

STATE COUNCIL FOR TECHNICAL EDUCATION AND VOCATIONAL TRAINING, ODISHA

TEACHING AND EVALUATION SCHEME FOR 5TH Semester DMLT(wef 2020-21)

Subject Number	Subject Code	Subject	Periods/week			Evaluation Scheme			
			L	T	P	Internal Assessment/ Sessional	End Sem Exams	Exams (Hours)	Total
Theory									
Th.1		Entrepreneurship and Management & Smart Technology	4		-	20	80	3	100
Th.2		PHARMACOLOGY-I	4		-	20	80	3	100
Th.3		RADIOGRAPHY TECHNIQUES	4		-	20	80	3	100
Th.4		HOSPITAL & CLINICAL PHARMACY –II	4		-	20	80	3	100
Th.5		PATHOLOGY-II	4			20	80	3	100
		<i>Total</i>	20			100	400	-	500
Practical									
Pr.1		PHARMACOLOGY-I LAB	-	-	4	25	25	3	50
Pr.2		RADIOGRAPHY TECHNIQUES LAB	-	-	4	25	25	3	50
Pr.3		HOSPITAL & CLINICAL PHARMACY –II LAB			4	25	25	3	50
Pr.4		PATHOLOGY-II LAB	-	-	6	25	50	3	75
Pr.5		Project Phase-I	-	-	2	25	-	-	25
		Student Centered Activities(SCA)			1	-	-		-
		<i>Total</i>	-	-	21	100	150	-	250
		Grand Total	20	-	21	200	550	-	750

Abbreviations: L-Lecturer, T-Tutorial, P-Practical . Each class is of minimum 55 minutes duration

Minimum Pass Mark in each Theory subject is 35% and in each Practical subject is 50% and in Aggregate is 40%

SCA shall comprise of Extension Lectures/ Personality Development/ Environmental issues /Quiz /Hobbies/ Field visits/ cultural activities/Library studies/Classes on MOOCs/SWAYAM etc. ,Seminar and SCA shall be conducted in a section.

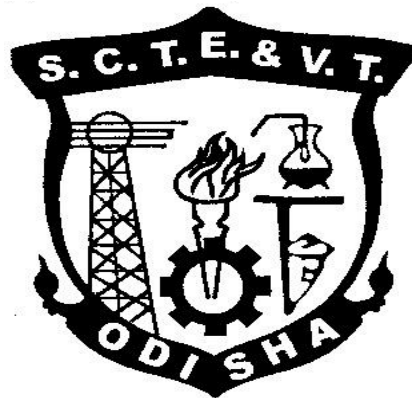
There shall be 1 Internal Assessment done for each of the Theory Subject. Sessional Marks shall be total of the performance of individual different jobs/ experiments in a subject throughout the semester

**CURRICULLUM OF 5th
SEMESTER**

For

**DIPLOMA IN Medical Lab
Technology**

**(Effective FROM 2020-21
Sessions)**



**STATE COUNCIL FOR TECHNICAL
EDUCATION & VOCATIONAL
TRAINING, ODISHA,
BHUBANESWAR**

Th1. ENTREPRENEURSHIP and MANAGEMENT & SMART TECHNOLOGY
(Common to all Branches)

Theory	4 Periods per week	Internal Assessment	20 Marks
Total Periods	60 Periods	End Sem Exam	80 Marks
Examination	3hours	Total Marks	100Marks

Topic Wise Distribution of Periods

No.	Topic	Periods
	Entrepreneurship	
	Market Survey and Opportunity Identification(Business Planning)	
	Project report Preparation	
	Management Principles	
	Functional Areas of Management	
	Leadership and Motivation	
	Work Culture, TQM & Safety	
	Legislation	
	Smart Technology	
	TOTAL	

RATIONALE

In the present day scenario, it has become imperative to impart entrepreneurship and management concepts to students, so that a significant percentage of them can be directed towards setting up and managing their own small enterprises. It may be further added that an entrepreneurial mind set with managerial skill helps the student in the job market. The students can also be introduced with Startup and Smart Technology concept, which shall radically change the working environment in the coming days in the face of Industry 4.0

In this subject, the Students shall be introduced/ exposed to different concepts and Terminologies in brief only, so that he/she can have broad idea about different concepts/items taught in this subject. Solving numerical problem on any topic/item is beyond the scope of this subject.

OBJECTIVES

After undergoing this course, the students will be able to :

- Know about Entrepreneurship, Types of Industries and Startups
- Know about various schemes of assistance by entrepreneurial support agencies
- Conduct market survey
- Prepare project report
- know the management Principles and functional areas of management
- Inculcate leadership qualities to motivate self and others.
- Maintain and be a part of healthy work culture in an organisation.
- Use modern concepts like TQM
- Know the General Safety Rules
- Know about IOT and its Application in SMART Environment.

DETAILED CONTENTS

1. Entrepreneurship

- Concept /Meaning of Entrepreneurship
- Need of Entrepreneurship
- Characteristics, Qualities and Types of entrepreneur, Functions
- Barriers in entrepreneurship
- Entrepreneurs vrs. Manager
- Forms of Business Ownership: Sole proprietorship, partnership forms and others
- Types of Industries, Concept of Start-ups

- Entrepreneurial support agencies at National, State, District Level(Sources): DIC, NSIC,OSIC, SIDBI, NABARD, Commercial Banks, KVIC etc.
- Technology Business Incubators (TBI) and Science and Technology Entrepreneur Parks

2. **Market Survey and Opportunity Identification (Business Planning)**

- Business Planning
- SSI, Ancillary Units, Tiny Units, Service sector Units
- Time schedule Plan, Agencies to be contacted for Project Implementation
- Assessment of Demand and supply and Potential areas of Growth
- Identifying Business Opportunity
- Final Product selection

3. **Project report Preparation**

- Preliminary project report
- Detailed project report, Techno economic Feasibility
- Project Viability

4. **Management Principles**

- Definitions of management
- Principles of management
- Functions of management (planning, organising, staffing, directing and controlling etc.)
- Level of Management in an Organisation

5. **Functional Areas of Management**

- a) Production management
 - Functions, Activities
 - Productivity
 - Quality control
 - Production Planning and control
- b) Inventory Management
 - Need for Inventory management
 - Models/Techniques of Inventory management
- c) Financial Management
 - Functions of Financial management
 - Management of Working capital
 - Costing (only concept)
 - Break even Analysis
 - Brief idea about Accounting Terminologies: Book Keeping, Journal entry, Petty Cash book, P&L Accounts, Balance Sheets(only Concepts)
- d) Marketing Management
 - Concept of Marketing and Marketing Management
 - Marketing Techniques (only concepts)
 - Concept of 4P s (Price, Place, Product, Promotion)
- e) Human Resource Management
 - Functions of Personnel Management
 - Manpower Planning, Recruitment, Sources of manpower, Selection process, Method of Testing, Methods of Training & Development, Payment of Wages

6. **Leadership and Motivation**

- a) Leadership
 - Definition and Need/Importance
 - Qualities and functions of a leader
 - Manager Vs Leader
 - Style of Leadership (Autocratic, Democratic, Participative)
- b) Motivation
 - Definition and characteristics
 - Importance of motivation
 - Factors affecting motivation
 - Theories of motivation (Maslow)

- Methods of Improving Motivation
 - Importance of Communication in Business
 - Types and Barriers of Communication
7. **Work Culture, TQM & Safety**
- Human relationship and Performance in Organization
 - Relations with Peers, Superiors and Subordinates
 - TQM concepts: Quality Policy, Quality Management, Quality system
 - Accidents and Safety, Cause, preventive measures, General Safety Rules , Personal Protection Equipment(PPE)
8. **Legislation**
- a) Intellectual Property Rights(IPR), Patents, Trademarks, Copyrights
 - b) Features of Factories Act 1948 with Amendment (only salient points)
 - c) Features of Payment of Wages Act 1936 (only salient points)
9. **Smart Technology**
- Concept of IOT, How IOT works
 - Components of IOT, Characteristics of IOT, Categories of IOT
 - Applications of IOT- Smart Cities, Smart Transportation, Smart Home, Smart Healthcare, Smart Industry, Smart Agriculture, Smart Energy Management etc.

Syllabus to be covered before IA: Chapter 1,2,3,4

RECOMMENDED BOOKS

1. Entrepreneurship Development and Management by R.K Singhal, Katson Books., New Delhi
2. Entrepreneurship Development and Management by U Saroj and V Mahendiratta, Abhishek Publications, Chandigarh
3. Entrepreneurship Development and Management by Vasant Desai, Himalaya Pub.House
4. Industrial Engineering and Management by O.P Khanna ,Dhanpat Rai and Sons
5. Industrial Engineering and Management by Banga and Sharma, Khanna Publications
6. Internet of Things by Jeeva Jose, Khanna Publications, New Delhi
7. Online Resource on Startups and other concepts
8. <https://www.fundable.com/learn/resources/guides/startup>

Th-2 PHARMACOLOGY-I

Name of the Course: MLT			
Course code:		Semester	5th
Total Period:	60	Examination :	3 hrs
Theory periods:	4P / week	Internal Assessment:	20
Maximum marks:	100	End Semester Examination ::	80

A. RATIONALE:

The subject Pharmacology is a compulsory paper for MLT. This subject includes scope of pharmacology, their advantages and disadvantages, Metabolism, distribution and excretion of drugs and General mechanism of drugs action and their factors which modify drugs action. Pharmacological classification of drugs etc .

B. OBJECTIVE:

On completion of study of Pharmacology, the students will be able to:

To acquire new knowledge in Pharmacology and Toxicology by conducting and promoting innovative research. The final aim of this research is to establish the efficacy, safety and effectiveness of medications in humans, to discover new lead compounds and to understand the mechanisms of action of drugs.

Topic- Wise Distribution Of Periods With Marks

S.L. No.	Topics	Periods
1	Introduction to pharmacology	12
2	General Mechanism Of Drugs	8
3	Drugs acting on Central Nervous system	20
4	Drugs Acting On Autonomic Nervous System	20
	Total	60

Introduction to pharmacology:

- 1 . 1 Introduction to pharmacology.
- 1 . 2 scope of pharmacology.
- 1 . 3 Routes of administration of drugs, their advantages and disadvantages.
- 1 . 4 Various processes of absorption of drugs and the factors affecting them.
- 1 . 5 Metabolism, distribution and excretion of drugs.

General Mechanism Of Drugs:

- 2.1 General mechanism of drugs action and their factors which modify drugs action.
- 2.2 Pharmacological classification of drugs.
- 2.3 The discussion of drugs should emphasize the following aspects:

Drugs acting on Central Nervous system:

- 3 . 1 Drugs acting on the central Nervous system:
- 3 . 2 16 General anaesthetics- adjunction to anaesthesia, intravenous anaesthetics.
- 3 . 3 Analgesic antipyretics and non-steroidal Anti-inflammatory drugs- Narcotic analgesics.
- 3 . 4 Antirheumatic and anti-gout remedies.
- 3 . 5 Sedatives and Hypnotics, psychopharmacological agents, anticonvulsants, analeptics.
- 3 . 6 Centrally acting muscle relaxants and anti parkinsonism agents.
- 3 . 7 Local anesthetics.

Drugs Acting On Autonomic Nervous System:

- 4.1 Drugs acting on autonomic nervous system.
- 4.2 Cholinergic drugs, Anticholinergic drugs, anticholinesterase drugs.
- 4.3 Adrenergic drugs and adrenergic receptor blockers.
- 4.4 Neurone blockers and ganglion blockers.
- 4.5 Neuromuscular blockers, used in myasthenia gravis.
- 4.6 Drugs acting on eye: Mydriatics, drugs used in glaucoma.

Reference Books:

1. **Pharmacology by S K Bhattacharya**
2. **Pharmacology by Goodman and Gilman**

Syllabus to be covered up to I.A.

Chapter: 1,2

Learning Resources:			
Sl.No	Title of the Book	Name of Authors	Name of Publisher
1.	Text book of Pharmacology	N. Muruges	Sathya Publishers
2.	Essential of Medical Pharmacology	K D Tripathy	Jaypee Brothers Publications

Th-3 RADIOGRAPHY TECHNIQUES

Name of the Course: MLT			
Course code:		Semester	5th
Total Period:	60	Examination :	3 hrs
Theory periods:	4P / week	Internal Assessment:	20
Maximum marks:	100	End Semester Examination ::	80

A. RATIONALE:

The subject Radiography Techniques is a compulsory paper for MLT. This subject includes scope of Radiography Techniques , X-ray techniques, Tomography, Ultrasonography and MPI etc .

B. OBJECTIVE:

It is used to diagnose or treat patients by recording images of the internal structure of the body to assess the presence or absence of disease, foreign objects, and structural damage or anomaly. During a radiographic procedure, an x-ray beam is passed through the body.

Topic- Wise Distribution Of Periods With Marks

S.L. No.	Topics	Periods
1	X-Ray Techniques	25
2	Computed Tomography	17
3	Ultrasonography	10
4	MPI	8
	Total	60

1. X-Ray Techniques:

- 1 . 1 Basic principle of x-ray imaging
- 1 . 2 Composition of x-ray film ,Concept of dark room processing & Patient care
- 1 . 3 X-ray cassette & Loading of X-ray film
- 1 . 4 Exposures – KV & mAS
- 1 . 5 Filtration & Field size,Distance, Focal spot size, Films and screen.
- 1 . 6 Grids, Air gap technique, Positioning of Patient & Radiation protection
- 1 . 7 X-ray procedure, Basic views of different parts, C-R system, digital x-ray.
- 1 . 8 Overview of - soft tissue radiography and uses, Multiple radiography.
- 1 . 9 Stereography, Macroradiography, Subtraction –Photography, Electronic and color subtraction, Uses of subtraction, x-ray Hazards.

2. Computed Tomography:

- 2.1 Introduction to Tomography
- 2.2 Indications, Mechanics, Blur
- 2.3 Exposure factors, Multisection tomography
- 2.4 Principle of CT scanning, Apparatus, Thickness of slice, Image storage, Localisation of level of cut, Contrast medium enhancement, Radiation dose, Uses, Patient Hazards, Patient safety

3. Ultrasonography:

- 3 . 1 Principle, Display of Ultrasound images – A, M, B mode
- 3 . 2 Real time scans
- 3 . 3 Doppler effect, Duplex Scanner, Obstetric Scanning
- 3 . 4 Echocardiography, Patient preparation, Uses.

4. MPI:

4.1 Principle

4.2 Relaxation

4.3 Pulse sequence, Apparatus

4.4 Hazards, Patient care, Warning, Uses

Reference Books:

1. Biomedical Instrumentation : R. S. Khandpur
2. Medical Instrumentation application & design : John G.

Syllabus to be covered up to I.A.

Chapter: 1,2

Learning Resources:			
Sl.No	Title of the Book	Name of Authors	Name of Publisher
1.	Diagnostic radiography	Bryan	Sathya Publishers
2.	A text book of Medical Instrument	Webster Cromwell	Tata McGraw Hill

Th-4 HOSPITAL & CLINICAL MANAGEMENT –II

Name of the Course: MLT			
Course code:		Semester	5th
Total Period:	60	Examination :	3 hrs
Theory periods:	4P / week	Internal Assessment:	20
Maximum marks:	100	End Semester Examination ::	80

A. RATIONALE:

The subject Hospital & Clinical Management is a compulsory paper for MLT. This subject includes scope of Sterile manufacture, Non-Sterile manufacture, Hospital Formulary system Functioning, composition, Drug Information service and Drug Information Bulletin & Surgical dressing etc .

B. OBJECTIVE:

To provide safe, secure, and high quality medical care. To foster excellent health professionals who will lead into the future. To support and develop community health and medical services. To promote advanced medical care and disseminate it to the world.

Topic- Wise Distribution Of Periods With Marks

S.L. No.	Topics	Periods
1	Sterile & Non-Sterile manufacturing	15
2	P.T.C. & Hospital Formulae	15
3	Application of computers	6
4	Physiological parameters with their significance.	12
5	Drugs	12
	Total	60

Sterile & Non-Sterile manufacturing:

- 1 . 1 **Manufacturing:** Economical considerations, estimation of demand.
- 1 . 2 **Sterile manufacture**-Large and small volume parenterals, facilities, requirements, layout production planning , man-power requirements.
- 1 . 3 **Non-sterile manufacture**-Liquid orals, externals, Bulk concentrates. Procurement of stores and testing of raw materials. Nomenclature and uses of surgical instruments and Hospital Equipments and health accessories.

P.T.C. & Hospital Formulae:

2.1P.T.C.(pharmacy Therapeutic Committee)

- 2.2 **Hospital Formulary system** and their organization, functioning, composition.
- 2.3 **Drug Information service** and Drug Information Bulletin.
- 2.4 **Surgical dressing** like cotton, gauze, bandages and adhesive tapes including their pharmacopoeial tests for quality. Other hospital supply eg. I.V.sets, B.G. sets, Ryals tubes, Catheters, Syringes etc.

Application of computers:

- 3.1 **Application of computers** in maintenance of records, inventory control, medication monitoring, drug information and data storage and retrieval in hospital retail pharmacy establishment.
- 3.2 **Physiological parameters with their significance.**
- 3.3 **Drug Interactions:** Definition and introduction. Mechanism of Drug Interaction. Drug-drug interaction with reference to analgesics, diuretics, cardiovascular drugs, Gastro-intestinal agents. Vitamins and Hypoglycemic agents. Drug-food interaction.
- 3.4 **Adverse Drug Reaction:** Definition and significance. Drug-Induced diseases and Teratogenicity.

Drugs:

- 4.1 **Drugs in Clinical Toxicity-** Introduction, general treatment of poisoning, systemic antidotes, Treatment of insecticide poisoning, heavy metal poison, Narcotic drugs, Barbiturate, Organophosphorus poisons.
- 4.2 **Drug dependences,** drug abuse, addictive drugs and their treatment, complications.
- 4.3 **Bio-availability of drugs,** including factors affecting it.

Reference Books:

Hospital And Clinical Pharmacy - Dr. A. R. Paradkar

Hospital And Clinical Pharmacy - Dj Patil

Syllabus to be covered up to I.A.

Chapter: 1,2

Learning Resources:			
Sl.No	Title of the Book	Name of Authors	Name of Publisher
1.	Hospital And Clinical Pharmacy	Mr. A. V. Yadav	Sathya Publishers
2.	Hospital And Clinical Pharmacy	Nanda & Kar	Birla

Th-5 PATHOLOGY-II

Name of the Course: MLT			
Course code:		Semester	5th
Total Period:	60	Examination :	3 hrs
Theory periods:	4P / week	Internal Assessment:	20
Maximum marks:	100	End Semester Examination ::	80

A. RATIONALE:

The subject **pathology** is a compulsory paper for MLT. This subject includes scope of cell, tissue, staining , cytology & aspiration etc .

B. OBJECTIVE:

The medical practice of **pathology** is dedicated to the general **study** of disease and its processes as well as the specific diagnosis of disease, since **pathologists** investigate the clues to diseases and injuries through the examination of organs, tissues, body fluids, cells, and molecules.

Topic- Wise Distribution Of Periods With Marks

S.L. No.	Topics	Periods
1	Cell & Tissue	8
2	Tissue Processing	15
3	Frozen Section	25
4	Autopsy Technique	12
	Total	60

Cell & Tissue:

- 1 . 1 Introduction, Cell, Tissue and their function.
- 1 . 2 Methods of examination of tissues and cells.
- 1 . 3 Fixation of tissue: Classification of fixatives., Simple Fixatives and their properties.

Tissue Processing :

- 2.1 Collection of specimen, Labeling and fixation , Dehydration , Clearing.
- 2.2 Impregnation , Embedding, Paraffin blockmaking.
- 2.3 Section Cutting: , Microtomes and microtome knives – sharpening of knife.
- 2.4 Microtome use – Honing, Stropping, Techniques of section cutting , Mounting of sections.

Frozen Section:

- 3 . 1 Staining.
- 3 . 2 Dyes and their properties , Theory of staining , Staining technique with haematoxylin and eosin.
- 3 . 3 Mounting of actions , Common special stains – , Routine H & E, Meason Trichrome , Men – Geison , Reticulin , PAS, Fe, Lipid, Mucicamine , Vencos for calcium , Special staining.
- 3 . 4 Decalcification : , Fixation , Decalcification , Detection of end point, Neutralization and processing.
- 3 . 5 Exfoliative Cytology and Fine needle aspiration cytology.
- 3 . 6 Types of specimens and preservation.
- 3 . 7 Preparation and fixation of smears. , Papanicolaous staining technique/MCC staining/HE staining/.
- 3 . 8 Sex chromatin staining , Nuscum Techniques , Reception of specimen, Preparation of fixation , Preservation , Presentation

Autopsy Technique:

- 4.1 Assisting in autopsy
- 4.2 Preservation of organs and Processing of the tissue.
- 4.3 Waste disposal and safety in laboratory.

Text Books:

1. Rosai and Ackerman's Surgical Pathology By Juan Rosai
2. Robbins and Cotran Pathologic Basis of Disease By Vijay Kumar
3. Differential Diagnosis in Surgical Pathology By Paolo Gattuso

Syllabus to be covered up to I.A.

Chapter: 1,2

Learning Resources:			
Sl.No	Title of the Book	Name of Authors	Name of Publisher
1.	Basic Pathology	Robbins & Cortrans	Tata McGraw Hill
2.	Understanding Pathophysiology	Eslevier	Tata McGraw Hill

Pr-1 PHARMACOLOGY-I LAB

Name of the Course: MLT			
Course code:		Semester	5th
Total Period:	60	Examination :	3 hrs
Lab. periods:	4 P / week	Sessional:	25
Maximum marks:	50	End Semester Examination ::	25

A. RATIONALE:

The response of Pharmacology is the study of the action of drugs in the widest possible sense, encompassing many types of chemicals as well as a medicines that affect the functioning of the body. Pharmacologists study how drugs work in the body and use this information explore how the body itself functions..

B. OBJECTIVE:

Experimental Pharmacology and Drug Discovery aims to publish significant basic research findings in pharmacology that shed light on mechanisms of drug action by analyzing the interaction with receptors and/or other specific biological targets, including enzymes, ion channels, transporters, transcription factors, etc..

C. Course content in terms of specific objectives:

1. Effect of potassium and calcium ions, acetylcholine and adrenaline on frog's heart.
2. Effect of acetyl choline on rectus abdomens muscle of frog and guinea pig ileum.
3. Effect of spasmogens and relaxants on rabbits intestine.
4. Effect of local anaesthetics on rabbit cornea.
5. Effect of mydriatics and miotics on rabbit's eye.
6. To study the action of strychnine on frog.

Pr-2 RADIOGRAPHY TECHNIQUES LAB

Name of the Course: MLT			
Course code:		Semester	5th
Total Period:	60	Examination :	3 hrs
Lab. periods:	4 P / week	Sessional:	25
Maximum marks:	50	End Semester Examination ::	25

A. RATIONALE:

Radiology started with the X-ray, which changed the field of medicine forever. The ability to use imaging to see inside the body, diagnose a broken bone, diagnose diseases and so much more has made **radiology** necessary for medical care. X-rays use radiation to look through the body and see foreign objects and bones.

B. OBJECTIVE:

The response of radiography Technique used to diagnose or treat patients by recording images of the internal structure of the body to assess the presence or absence of disease, foreign objects, and structural damage or anomaly. During a radiographic procedure, an x-ray beam is passed through the body.

C. Course content in terms of specific objectives:

1. Clinical Radiography.
2. Xray Film / Image processing Techniques including Dark Room Techniques.
3. Contrast & Special Radiography procedures
4. Equipments of Advanced Imaging Modalities
5. Modern Imaging Techniques and Recent Trends in Imaging
6. Quality Control, Radiobiology & Radiation Safety in Radio diagnosis / Imaging other than X-ray related.

Pr-3 HOSPITAL & CLINICAL MANAGEMENT –II LAB

Name of the Course: MLT			
Course code:		Semester	5th
Total Period:	60	Examination :	3 hrs
Lab. periods:	4 P / week	Sessional:	25
Maximum marks:	50	End Semester Examination ::	25

A. RATIONALE:

The use of **clinical objectives** can be very helpful in evaluating the performance of the new orientee into critical care. Specifically written, these **objectives** have been used to assess new graduates as well as other nurses orienting to critical care.

B. OBJECTIVE:

To provide safe, secure, and high quality medical care. To foster excellent health professionals who will lead into the future. To support and develop community health and medical services. To promote advanced medical care and disseminate it to the world.

C. Course content in terms of specific objectives:

1. Transfusion Fluids - General
2. Preparation of Transfusion Solutions
3. Raw Materials
4. Limit Tests
5. Finished Products Testing
6. Containers and Closures
7. Surgical Dressing
8. Surgical Instruments
9. Do's and Don'ts' on LVP manufacturing
10. Production Record (Specimen Forms)
11. Data Processing Equipments
12. Items as Spotters

Pr-4 PATHOLOGY-II LAB

Name of the Course: MLT			
Course code:		Semester	5th
Total Period:	60	Examination :	3 hrs
Lab. periods:	4 P / week	Sessional:	25
Maximum marks:	75	End Semester Examination ::	50

A. RATIONALE:

Pathology is a medical specialty that determines the cause and nature of diseases by examining and testing body tissues and bodily fluids (from samples including blood and urine). The results from these **pathology** tests help doctors diagnose and treat patients correctly.

B. OBJECTIVE:

Provide the knowledge, technical skills and experience necessary for residents to competently practice anatomic and clinical **pathology**, this includes developing knowledge of basic pathologic processes and skills needed to interpret **laboratory** data as well as make clinicopathologic correlations.

C. Course content in terms of specific objectives:

1. Histotechnology and Cytology .
2. Fixation, processing.
3. Embedding and section and reparation of slides.
4. Sharpending of the knife. , Preparation of fixatives and decalcifying fluid.
5. Preparation of adhesives to fix the section to the slide.
6. Preparation and fixation of cytology smears and ,Papanicolaoue's staining techniques.
7. MOG staining /HE staining.
8. Mounting .

Pr 5. PROJECT WORK (Phase-I)

Name of the Course: Diploma in MLT			
Course code:		Semester	5 th
Total Period:	30	Examination :	-
Theory periods:	2P / week	Sessional Marks	25
EXAMS	-	TOTAL Marks	25

RATIONALE

Students' Project Work aims at developing innovative skills in the students whereby they apply the knowledge and skills gained through the course covered in many subjects and Labs, by undertaking a project. The prime emphasis of the project work is to understand and apply the basic knowledge of the principles of Medical Lab Technology and practices in real life situations, so as to participate and manage a large organization and projects, in future.

Entire Project shall spread over 5th and 6th Semester. Part of the Project covered in 5th Semester shall be named as *Project Phase-I* and balance portion to be covered in 6th Semester shall be named as *Project Phase-II*.

OBJECTIVES

After undergoing the Project Work, the student will be able to:

- Implement the theoretical and practical knowledge and skills gained through various subjects/courses into an application suitable for a real practical working environment
- Identify and contrast gap between the technological knowledge acquired through curriculum and the actual industrial need and to compensate it by acquiring additional knowledge as required.
- Carry out cooperative learning through synchronous guided discussions within the class in key areas, asynchronous document sharing and discussions, as well as prepare collaborative edition of the final project report.
- To achieve real life experience of working in a work place.
- To develop the skill of writing Project Report

General Guidelines

The individual students have different aptitudes and strengths and also areas of interest. Project work, therefore, should match the strengths and interest of the students. For this purpose, students should be asked to identify the type of project work, they would like to execute. The activity of problem identification should begin well in advance (right from beginning of 5th semester). Students should be allotted a problem of interest to him/her as a project work. It is also essential that the faculty of the respective department may have a brainstorming session to identify suitable project assignments for their students. The project assignment can be individual assignment or a group assignment. Preferably there should not be more than 5 students, if the project work is given to a group. The project work identified in collaboration with industry/organisation should be preferred.

A suggestive criterion for assessing student performance by the external (preferably person from Working organization in the field) and internal (teacher) examiner is given in table below:

Sl. No.	Performance Criteria
1.	Selection of project assignment
2.	Planning and execution of considerations
3.	Quality of performance
4.	Providing solution of the problems or production of final product
5.	Sense of responsibility
6.	Self expression/ communication/ Presentation skills
7.	Interpersonal skills/human relations
8.	Report writing skills
9	Viva voce

The teachers are free to evolve other criteria of assessment, depending upon the type of project work.

It is proposed that the institute may organize an annual exhibition of the project work done by the students and invite leading Industrial organisations of area of subject to such an exhibition.

Project Phase-I and Phase-II

The Project work duration shall cover 2 semesters(5th and 6th sem). The Grouping of students, selection of Project, assignment of Project Guide to the Group shall be done in the beginning of 5th sem under Project Phase-I. The students may be allowed to study literature, any existing system and then define the Problem/objective of the Project. Requirements specification and Preliminary work of the system have to be complete in Phase-I. Project Milestones are to be set so that progress can be tracked . In Phase-II Detailed work, Documentation have to be complete. *Project Report have to be prepared and complete in Phase-II.* All Project reports should be organized uniformly in proper order, irrespective of group. Teacher Guides can make suitable alteration in the components of Task and schedule.

At the end of Project Phase-I in 5th semester there shall be one presentation by each group to mark to progress and also to judge whether the Project is moving in right direction as per the objective of the Project.

List of Equipments for a batch size thirty

Sl. No.	Equipment
1.	Test tube
2.	Folin-Wu tube
3.	Glass slide mycole and cover slips
4.	Petri dish
5.	Glass beaker
6.	Glass flask
7.	Pasteur pipette
8.	Graduated pipettes
9.	Syringes
10.	Disposable gloves
11.	Tourniquet
12.	Microscope
13.	Bunsen burner or spirit lamps or candles
14.	Ultracentrifuge
15.	Electrophoresis apparatus
16.	Chromatography:
17.	Glass beaker
18.	Glass flask
19.	Pasteur pipette
20.	Graduated pipettes
21.	Syringes
22.	Disposable gloves
23.	Hot Air Oven
24.	Centrifuge Machine
25.	Hematology analyzer