WEST BENGAL STATE COUNCIL OF TECHNICAL EDUCATION

Proposed Syllabus of Diploma in Medical Laboratory Technology

Part - II

(3rd Semester)

[Modification of course curriculum structure & syllabus of Part –II and Part – III of the Diploma in Engineering]

March' 2014

1.HUMAN ANATOMY

Course: Diploma in Medical Laboratory Technology		**Credit: 3**	
Subject of Study: **Human Anatomy**		Evaluation Scheme:	
Subject Code: MLT 301		Internal:	30
Subject Offered in : **DMLT Part-II 3rd Semester**		TA: 10 + CT: 20	
Contact Periods: 3 L / Week		ESE	70
Subject: **Theoretical** Duration: **17 weeks**		Total Marks	100
AIM: 1. To provide overview of the human body structure 2. To apply the knowledge of human anatomy in biomedical engineering field 3. The content of the subject provides the basic knowledge of anatomical terms, human skeletal, Muscle, Joints and surface anatomy of different body organs.			

TEACHING SCHEME			
Teaching	15 weeks	45 Periods	45 Hrs
Internal Assessment	2 weeks	6 Periods	6 Hrs
Total Contact Periods:	17 weeks	51 Periods	51 Hrs

END SEMESTER EXAMINATION SCHEME							
Sl. No	Questions	Group	From Unit	To be Set	To be Answered	Allotted Marks	Total Marks
1. a. b. c.	**Objective Questions:** MCQ Fill in the blanks True/False		1 To 7	10 8 8	8 6 6	1 x 8 1 x 6 1 x 6	**20**
2. to 10	**Subjective Questions:** (May have Part Marking)	A	1, 2, 3, 4	5	**Any 5** at least Taking **two** From each Group	10 x 5	**50**
		B	5, 6, 7	4			
Grand Total							70

DETAIL SUBJECT CONTENT		
Unit	Topic	Contac Periods
1	**An Overview of Anatomy:** Topics of Anatomy - Regional, Systemic, Surface and Microscopic anatomy. Cytology, Histology, Embryology. Pathological anatomy, Radiographic anatomy; Levels of Structural Organization; Language of anatomy - Anatomical Position, Anatomical Planes & sections, Directional terms, Regional terms; Body cavities & Membranes; Abdominopelvic regions and quadrants; Other body cavities.	2
2	**Bones and Skeletal Tissues:** Skeletal Cartilage (Basic structure, types and Location), Growth of cartilage; Bone -Classification of Bones; Function of bones, Bone Structure - Gross anatomy (bone marking and structure) and Microscopic anatomy - Compact bone, spongy bone; Chemical composition of Bone; Fracture, Repairing of bone;	6
3	**Human Skeleton :** Skeleton - Axial and Appendicular skeleton; Skull; Vertebral Column; Thorax, Pectoral Girdle and Upper limb; Pelvic Girdle and lower limb;	8

4	**Joints:** joints; Classification of Joints; Fibrous joints, Cartilaginous joints and Synovial Joints; Movement allowed by synovial joints - Gliding, Angular movements- Flexion, Extension, Abduction, Adduction,Circumduction, Rotation; Special movements - Supination and Pronation, Inversion and Eversion, Protraction and Retraction, Elevation and Depression; Structure of synovial joints; Different types of synovial joints, Brief of Elbow joint, Knee joint, Shoulder joint ant Pelvic joint	8
5	**Muscles:** Overview of types of Muscle tissue; Functional Characteristics of muscle tissue; function of muscle; Gross anatomy of Skeletal muscle; Microscopic anatomy of muscle; Smooth muscle; Types of Smooth muscle; Muscular system; Major Skeletal muscles of the body	7
6	**Fundamental of Nervous system:** Overview of Nervous system; Organization of the Nervous system - CNS, PNS; Neurons - Structure, Classification, Function; Regions and organization of Brain, Gross anatomy and protection of Spinal Cord; Cranial nerves; ANS anatomy;	5
7	**Surface and Gross Anatomy:** Brief introduction of Cardiovascular system, Respiratory system, Digestive System, Urinary System; Surface anatomy, Location and Gross anatomy of Heart, Lungs, Liver, Gall Bladder, Stomach, Spleen, Kidney, Appendix;	9
Total		**45**

REFERENCE BOOKS			
Sl. No	Books	Author	Publisher
1	Human Anatomy & Physiology	Elaine N. Marieb	Pearson
2	Anatomy & physiology	Rose & Wilson	
3	Human Anatomy	A. K. Dutta	
4	Anatomy	B. Sahanuiza	Central Book Agency

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2. HUMAN PHYSIOLOGY

Course: Diploma in Medical Laboratory Technology		**Credit: 3**	
Subject of Study: **Human Physiology**		Evaluation Scheme:	
Subject Code: MLT 302		Internal:	30
Subject Offered in : **DMLT Part-II 3rd Semester**		TA: 10 + CT: 20	
Contact Periods: **3** L / Week		ESE	70
Subject: **Theoretical**	Duration: **17 weeks**	Total Marks	100

AIM:
1. To provide Basic Knowledge of functions of the different organs & system in the human body.
2. The content of the subject provides the basic knowledge of different physiological parameters
3. To apply the knowledge of human Physiology in Medical lab. and as well as biomedical engineering field

TEACHING SCHEME			
Teaching	15 weeks	45 Periods	45 Hrs
Internal Assessment	2 weeks	6 Periods	6 Hrs
Total Contact Periods:	17 weeks	51 Periods	51 Hrs

SI. No	Questions	Group	From Unit	To be Set	To be Answered	Allotted Marks	Total Marks
1. a. b. c.	**Objective Questions:** MCQ Fill in the blanks True/False		1 To 10	10 8 8	8 6 6	1 x 8 1 x 6 1 x 6	**20**
2. to 11	**Subjective Questions:** (May have Part Marking)	A	2, 3, 4,5	4	Any 2	10 x 5	**50**
		B	6,7,8	4	Any 2		
		C	9,10	3	Any 1		
			Grand Total				70

	DETAIL SUBJECT CONTENT	
Unit	**Topic**	**Contac Periods**
1	**An Overview of Physiology :** Topics of Physiology, Survival Needs -Nutrients, oxygen, water, normal body temperature, atmospheric pressure; Homeostasis; Negative feedback mechanisms and Positive feedback mechanisms	2
2	**Cells and Tissues:** Cell; Overview of the cellular basis of life - cell theory; Cell -Shape, Structure, organelles & Functions; Structure of Cell membrane; Structure of Nucleus, Chromatin; Tissues - Types, Structure, Function , Distribution;	5
3	**Digestive System:** Overview of digestive system; Digestive processes - Ingestion, Propulsion, Mechanical digestion, Chemical digestion, absorption, Defecation, Digestive processes occurring in the different parts of the elementary track. Role of the different gland in digestion	4
4	**Cardiovascular System:** Overview of cardiovascular system, Structure of heart, Electrophysiology of heart, Composition of Blood, function of blood, Overview of blood circulation - Systemic & pulmonary; Systemic blood pressure, HR, Cardiac output;	4
5	**Respiratory System:** Overview of respiratory system, Mechanism of Breathing, external & internal respiration, Lung Compliance, Respiratory Volumes, Respiratory capacities, Composition of Alveolar gas, Transport of Respiratory gases by blood, Respiration Rate, Ventilation	5
6	**Physiology of Skeletal Muscle fiber:** Generation of Action potential, Neuromuscular junction and nerve stimulation, depolarization, repolarization, refractory period; Muscle fiber contraction, Muscle Twitch, Muscle tone; Energy for muscle contraction	5
7	**Nervous System:** Overview of nervous system, Neuron - Neurophysiology, Resting Membrane potential, Action potential, Nerve impulse Transmission, Synapse, Brain waves, Consciousness, Sleep and sleep-awake cycle., Sleep Pattern, overview of ANS,	5
8	**Urinary System:** Overview of Urinary system, Kidney, Nephron , Mechanism of Urine formation, Diuretic, Renal Clearance, Urinary Bladder,	3
9	**Endocrine System:** Overview of Endocrine system, Hormones, Mechanism of hormone action, Major Endocrine Organs- Overview of Pituitary Gland, Thyroid gland, Parathyroid glands, Adrenal glands, Pancreas- Glucagon, insulin, Gonads, Thymus; Other hormones.	6
10	**Special Senses:** Taste and Smell, The Eye and Vision - Structure of Eyeball, internal chambers and fluids, Overview of physiology of vision, Retina, Photoreception, light and Dark adaptation, Ear- Overview of structure of ear& Physiology of hearing,	6
	Total	45

REFERENCE BOOKS			
Sl. No	Books	Author	Publisher
1	Human Anatomy & Physiology	Elaine N. Marieb	Pearson
2	Human Physiology	C. C. Chatterjee	Medical Allied Agency
3	Anatomy & physiology	Rose & Wilson	Churchill Living Stone
4	Medical Physiology	Guyton & Hall	Elsevier
5	Medical Physiology	Berman & Mahapatra	C.B. International

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3. <u>HEMATOLOGY & BODY FLUIDS</u>

Course: Diploma in Medical Laboratory Technology	**Credit: 3**	
Subject of Study: **Hematology and Body Fluids**	Evaluation Scheme:	
Subject Code: MLT 303	Internal: TA: 10 + CT: 20	30
Subject Offered in : **DMLT, Part-II, 3rd Semester**		
Contact Periods: **3** L / Week	ESE	70
Subject: **Theoretical** Duration: **17 weeks**	Total Marks	100

AIM:
1. To Study of Blood and introduction of body fluids.
2. To provide Knowledge of hematology
3. To provides the basic knowledge of different Blood cells and their pathological test
4. To apply the knowledge of hematology in biomedical Instrumentation.

TEACHING SCHEME			
Teaching	15 weeks	45 Periods	45 Hrs
Internal Assessment	2 weeks	6 Periods	6 Hrs
Total Contact Periods:	17 weeks	51 Periods	51 Hrs

END SEMESTER EXAMINATION SCHEME							
Sl. No	Questions	Group	From Unit	To be Set	To be Answered	Allotted Marks	Total Marks
1. a. b. c.	**Objective Questions:** MCQ Fill in the blanks True/False		1 To 8	10 8 8	8 6 6	1 x 8 1 x 6 1 x 6	**20**
2. to 11	**Subjective Questions:** (May have Part Marking)	A	1,2, 3	4	**Any 5** at least Taking **one** From each Group	10 x 5	**50**
		B	4	2			
		C	5,6,7,8	4			
Grand Total							70

Unit	DETAIL SUBJECT CONTENT	Contact Periods
	Topic	
1	**Blood:** Blood, Composition & function of blood, Blood Plasma, Source and function of Plasma proteins, Formed Elements, Collection of blood, Anticoagulants - EDTA, Trisodium citrate, Oxalates, Sodium fluoride, Heparin (Uses and disadvantages)	5
2	**Erythrocytes:** Erythrocytes- Structural characteristic, Hemoglobin- structure and function, Function of Erythrocytes, Production of Erythrocytes, Fate and Destruction of Erythrocytes, Erythrocyte disorders- Anemia, Low hemoglobin, Abnormal hemoglobin, Thalassemias, sickle-cell anemia; Counting Chamber, Total count of RBC, Estimation of Hb, ESR, PCV, MCV,MCH, MCHC, Color Index,	10
3	**Leucocytes And Platelets:** Leucocytes- Types and their structural characteristic, production if WBC, Function of WBC, DC, Total count of WBC, Leucocytosis; Platelet - Characteristic, Function of Platelet, Production of Platelet, Coagulation Steps, Coagulation factors, Total count of platelet, BT, CT, P time,	10
4	**Blood Banking:** Storage, Collection, Blood grouping, Rh factor, Blood Transfusion,	3
5	**Overview of Body Fluids:** Body water content, Overview of Fluid compartments - ICF, ECF, Plasma, IF, Composition of body fluids, Composition of ICF & ECF,	2
6	**CSF:** Transudata & Exudate,Source of CSF, Composition of CSF, Indication for collection of CSF, Meningitis, Collection of CSF, Physical, Mircoscopical and Chemical examinations	5
7	**Urine:** Collection and Preservation of Urine, Physical, Chemical and Microscopical examination	7
8	**Semen Analysis:** Collection of Semen, Physical & Chemical examination- Volume, Viscosity, Relation; Microscopical Examination-Sperm Morphology, Sperm count, Motility	3
	Total	45

REFERENCE BOOKS FOR HEMATOLOGY & BODY FLUIDS			
Sl. No	**Books**	**Author**	**Publisher**
1	Human Anatomy & Physiology	Elaine N. Marieb	Pearson
2	Human Physiology	C. C. Chatterjee	Medical Allied Agency
3	Medical Laboratory Technology	Kanai Lal Mukherjee	Churchill Living Stone
4	Medical Laboratory Technology	V. H. Talib	C.B.S
5	Practical Pathology	P. Chakraborty & Gargi Chakraborty	New Central Book
6	Medical Laboratory Technology	Rambik Sood	

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4. BIOMEDICAL INSTRUMENTATION-I

Course: Diploma in Medical Laboratory Technology		**Credit: 3**	
Subject of Study: **Biomedical Instrumentation-I**		Evaluation Scheme:	
Subject Code: MLT 304		Internal:	30
Subject Offered in : **DMLT, Part-II, 3rd Semester**		TA: 10 + CT: 20	
Contact Periods: **3** L / Week		ESE	70
Subject: **Theoretical**	Duration: **17 weeks**	Total Marks	100

Diploma in Medical Laboratory Technology **WBSCTE**

AIM:
1. To provides the basic knowledge of Instrumentation system and introduction to biomedical instrumentation.
2. The content of the subject provides the basic knowledge of working principle of Transducers & sensors used in medical instruments
3. To apply the knowledge of Transducer & sensors in biomedical instrumentation.

TEACHING SCHEME			
Teaching	15 weeks	45 Periods	45 Hrs
Internal Assessment	2 weeks	6 Periods	6 Hrs
Total Contact Periods:	17 weeks	51 Periods	51 Hrs

END SEMESTER EXAMINATION SCHEME							
Sl. No	Questions	Group	From Unit	To be Set	To be Answered	Allotted Marks	Total Marks
1. a. b. c.	**Objective Questions:** MCQ Fill in the blanks True/False		1 To 4	10 8 8	8 6 6	1 x 8 1 x 6 1 x 6	**20**
2. to 10	**Subjective Questions:** (May have Part Marking)	A	1,2,	4	Any 2	10 x 5	**50**
		B	3, 4	5	**Any 3**		
Grand Total							70

DETAIL SUBJECT CONTENT		
Unit	Topic	No. of Periods
1	**Fundamental of Medical Instrumentation:** Fundamental of Instrumentation, Different types of Medical instrument, General Block diagram of Biomedical Instrumentation system - Measurand, Transducer/Sensor, Signal conditioner, Display system, Alarm , data storage, data Transmission, Performance requirements of Medical Instrumentation System,	5
2	**Bioelectric Potential and Electrodes:** Bio-potential- Resting membrane potential, Action potential, Sources of Bio-signals, Electrode - Function of Electrodes, Electrode Metals, General Classification of Electrodes, Surface electrode, Needle electrodes, Microelectrodes and their uses, Electrode-Tissue Interface, Metal-Electrolyte & Electrolyte- tissue interface, Polarization, Skin Contact Impedance, Introduction to different Bio-signals,	12
3	**Bio-Transducer:** Transducer - Classification of Transducers, Bio-transducer, Factors for Bio-transducer, Overview of Transducer Characteristics: Static Characteristics- Accuracy, Precision, Resolution, Sensitivity, Drift, Linearity, Threshold, Hysteresis, Span, Dynamic Characteristic - Zero-order system, First-order-system, Displacement, Position and Motion Transducer : Working & uses of Potentiometric, Variable Capacitive, variable Inductive transducer, LVDT; Pressure Transducer: LVDT pressure Transducer, Strain Gauge; Transducer for body temperature: Thermocouple, Electrical resistance Thermometer, Thermistors,P-N junction, Chemical thermometry; Photoelectric Transducers: Photovoltaic Cell, Photo emissive cells, Piezoelectric transducer,	20
4	**Sensor:** Optical fiber sensor: structure & Working principle of optical fiber, Types of Optical fiber Sensors - Photometric sensors, Physical sensor, chemical Sensors; Biosensors: introduction, Dissolved O2 Sensor and their application, Glucose Sensor, pH Sensor,	8
Total		45

	REFERENCE BOOKS		
Sl. No	Books	Author	Publisher
1	Hand book of Biomedical Instrumentation	R. S. Khandpur	Tata Mc
2	Biomedical Instrumentation & Measurements	Cromwell	Pearson
3	Principle of Medical Electronic & Biomedical Instrumentation	C Raja Rao & S K Guha	
4	Electrical & Electronics measurement & instrumentation	A K Sawhney	Dhanpat Rai
5	Electronics Instrumentation	H S Kalsi	Tata Mc
6	Medical Instrument	J. G. Webster	

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5. <u>BASIC ELECTRICAL & ELECTRONICS</u>

Course: Diploma in Medical Laboratory Technology	**Credit: 2**	
Subject of Study: **Basic Electrical & Electronics**	Evaluation Scheme:	
Subject Code: MLT 305	Internal:	30
Subject Offered in : **DMLT, Part-II, 3rd Semester**	TA: 10 + CT: 20	
Contact Periods: 2 L+ 1 TU / Week	ESE	70
Subject: **Theoretical** Duration: **17 weeks**	Total Marks	100

AIM:
1. To provides the basic knowledge of Electrical Engg. and brief introduction to Basic Electronic
2. To have the students become competent in Basic Electrical & Electronics
3. To apply the knowledge of basic Electrical in Biomedical Instrumentation

TEACHING SCHEME			
Teaching	15 weeks	45 Periods	45 Hrs
Internal Assessment	2 weeks	6 Periods	6 Hrs
Total Contact Periods:	17 weeks	51 Periods	51 Hrs

END SEMESTER EXAMINATION SCHEME							
Sl. No	Questions	Group	From Unit	To be Set	To be Answered	Allotted Marks	Total Marks
1. a. b. c.	**Objective Questions:** MCQ Fill in the blanks True/False		1 To 11	10 8 8	8 6 6	1 x 8 1 x 6 1 x 6	**20**
2. to 11	**Subjective Questions:** (May have Part Marking)	A	1, 2	2	**Any 5** at least Taking **one** From each Group	10 x 5	**50**
		B	3,4, 5	3			
		C	6, 7, 8	3			
		D	9, 10 , 11	2			
Grand Total							70

Unit	Topic	Contact Periods
	DETAIL SUBJECT CONTENT	
1	**Fundamentals of Electrical Engineering:** Concept of Power Supply System, **I**ntroduction to Single phase and three phase systems, Inter connections of three phase systems, Phase voltage, Line voltage, Phase current , Line current and their relation, Power transmitted by a three phase line , Active power, apparent power, Average Power, Star and delta connection and their conversion, Faraday's laws of electromagnetic induction, Lenz's law, idea of field and armature of rotating machines.	4
2	**Network Analysis:** Active and passive network – Balanced and unbalanced network – Symmetrical and asymmetrical network – T and Pie network and their conversion – Simple problems Characteristic impedance – Propagation constant and image impedance – Open and short circuit impedance and their relation to characteristic impedance, KCL, KVL, Voltage divider Rule, Current divider rule, Mesh analysis, Nod analysis, Thevenin's theorem – Norton's theorem – Maximum Power Transform theorem – Superposition theorem – Simple problems, Basic idea of Passive Filter, Attenuator, Equalizer, Transmission line	10
3	**DC Machines:** Construction & Classification of DC machine-EMF Equation of DC generator – Field applications of Shunt, Series & Compound wound generators- Principle of operation of d.c. motors, back e.m.f., voltage and current equation, speed and torque equations (no deduction), simple problems. Speed control: shunt motors – field control, armature resistance control, series motors – field control, armature resistance control.	5
4	**AC Machines:** Basic idea of 3 phase system-Essential parts, types and principle of operation. - Definitions and mathematical expressions (without deductions) of synchronous speed, actual rotor speed, slip and rotor current frequency – simple problems.- Alternators	5
5	**Transformer:** Basic principles, essential parts and types, E.M.F. equation (no deduction), transformation ratio, voltage ratio and current ratio – simple problems.Behavior of transformers under no-load and load conditions (explanations, without phasor diagrams)-Losses and efficiency.- Auto-transformer – principle, advantages, fields of application.	5
6	**PN Junction Diode :** Semiconductor physics- P & N type semiconductor- Construction of PN junction diode- Its characteristics & applications-Full wave & Half wave rectifier-Clipper & Clamper circuits	3
7	**Zener Diode :** Zener diode, Construction and operation of zener diode, Break down - zener break down and avalanche break down, Characteristics, Equivalent Circuit, Specification, Application, Voltage regulator,	2
8	**Introduction to BJT :** BJT- Construction, symbol and operation of NPN and PNP transistors, CE, CB, CC configuration and their differences, definitions of current gains and their relationship, V-I characteristics, transistor in active, saturation and cut-off.	3
9	**Introduction to FET:** Construction, operation and VI characteristics of JFET, pinch-off voltage, drain résistance, transconductance, amplification factor and their relationship , Enhancement and depletion type MOSFET- concepts of CMOS, Differences between BJT and JFET	3
10	**Special Semiconductor Devices:** Construction, operation and characteristics of UJT – Equivalent circuit – UJT as relaxation oscillator,Construction, operation and characteristics of SCR , SCS, DIAC, TRIAC and their uses	3
11	**Optoelectronics & Ics :** Elementary ideas of LED, LCD, photodiode, phototransistor and solar cell and their applications Basic idea of Ics – Classifications: linear and digital Ics, SSI, MSI, LSI and VLSI	2
	Total	45

	REFERENCE BOOKS		
Sl. No	Books	Author	Publisher
1	Electrical Technology	B L Theraja	S Chand
2	Basic Electronics	B L Theraja	S Chand
3	Basic Electrical Engineering	D P Kothari	

4	Principle of Electronics	V K Mehata	
5	Basic Electronics	S Chowdhury	Dhanpat Rai
6	Basic Electronics	D Chattopadhyay	Knowledge kit
7	Basic Electronics	Prof. D Dey Roy	

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6. COMPUTER PROGRAMMING IN C

Course: Diploma in Medical Laboratory Technology		**Credit: 3**	
Subject of Study: **Computer Programming in C**		Evaluation Scheme:	
Subject Code: MLT 306		Internal: TA: 10 + CT: 20	30
Subject Offered in : **DMLT, Part-II, 3rd Semester**			
Contact Periods: 3 L+ 1 TU / Week		ESE	70
Subject: **Theoretical**	Duration: **17 weeks**	Total Marks	100

AIM:
1. To provides the concept of programming & basic knowledge of computer programming language C
2. To have the students become competent in writing C programming
3. To apply the Programming knowledge in Biomedical Engineering field.

TEACHING SCHEME			
Teaching	15 weeks	60 Periods	60 Hrs
Internal Assessment	2 weeks	8 Periods	8 Hrs
Total Contact Periods:	17 weeks	68Periods	68 Hrs

END SEMESTER EXAMINATION SCHEME							
Sl. No	Questions	Group	From Unit	To be Set	To be Answered	Allotted Marks	Total Marks
1. a. b. c.	**Objective Questions:** MCQ Fill in the blanks True/False		1 To 11	10 8 8	8 6 6	1 x 8 1 x 6 1 x 6	**20**
2. to 11	**Subjective Questions:** (May have Part Marking)	A	1, 2,3, 4,5	6	**Any 5** at least Taking **two** From each Group	10 x 5	**50**
		B	6,7,8,9, 10, 11	4			
			Grand Total				70

DETAIL SUBJECT CONTENT		
Unit	Topic	Contact Periods
1	**Introduction to Computer Programming:** Concept of programming, Overview of different programming languages, Concept of Algorithm and flow chart, Language Translators, compiler,	2
2	**Fundamental of C Language: Back ground of C,** Steps of C Program Execution, Process of compiling and running a C program, Compiling and Linking, Basic structure of C program, Character set, Keywords, Identifier, Constant, Header file, Library functions,	4
3	**Data types & Variable:** Data types and their size, Variable, Declaration of variable, Operators, Expression, Operator precedence and associatively, Type Conversion	6

4	**Input/output Functions and statements:** scanf(), printf(), Formatted i/o function, Escape Sequences, Assignment statement, Writing user-friendly program, Character Input/output functions - getchar(), putchar(), getch(), putch(), getche(), gets(), puts(),clrscr(),	4
5	**Control Statements:** Decision making and branching : if, if-else, Nested if-else statements with example, goto and break statement, Switch-case statements with example, Loop control structure: Loop control statements, for Loop,Nested for along with Examples, while loop, do-while Loop with Example, Comparison of Loop control structures,	5
6	**Array:** Array, one-dimensional and their declaration, initialization and access values, two-dimensional array their declaration, initialization and access values, Programs using array.	5
7	**String:** String, String manipulation functions - strlen(), strcpy(), strcat(), strcmp(), Reading/writing strings,	5
8	**Pointer:** Concept of pointer, pointer declaration and initialization, accessing variables through pointer, pointer and array.	4
9	**User-defined Function:** Concept of User-defined function, Parameter passing techniques; Calling function , Called function, Recursive function, Scope and lifetime of variables in functions, difference between user-defined and library function, Function call: call by value and call by reference	4
10	**Structure and Union:** Concept of structure, structure members, structure variable, Declaration and Initialization of structure, Union, Declaration and initialization of union, difference between structure & union,	3
11	**Overview of File handling:** Concept of file handling in C, Different types of files, command line arguments, file handling functions,	3
	Total	45

REFERENCE BOOKS			
Sl. No	**Books**	**Author**	**Publisher**
1	Programming with C	T Joyprovoon	Vikash Publishing house
2	Programming in ANCI	Balaguruswami	Tata Mc
3	Let us C	Y. Kanetkar	
4	Programming with c	Byron Gottfried	

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7. HUMAN ANATOMY LAB.

Course: Diploma in Medical Laboratory Technology		**Credit: 2**	
Subject of Study: **Human Anatomy Lab.**		Evaluation Scheme:	
Subject Code: MLT P307		Internal:	25
Subject Offered in : **DMLT Part-II 3rd h Semester**			
Contact Periods: 3PR / Week		External Exam.	25
Subject: **Practical**	Duration: **17 weeks**	**Total Marks**	**50**
AIM:			

1. To provide overview of the human body structure
2. To identify the bones of the human skeleton
3. To identify the different joints
4. To identify the systemic anatomy and surface anatomy

EVALUATION SCHEME

Sl. No	Assessment/ examination	Distribution of Marks	Total Marks
1	**Internal Assessment:** * Continuous Internal Assessment is to be carried out by the teacher throughout the semester	Experiment : 10 Attendance: 5 Lab. Report: 5 Viva Voce: 5	25
2	**External Examination:** * External Examination shall be held at the end of the semester * Each Student have to perform one Expt. allotted by lottery basis	On spot Experiment: 10 On spot Report: 5 Viva-Voce: 10	25
	Total		50

Sl. No	List of Experiments/jobs
1	Determination of Anatomical Position & Plane
2	Determination of abdominopelvic regions & quadrants
3	Determination of body cavities
4	Identification of Human Skeleton
5	Identification of bones of human skull
6	Identification of bones of human vertebral column
7	Identification of bones of human thorax
8	Identification of bones of human pectoral girdle & upper limbs
9	Identification of bones of human pelvic girdle & lower limbs
10	Identification of different types of joints
11	Identification of different parts of the digestive system
12	Identification of different parts of the cardiovascular system
13	Identification of different parts of the pulmonary system
14	Identification of surface anatomy of Heart-Lungs
15	Identification of surface anatomy of Stomach-Liver-gall bladder-Intestine
16	Identification of surface anatomy of kidneys
17	Dissection of the digestive system of toad

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8. <u>HEMATOLOGY & BODY FLUIDS LAB.</u>

Course: Diploma in Medical Laboratory Technology Subject of Study: **Hematology & Body Fluids Lab.** Subject Code: MLT P308 Subject Offered in : **DMLT Part-II 3rd h Semester** Contact Periods: 4PR / Week Subject: **Practical** Duration: **17 weeks**	**Credit: 2**

Evaluation Scheme:	
Internal:	50
External Exam.	50
Total Marks	**100**

AIM:
   1.   To be familiar with the Hematology & sample collection foe different tests.
   2.   To perform different hematological tests
   3.   To be familiar with the different body fluids & its analysis
   4.   To be familiar with the MLT.

EVALUATION SCHEME

Sl. No	Assessment/ examination	Distribution of Marks	Total Marks
1	**Internal Assessment:**	Experiment : 20	50

		Attendance: 10	
	* Continuous Internal Assessment is to be carried out by the teacher throughout the semester	Lab. Report: 10	
		Viva Voce: 10	
2	**External Examination:** * External Examination shall be held at the end of the semester * Each Student have to perform one Expt. allotted by lottery basis	On spot Experiment: 20 On spot Report: 10 Viva-Voce: 20	50
	Total		100

Sl. No	List of Experiments/jobs
1	Collection of venous blood
2	Estimation of Hb
3	Estimation of ESR
4	Estimation of Total Count of RBC
5	Estimation of PCV, MCV, MCH, MCHC, Color index
6	Estimation of Total Count of WBC
7	Differential Count of WBC
8	Estimation of Total Count of Platelet
9	Determination of blood group (ABO) & Rh factor
10	Determination of BT, CT
11	Separation of cell & plasma
12	Determination of PT
13	Collection of Urine & Routine Examination
14	Collection of semen & analysis (Physical, Chemical & Microscopical Examination)
15	Demonstration of collection of CSF
16	CSF Analysis

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9. BASIC ELECTRICAL & ELECTRONICS LAB.

Course: Diploma in Medical Laboratory Technology		**Credit: 2**	
Subject of Study: **Basic Electrical & electronics Lab.**		Evaluation Scheme:	
Subject Code: MLT P309		Internal:	25
Subject Offered in : **DMLT Part-II 3^{rd h} Semester**			
Contact Periods: 3PR / Week		External Exam.	25
Subject: **Practical**	Duration: **17 weeks**	**Total Marks**	**50**

AIM:
1. To be familiar with the common assembly tools and basic Electronics instruments..
2. To be familiar with the Motor, Generator and Transformer
3. To identify the different active & passive components

	EVALUATION SCHEME		
Sl. No	**Assessment/ examination**	**Distribution of Marks**	**Total Marks**
1	**Internal Assessment:** * Continuous Internal Assessment is to be carried out by the teacher throughout the semester	Experiment : 10 Attendance: 5 Lab. Report: 5 Viva Voce: 5	25
2	**External Examination:** * External Examination shall be held at the end of the semester * Each Student have to perform one Expt. allotted by lottery basis	On spot Experiment: 10 On spot Report: 5 Viva-Voce: 10	25
	Total		50

Diploma in Medical Laboratory Technology **WBSCTE**

Sl. No	List of Experiments
1	Identification of common assembly tools
2	Identification & use of Multimeter
3	Identification & use of function generator & Oscilloscope
4	Study of construction details of D.C. machine.
5	Study of constructional details of single phase capacitor motor
6	Study of the constructional details of 3-phase induction motor.
7	Study of low power transformer
8	Design, wind and testing of low power transformer
9	Verification of KCL & KVL
10	Verification of Thevenin's and Norton's theorems.
11	Verification of Maximum Power Transfer theorem.
12	Identification & Specification of Resistor, Capacitor, Inductor, relay, Switch, batteries
13	Identification & Specification of diode, transistor, SCR, DIAC, TRIAC
14	Identification & Specification of LED, LCD, Photodiode, Phototransistors, Ic etc.
15	Study of V-I characteristic of P-N junction Diode
16	Study of Half-wave and full wave rectification
17	Study of Zener diode as a voltage regulator

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10. <u>COMPUTER PROGRAMMING IN C LAB.</u>

Course: Diploma in Medical Laboratory Technology Subject of Study: **Computer Programming in C Lab.** Subject Code: MLT P310 Subject Offered in : **DMLT Part-II 3^{rd h} Semester** Contact Periods: 2PR / Week Subject: **Practical** Duration: **17 weeks**	**Credit: 1**	
	Evaluation Scheme:	
	Internal:	25
	External Exam.	25
	Total Marks	**50**

AIM:
1. To be familiar with the computer programming.
2. To be familiar with keywords and identifiers
3. To built the ability to write and run the programme to solve a particular task.

	EVALUATION SCHEME		
Sl. No	**Assessment/ examination**	**Distribution of Marks**	**Total Marks**
1	**Internal Assessment:** * Continuous Internal Assessment is to be carried out by the teacher throughout the semester	Experiment : 10 Attendance: 5 Lab. Report: 5 Viva Voce: 5	25
2	**External Examination:** * External Examination shall be held at the end of the semester * Each Student have to perform one Expt. allotted by lottery basis	On spot Experiment: 10 On spot Report: 5 Viva-Voce: 10	25
	Total		50

Sl. No	List of Experiments/ jobs
1	Execution of a sample C program to study the basic structure of C program.
2	To be familiar with keywords and identifiers
3	To write program using Arithmetic, Relational, Logical and Assignment operators
4	To write program to implement increment & decrement operators and to find the greatest between two Numbers using conditional operator.
5	To evaluate an expression to study operator precedence and associativity and to write a program using casting a value.
6	To use formatted scanf( ) and printf( ) functions for different types of data.
7	To find the roots of a quadratic equation. Find the greatest of three numbers using IF –ELSE and IF -ELSE IF statements.
8	Write a program and run using for loop.
9	Write a program and run using while loop.
10	Write a program and run using do-while loop.
11	Write a program and run using single dimensional array.
12	Write a program and run using multi-dimensional array.
13	Write a program and run using Structure and Union
14	Write a program and run using pointer
15	Write a program and run using user-defined function.
16	Write a program and run using user-defined function, call-by value and Call by reference
17	Write a program and run to open, create, edit, close the file

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11. PROFESSIONAL PRACTICE-I

Course: Diploma in Medical Laboratory Technology Subject of Study: **Professional Practice-I** Subject Code: MLT P311 Subject Offered in : **DMLT Part-II 3^{rd h} Semester** Contact Periods: 1PR / Week Subject: **Practical** Duration: **17 weeks**	**Credit: 1**	
	Evaluation Scheme:	
	Internal:	25
	External Exam.	nil
	Total Marks	**25**

AIM:
1. To be familiar with the computer hardware and different application software
2. To be familiar with the Note preparation and slide preparation
3. To be familiar with e-mail, Net searching and down loading etc

	EVALUATION SCHEME		
Sl. No	Assessment/ examination	Distribution of Marks	Total Marks
1	**Internal Assessment:** * Continuous Internal Assessment is to be carried out by the teacher throughout the semester	Performance : 10 Attendance: 5 Lab. Report: 5 Viva Voce: 5	25
	Total		25

Sl. No	List of Experiments/ jobs
1	To be familiar with the working of office packages - Word documentation, MS-Excel, PPT.
2	Preparation of a note in MS-Word in the given topic
3	Preparation of a Sheet in MS-Excel in the given topic
4	Preparation of Presentation in MS-ppt in the given topic (Anatomy/physiology/ Biomedical related)
5	To be familiar with the creating email Id, e-mailing, searching and down loading
6	Seminar presentation on a topic (Anatomy/physiology/ Biomedical related)
7	Introduction to the working of Matlab, Pspice Software etc.

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