagram of an electron microscope<br><br>Prepare a flow chart of tissue processing of electron microscope | 3 | Explain the uses and application of electron microscope | Explains the electron microscope<br><br>Defines the special processing of tissue for electron microscope<br><br>Processes the tissue for electron microscope |
| | Week 16 | Day 1 | Museum technique<br>Basic Museum technique<br>Kaiserling's Technique<br>Preparation of Kaiserlingsolution(I,II & III) | 2 | Prepare the Kaiserling solution I,II and III | 3 | Explain the use of the Kaiserling solution in museum technique | Familiarity with basic museum techniques<br><br>Prepares the Kaiser ling solution (I,II and III) |
| | | Day 2 | Procedure for mounting of specimens for museum | 2 | Mounting for specimens in glass jars for museum | 3 | Explain the procedure for mounting specimens for museum through videos | Mounts the specimens for museum |
| | Week 17 | Day 1 | Exfoliative cytology:<br>Principal<br>Methods of sample<br>Collection for Exfoliative cytology | 2 | Demonstration of Oral Exfoliative cytology<br><br>Display picture of instruments used for taking the exfoliative cytology specimens | 3 | Explain the methods for collection of Exfoliative cytology | Identifies the methods of collection of exfoliative cytology<br><br>Collects, transports and stores the specimens |

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| | | Day 2 | Cytology specimen collection, transport and storage<br><br>Safety in cytology laboratory<br>- Universal precautions<br>- Biohazardous material | 2 | Demonstration of collection, transport and storage of Cytology specimen through video | 3 | Explain the safety measures to be fallowed in Cytology lab | Collects, transports and stores the cytology specimens<br><br>Enumerates the safety measures, universal precaution and biohazardous material |
| | Week 18 | Day 1 | Five needle aspiration cytology<br><br>Equipment required<br><br>Aspiration technique<br><br>Smear preparation | 2 | Demonstration of FNAC technique though video | 3 | Discuss & explain the difference in procedure of smear preparation of the aspiration material | Identifies the equipment used for FNA<br><br>Prepares the smear from the aspiration material |
| | | Day 2 | Cytology specimen<br><br>Processing and staining<br><br>Papanicolaou stain<br>May- Greenwald Giemsa,<br>Ziehl-Neelsen stain | 2 | Preparation of regents for Papanicolaou stain, MGG stain, EZ-N stain | 3 | Explain the features of Papanicolaou stain<br>May- Greenwald Giemsa,<br>Ziehl-Neelsen stain | Familiarity with the processing of cytology specimen<br><br>Enumerates the reagents required for PAP, MGG, EZN stain<br><br>Prepares the PAP, MAGG and |

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| | | | | | | | | Z-N stain and interpret the results |
| | Week 19 | Day 1 | Cytology disposal of human waste | 2 | Familiarize with the steps to be followed for spill management<br><br>Needle stuff injury through video | 3 | Draw a color-coded table for BMW disposal | Manages the blood spill and needle stain injury<br><br>Lists the steps to be followed after spill management and needle stains injury |
| | | Day 2 | Cytology screening and hormonal assessment (pertaining of cervical pap smear) | 2 | Demonstration through video the procedures for sample collection, processing of specimen, screening and interpretation of specimen | 3 | Explain the abnormalities that can be prised up on cervical smears | Familiarity with the cervical cytology sample collection ,processing and screening of the smear<br><br>Assess the hormonal status according to cervical smear<br><br>Detects / identifies the abnormalities on cervical PAP smear |
| | Week 20 | Day 1 | Cytomorphology:<br>- Recognition & classification of cells according to Cytomorphological features<br>- Identification of response to injury | 2 | Demonstration of various cell morphology<br>Cellular response to injury and malignant tumours through PPTs | 3 | Comparison between the normal & abnormal tissues | Defines the cytological features in response to injury<br><br>Identifies the Cytomorphological features of Malignancy |

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| | | | - Features of tumours especially Malignancy on cytology | | | | | |
| | | Day 2 | Quality control in Cytology<br><br>Various methods of quality control | 2 | Prepare a list of steps to be followed for quality control in cytology lab | 3 | Explain the quality control in cytology laboratory in detail<br><br>Explain the methods used for assuring the quality in cytology laboratory | Follows the quality control measures in Lab.<br><br>Ensures the parameters to be checked to maintain quality in laboratory |
| Total Hrs. | | | | 80 | | 120 | | |
| Total Hrs. | | | 200 | | | | | |