

WEST BENGAL STATE COUNCIL OF TECHNICAL EDUCATION

**Proposed Syllabus for the Diploma in
Medical Laboratory Technology**

Part - II

(4th Semester)

[Modification of curriculum structure & syllabus of part-II and part- III of Diploma in Engineering Course]

March' 2014

1. CLINICAL BIOCHEMISTRY & BIOPHYSICS

Course: Diploma in Medical Laboratory Technology Subject of Study: Clinical Biochemistry & Biophysics Subject Code: MLT 401 Subject Offered in : DMLT Part-II 4th Semester Contact Periods: 3 L + 1 TU / Week Subject: Theoretical	Credit: 3								
	Evaluation Scheme:								
	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 70%;">Internal:</td> <td style="text-align: center;">30</td> </tr> <tr> <td>TA: 10 + CT: 20</td> <td></td> </tr> <tr> <td>ESE</td> <td style="text-align: center;">70</td> </tr> <tr> <td>Total Marks</td> <td style="text-align: center;">100</td> </tr> </table>	Internal:	30	TA: 10 + CT: 20		ESE	70	Total Marks	100
Internal:	30								
TA: 10 + CT: 20									
ESE	70								
Total Marks	100								
Duration: 17 weeks									
AIM: <ol style="list-style-type: none"> 1. To understand the basic functions of the human body 2. To acquire the basic knowledge of the nutrients. 3. To know the blood chemistry and their estimation with their normal label in human body 4. To acquire the Medical Laboratory techniques 									

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

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

DETAIL SUBJECT CONTENT		
Unit	Topic	Contact Periods
1	Introduction to Biochemistry: Concept of Biochemistry, Chemical in the body – Organic compounds & inorganic compounds, Overview of body water and Salts, Ion transportation through cell membrane, Concept of blood pH, Knowledge of Nutrients - Carbohydrate, Proteins, Lipids, Minerals, Vitamins, Knowledge of Enzyme	12
2	Biochemical Process of the Body: Basic Physiology and biochemistry of the body, Interrelated metabolic process of the body, Brief introduction to Functions of Various Body Organs: Liver, Kidney, Heart, Pancreas, Endocrine gland, Lung, Brain, Biochemical changes in body under Pathologic conditions	5
3	Sample collection for Biochemical Estimation: Basic clinical biochemistry- chemistry profiles, Types of specimens, Units of Measure, Reference ranges, Collection of blood, Anticoagulants and preservatives for blood, Preparation of serum, Urine collection – timed urine specimen, urine preservatives, Collection of CSF, and knowledge of others fluids, Separation and Storage of Specimens, Care of handling in case of infected	6
4	Biochemical Estimation: OD, Basic Principle of Colorimetric, UV-Spectrophotometry Estimation & clinical significance of the Followings: Blood sugar (F/PP/R), True glucose, Glucose Tolerance Test, Total Plasma protein, Albumin, Globulin, Cholesterol, Triglyceride, Lipoproteins-LDL, VLDL, HDL, Blood Urea, Uric acid, Creatinine, Bilirubin , SGPT, SGOT, Alkaline Phosphate,	25

	Knowledge of LFT, Kidney Function Test, Lipid profile, Cardiac function test,	
5	Basic Biophysics: Acidity and alkalinity, pH, Effects of temperature on pH, definition of Buffer, Principles of buffer, determination of pH of buffer, Buffer Mixture, Buffer pair in blood, Buffer of tissue fluids and tissues, Role of Buffer in pH regulation, Bicarbonate buffer, Phosphate buffer, Protein buffer, Diffusion – definition, Experiment, characteristics, Fick’s law, Physiological role, Clinical aspects, Osmosis – definition, Experiment, Osmotic Pressure, Physiological important, Surface tension- definition, Explanation only, Viscosity – definition, Factors affecting viscosity, Colloids – definition and colloid terminology only, Concept of Dialysis,	12
TOTAL		60

REFERENCE BOOKS			
Sl. No	Books	Author	Publisher
1	Medical Laboratory technology (Vol. - III)	K L Mukherjee	Mc Graw Hill
2	Medical Laboratory technology	Sood	
3	Fundamentals of Biochemistry	A C Deb	New Central Book agency
4	Clinical Biochemistry	D M Vasudevan & Sreekumari S	Jaypee
5	Biochemistry	Debajyoti Das	Academic Publisher
6	Practical Pathology	P. Chakraborty & Gargi	New Central Book
7	Biophysics	Chakraborty	Central
8	Viva & Practical Biochemistry & Biophysics	Dr. R. N. Roy Dr. R. N. Roy	

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2. SEROLOGY & BIOPSY

Course: Diploma in Medical Laboratory Technology Subject of Study: Serology & Biopsy Subject Code: MLT 402 Subject Offered in : DMLT, Part-II, 4th Semester Contact Periods: 2 L / Week Subject: Theoretical	Credit: 2	
	Evaluation Scheme:	
	Internal:	30
	TA: 10 + CT: 20	70
Duration: 17 weeks	ESE	100
Total Marks		
AIM: <ol style="list-style-type: none"> 1. To understand the basic concept of Immunology, i.e. antigen & antibody 2. To acquire the basic knowledge of the different serological tests. 3. To acquire the basic knowledge of Biopsy. 4. To acquire the Medical Laboratory techniques. 		

TEACHING SCHEME			
Teaching	15 weeks	30 Periods	30 Hrs
Internal Assessment	2 weeks	4 Periods	4 Hrs
Total Contact Periods:	17 weeks	34 Periods	34 Hrs

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

DETAIL SUBJECT CONTENT		
Unit	Topic	Contact Periods
1	Introduction to Immunology : Introduction to serology, Immunity, Acquired immunity, active and passive immunity, Introduction to immunity system of the body, Immunization, Primary and secondary antibody response , Diseases involving immune system, Clinical significance of Serodiagnosis,	2
2	Principle of Serological Tests: Principle of Immunological tests, Recognition of Antigen-Antibody reaction, sensitivity and Specificity of test procedure, Reporting of Serological Tests – qualitative, Semi quantitative, titer, quantitative, Titer determination, Problems in serological Assays, Principles of Serodiagnostic test – Precipitation, Flocculation, Agglutination, Haemagglutination, Neutralization Reaction, complement fixation, EIA, MIA, fluorescent Antibody (FA) , RIA.	3
3	Laboratory Procedure in Serology: VDRL, Widal, Latex Agglutination, ASO, CRP, RA factor, HIV, Viral Hepatitis, HBsAg, Dipstick test for Malaria, hCG, T3, T4, TSH, ELISA, RIA	15
4	Overview of Biopsy: Biopsy, types of biopsy, Factors for selection of types of biopsy, Some common biopsy used in diagnosis, Different steps followed in biopsy specimen preparation – Fixation, Tissue processing, Blocking, Section cutting & fixing on slide, Staining with appropriate stain, Mounting, Observation, Different stain and their use, advantages and disadvantages, Overview of Microtome,	10

REFERENCE BOOKS			
Sl. No	Books	Author	Publisher
1	Medical Laboratory technology (Vol. - II)	K L Mukherjee	Mc Graw Hill
2	Medical Laboratory technology	Ramnik Sood	
3	Clinical Biochemistry	D M Vasudevan & Sreekumari S	Jaypee
4	Practical Pathology	P. Chakraborty & Gargi Chakraborty	New Central Book
5	Viva & Practical Biochemistry & Biophysics	Dr. R. N. Roy	Central
6	Hand book of Medical Lab. technology	V. H. talib	

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3. BIOMEDICAL INSTRUMENTATION – II

Course: Diploma in Medical Laboratory Technology Subject of Study: Biomedical Instrumentation-II Subject Code: MLT 403 Subject Offered in : MLT Part-II 4th Semester Contact Periods: 4 L / Week Subject: Theoretical	Credit: 4 Evaluation Scheme: Internal: 30 TA: 10 + CT: 20 ESE 70 Total Marks 100
AIM: <ol style="list-style-type: none"> 1. To acquire the basic knowledge of the different analytical & diagnostic equipment used in medical field. 2. To know the basic principle and basic block -diagram of the medical instruments. 3. To know the application and specification. 	

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

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

DETAIL SUBJECT CONTENT		
Unit	Topic	Contact Periods
1	Analytical Equipments: Different types of sterilization, Autoclave, Binocular – functional parts, Centrifuge machine – working principle, parts, application, Specification, Colorimeter- principle, Beer-Lambert’s Law, Different functional parts, application, Specification, UV Spectrophotometer – Principle of measurement, application, Specification, pH meter – pH electrodes, Bio-chemical analyzer- Semi-analyzer, Auto analyzer, Electrolytes analyzer	25
2	Diagnostic Equipments: Sphygmomanometer, Stethoscope, BP measuring principle based on Korotkoff sound, Semi automated BP Instrument, Automated BP Instrument, ECG machine-ECG electrodes, Leads, Basic functional block diagram of ECG, ECG amplifier, filter, recorder, Specification of ECG machine, EEG machine – electrodes , Basic functional block diagram of EEG, Application, EMG machine, Spirometer, Blood cell Counter, Blood gas analyzer – pH, p CO ₂ , pO ₂ measurement, Overview of blood flow meter,	35
Total		60

REFERENCE BOOKS			
Sl. No	Books	Author	Publisher
1	A hand book of analytical Instrumentation	R. S. Khandpur	Tata Mc
2	Biomedical Instrumentation	R. S. Khandpur	
3	Biomedical Instrumentation	Cromwell	
4	A text book of Medical Instrument	S. Ananthi	
5	Medical Instrument	Webstar	

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4. MEDICAL TECHNIQUES

Course: Diploma in Medical Laboratory Technology		Credit: 2	
Subject of Study: Medical Techniques		Evaluation Scheme:	
Subject Code: MLT 404		Internal:	30
Subject Offered in : MLT Part-II 4th Semester		TA: 10 + CT: 20	
Contact Periods: 2 L / Week		ESE	70
Subject: Theoretical		Total Marks	100
weeks		Duration: 17	
AIM:			
<ol style="list-style-type: none"> To introduce the different medical techniques. To know the different diagnostic procedure and patient preparations. To be familiar with use of the medical instruments. To know the application of different medical instruments. 			

TEACHING SCHEME			
Teaching	15 weeks	30Periods	30 Hrs
Internal Assessment	2 weeks	4 Periods	4Hrs
Total Contact Periods:	17 weeks	34Periods	34Hrs

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

DETAIL SUBJECT CONTENT		
Unit	Topic	Contact Periods
1	Body temperature , Heart sound and Blood pressure Measurement: Normal Body temperature, Body temperature measurement site, using clinical thermometer, Electronic thermometer, BP, different BP, Indirect methods of BP measurement techniques – Auscultatory, Oscillatory, Palpatory method, Normal range , Hypertension and hypotension, Different heart sound their auscultation and measurement.	4

2	ECG Technique: ECG, Conduction system of the heart, ECG waves and their clinical significance, Leads, Einthoven Law, Einthoven Triangle, ECG paper, Patient preparation, ECG procedure, Measurements, Cardiac vector, Reporting	8
3	EEG Technique: Source, Different brain waves, Electrode system, different modes, Montage, Patient preparation, Procedure, Measurement, Clinical interpretation, Application, Different sleep pattern,	8
4	EMG & ERG Technique: Background of EMG, Recording, Physiology of ERG, ERG recording,	2
5	PFT : Back ground of PFT, Different Lungs volumes & capacities, Recording,	2
6	Laboratory techniques: UV-Spectrophotometry, ELISA Techniques, Electrophoresis, Chromatography,	6
Total		30

REFERENCE BOOKS			
Sl. No	Books	Author	Publisher
1	A hand book of analytical Instrumentation	R. S. Khandpur	Tata Mc
2	Biomedical Instrumentation	R. S. Khandpur	
3	Biomedical Instrumentation	Cromwell	
4	A text book of Medical Instrument	S. Ananthi	
5	Viva & practical Physiology, Biochemistry & biophysics	R N Roy	
6	Human Anatomy & Physiology	E. Merieb	
7	Principle hints to clinical Electrocardiography	C R Maiti & N Goswami	

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5. ANALOG ELECTRONICS

Course: Diploma in Medical Laboratory Technology		Credit: 3	
Subject of Study: Analog Electronics		Evaluation Scheme:	
Subject Code: MLT 405		Internal:	30
Subject Offered in : MLT Part-II 4th Semester		TA: 10 + CT: 20	
Contact Periods: 3 L / Week		ESE	70
Subject: Theoretical		Total Marks	100
Duration: 17 weeks			
AIM:			
<ol style="list-style-type: none"> 1. To acquire the basic knowledge of transistor biasing & stabilization, 2. To know the different application of BJT. 3. To be familiar with OPAMP and its applications. 4. To acquire the basic knowledge of timer circuit. 5. To be familiar with voltage regulator and power supply. 			

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

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

Total	70
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DETAIL SUBJECT CONTENT		
Unit	Topic	Cont. Periods
1	Transistor Biasing & Amplifier Circuits: Biasing, need for bias stabilization, Selection of operating point, Biasing methods (emitter to base bias, fixed bias, collector to base bias, self bias), dc load line. Stability & bias compensation: only concepts Thermal run away & its prevention, heat sinks. Multistage amplifiers- cascading of amplifiers (RC coupled CE configuration only), their gain, frequency response, input & output impedance, gain-bandwidth characteristics, distortion in amplifier: basic concepts & no deduction. Power amplifier: Class A, B, AB & C operation (only basic concepts, & graph). Tuned Amplifier,	12
2	Feedback network & Oscillators: Feedback principle- positive & negative feedback concepts, amplifier without & with feedback, effect of negative feedback in amplifier gain, noise, distortion, input & output resistance. Oscillator: Classification of oscillators, principle of oscillation, damped & un-damped oscillation, use of positive feedback, Barkhausen criterion for oscillation. Different oscillator circuits: L-C tuned collector oscillator, R-C phase shift oscillator, Wien bridge oscillator, Hartley oscillator: only ckt. & relevant equations.	12
3	Differential amplifier: Basic principle, common mode rejection ratio in differential amplifier, operation with differential input, operation with common mode signal, single ended & double ended differential amplifier. Constant current replacement for emitter resistance, dc level shifter, complementary output stage.	3
4	Operational amplifier circuit: Op-amp configurations (building blocks), op-amp parameters, characteristics of an ideal op-amp. Application of op-amp as – inverting amplifier, non-inverting amplifier, adder, subtractor, differentiator, integrator, unity gain buffer, comparator, sample & hold circuit, Logarithmic Amplifier, Schmitt trigger, instrumentation amplifier, IC 741 / OP 07 pin diagram. Active Filters: High pass, Low pass, Band pass & Band reject filters- only circuit description & operation (no deduction)	8
5	Timer Circuits : Principle of operation of electronic timer - Functional description of internal blocks of timer IC555 - Use of 555 timers in monostable and astable mode - Principle of operation of digital timer	4
6	Voltage Regulator & Power Supply: Transistorised Voltage Regulator – Function of bleeder resistor-Series and shunt regulator using transistor-OP-Amp Regulator-IC Voltage Regulators- Three terminal IC voltage Regulator- Concept of switch mode power supply- Block schematic description of uninterrupted power supply.	6
Total		45

REFERENCE BOOKS			
Sl. No	Books	Author	Publisher
1	Electronic Principles	Malvino	Tata McGraw-Hill
2	Electronic Devices and Circuits	Boylestad & Nashalsky	Prentice Hall of
3	Electronic Devices and Circuits	S. Salivanan	India,N.Delhi
4	Electronic Devices and Circuits	Millman & Halkias	Tata McGraw-Hill
5	Electronic Devices and Circuits	J.B. Gupta	Tata McGraw-Hill
6	Electronic Fundamentals and Applications	Chattopadhyay & Rakhshit	S.K. Kataria & Sons
7	Linear IC and OPAMP	R Gyakawad	New Age International

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6. CLINICAL BIOCHEMISTRY & BIOPHYSICS LAB.

Course: Diploma in Medical Laboratory Technology Subject of Study: Clinical Biochemistry & Biophysics Lab. Subject Code: MLT P406 Subject Offered in : DMLT Part-II 4th Semester Contact Periods: 3PR / Week Subject: Practical Duration: 17 weeks	Credit: 2 Evaluation Scheme: <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">Internal:</td> <td style="width: 50%; text-align: center;">50</td> </tr> <tr> <td>External Exam.</td> <td style="text-align: center;">50</td> </tr> <tr> <td>Total Marks</td> <td style="text-align: center;">100</td> </tr> </table>	Internal:	50	External Exam.	50	Total Marks	100
Internal:	50						
External Exam.	50						
Total Marks	100						
AIM: <ol style="list-style-type: none"> 1. To acquire the basic knowledge of Biochemical tests. 2. To know the blood chemistry and their estimation with their normal label in human body 3. To acquire the basic knowledge & perform the Experiments of Biophysics. 4. To acquire the Medical Laboratory techniques 							

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 : 20 Attendance: 10 Lab. Report: 10 Viva Voce: 10	50
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

DETAIL SUBJECT CONTENT	
Sl. No	List of Experiments/ Jobs
1	Collection of venous blood & serum preparation
2	Estimation of Blood sugar.
3	Estimation of Blood Cholesterol
4	Estimation of Blood Urea
5	Estimation of Blood Uric acid
6	Estimation of Blood creatinine
7	Estimation of Bilirubin (Total, Conjugated, Unconjugated)
8	Estimation of SGPT
9	Estimation of SGOT
10	Estimation of Alkaline Phosphate
11	Estimation of Triglyceride
12	Estimation of Plasma protein
13	Estimation of Albumin, Globulin
14	Estimation of Electrolytes (Na ⁺ , K ⁺ , Cl ⁻ ,)
15	Identification of urinary sugar
16	Estimation of urinary bile salt & bile pigment
17	Experiment of Diffusion
18	Experiment of Osmosis
19	Measurement of Viscosity
20	Measurement of pH

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7. SEROLOGY & BIOPSY LAB.

Course: Diploma in Medical Laboratory Technology Subject of Study: Serology & Biopsy Lab. Subject Code: MLT P407 Subject Offered in : DMLT Part-II 4th Semester Contact Periods: 2PR / Week Subject: Practical	Credit: 1 Evaluation Scheme: <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">Internal:</td> <td style="width: 50%; text-align: center;">25</td> </tr> <tr> <td>External Exam.</td> <td style="text-align: center;">25</td> </tr> <tr> <td>Total Marks</td> <td style="text-align: center;">50</td> </tr> </table>	Internal:	25	External Exam.	25	Total Marks	50
Internal:	25						
External Exam.	25						
Total Marks	50						
AIM: <ol style="list-style-type: none"> 1. To acquire the basic knowledge of the Serological tests 2. To practice of Serological tests. 3. To acquire the basic knowledge of biopsy. 4. To acquire the Medical Laboratory techniques. 							

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

DETAIL SUBJECT CONTENT	
Sl. No	List of Experiments/ Jobs
1	VDRL test
2	Widal test
3	ASO
4	CRP
5	RA factor
6	HIV
7	Viral Hepatitis C
8	HBsAg
9	Dipstick test for Malaria
10	hCG
11	Estimation of T3/ T4/TSH
12	Demonstration of different biopsy specimen
13	Demonstration of different biopsy specimen preparation
14	Demonstration of Microtome and their use.
15	Demonstration of Straining of biopsy specimen
16	Demonstration of observation of biopsy specimen

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8. BIOMEDICAL INSTRUMENTATION-II LAB.

Course: Diploma in Medical Laboratory Technology Subject of Study: Biomedical Instrumentation Lab. Subject Code: MLT P408 Subject Offered in : DMLT Part-II 4th Semester Contact Periods: 3PR / Week Subject: Practical Duration: 17 weeks	Credit: 2 Evaluation Scheme: <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">Internal:</td> <td style="width: 50%; text-align: center;">50</td> </tr> <tr> <td>External Exam.</td> <td style="text-align: center;">50</td> </tr> <tr> <td>Total Marks</td> <td style="text-align: center;">100</td> </tr> </table>	Internal:	50	External Exam.	50	Total Marks	100
Internal:	50						
External Exam.	50						
Total Marks	100						
AIM: <ol style="list-style-type: none"> 1. To study the working principle of different transducers/ sensors 2. To identify the parts of the different analytical and diagnostic equipment. 3. To acquire the basic knowledge of different biomedical instruments. 							

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 : 20 Attendance: 10 Lab. Report: 10 Viva Voce: 10	50
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

DETAIL SUBJECT CONTENT	
Sl. No	List of Experiments/ Jobs
1	Study of temperature transducer/sensor (thermister, P-N junction etc)
2	Study of displacement transducer (Potentiometric, Capacitive, LVDT etc)
3	Study of pressure transducer/sensor
4	Study of piezo-electric transducer/sensor
5	Study of different parts colorimeter
6	Study of different parts of UV spectrophotometer
7	Study of different parts of Semianalyzer / Autoanalyzer
8	Study of different parts of Electrolyte analyzer
9	Study of different parts of Blood gas analyzer
10	Study of different parts of O ₂ Sensor
11	Study of different parts of Blood cell counter
12	Study of different parts of ECG machine
13	Study of different parts of EEG machine
14	Study of different parts of Autoclave

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9. MEDICAL TECHNIQUES LAB.

Course: Diploma in Medical Laboratory Technology Subject of Study: Medical Techniques Lab. Subject Code: MLT P409 Subject Offered in : DMLT Part-II 4th Semester Contact Periods: 3PR / Week Subject: Practical Duration: 17 weeks	Credit: 2 Evaluation Scheme: <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">Internal:</td> <td style="width: 50%; text-align: center;">25</td> </tr> <tr> <td>External Exam.</td> <td style="text-align: center;">25</td> </tr> <tr> <td>Total Marks</td> <td style="text-align: center;">50</td> </tr> </table>	Internal:	25	External Exam.	25	Total Marks	50
Internal:	25						
External Exam.	25						
Total Marks	50						
AIM: <ol style="list-style-type: none"> 1. To be familiar with the medical techniques. 2. To acquire the basic knowledge of different medical techniques. 3. To measure the physiological parameters 4. To make practice of Medical techniques 							

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

DETAIL SUBJECT CONTENT	
Sl. No	List of Experiments/ Jobs
1	Body temperature Measurement
2	Blood Pressure Measurement
3	Auscultation of Heart Sound
4	Recording of Heart Sound
5	Recording of ECG
6	Recording of EEG
7	Recording of EMG
8	PFT
9	UV Spectrophotometry
10	Serum Electrophoresis
11	Chromatography

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10. ANALOG ELECTRONICS LAB.

Course: Diploma in Medical Laboratory Technology Subject of Study: Analog Electronics Lab. Subject Code: MLT P410 Subject Offered in : DMLT Part-II 4th Semester	Credit: 2 Evaluation Scheme: <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">Internal:</td> <td style="width: 50%; text-align: center;">25</td> </tr> </table>	Internal:	25
Internal:	25		

Contact Periods: 3PR / Week	External Exam.	25
Subject: Practical	Duration: 17 weeks	Total Marks
		50
AIM:		
<ol style="list-style-type: none"> To be familiar with the Transistor biasing and Amplifier Design of amplifier circuit To acquire the basic knowledge of Oscillator To be familiar with the OPAMP IC and its Application To be familiar with the IC 555 		

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

DETAIL SUBJECT CONTENT	
Sl. No	List of Experiments/ Jobs
1	Study of input & output characteristics of BJT.
2	Study of different biasing methods and draw the dc load line, determine the Q point
3	Study of frequency response of R-C coupled amplifier
4	Study of Wien bridge oscillator
5	Study of R-C phase shift oscillator.
6	Study of parameters of practical op-amp.
7	Use of op-amp as – Non-inverting amplifier, Inverting amplifier, Buffer, Adder, Differentiator, Integrator
8	Study of Triangular wave generator using Op-Amp
9	study of Schmitt Trigger Circuit using Op-Amp
10	Study of active filters:- a) High pass b) Low pass c) Band pass d) Band reject
11	Study of Instrumentation amplifier using Op-Amp
12	study the characteristics of IC555 timer connected as: (a) astable multi-vibrator; (b) constable multi-vibrator
13	Study of IC operated voltage regulator

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11. DEVELOPMENT OF LIFE SKILL-II

Course: Diploma in Medical Laboratory Technology Subject of Study: Development of life Skill-II. Subject Code: MLT P411 Subject Offered in : DMLT Part-II 4th Semester Contact Periods: 2PR / Week Subject: Practical	Credit: 1	
	Evaluation Scheme:	
	Internal:	25
	External Exam.	25
Duration: 17 weeks	Total Marks	50
AIM:		
<ol style="list-style-type: none"> Develop the status of mind to work as a team Apply problem solving skills for a given situation. Use effective presentation techniques. 		

<ol style="list-style-type: none"> 4. Apply techniques for effective time management. 5. Apply task management techniques for given project. 6. Enhance leadership traits. 7. Resolve conflict by appropriate method 8. Face interview without fear. 9. Follow moral and ethics. 10. Convince people to avoid frustration
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Pre-requisite:
<ol style="list-style-type: none"> 1. Team work and presentation skill 2. Positive attitude and thirst of learning

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
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	Performance: 10 On spot Report: 5 Viva-Voce: 10	25
Total			50

DETAIL SUBJECT CONTENT	
Sl. No	List of Experiments/ Jobs
1	Social Skill: Societies, Social Structure, Develop Sympathy and Empathy
2	SWOT Analysis: Concept, How to make use of SWOT
3	Interpersonal Relation: 3.1 Source of conflict, Resolution of conflict 3.2 Ways to enhance interpersonal relation
4	Problem Solving: 4.1 Steps in Problem Solving 4.1.1 Identify and clarify the problem 4.1.2 Information gathering related to problem 4.1.3 Evaluate the evidence 4.1.4 Consider alternative solutions and their implications 4.1.5 Choose and implement the best alternatives 4.1.6 Review 4.2 Problem solving techniques 4.2.1 Trial and error 4.2.2 Brain Storming 4.2.3 Lateral Thinking
5	Presentation Skills: 5.1 Body language 5.2 Dress 5.3 Posture, Gesture, Eye contact and facial expression 5.4 Voice and language- Volume, Pitch, Inflection, Speed, Pause, Pronunciation, Articulation, Language, Practice of speech 5.5 Use of Aids- OHP, LCD projector, white board
6	Group Discussion & Interview Techniques: 6.1 Group Discussion 6.1.1 Introduction to group discussion 6.1.2 Ways to carry out group discussion 6.1.3 Parameters- Contact, body language, analytical and logical thinking, decision making

7	<p>6.2 Interview Techniques</p> <p>6.2.1 Appearance at interview board</p> <p>6.2.2 Tips for handling common questions</p> <p>Working in Teams:</p> <p>7.1 Understanding the utility to work as a team</p> <p>7.2 Tips to work effectively in team</p> <p>7.3 Establish good rapport</p> <p>7.4 Interest toward others and work effectively with them to meet common objectives</p> <p>7.5 Tips to provide and accept feedback in a constructive and considerate way</p> <p>7.6 Leadership in team</p> <p>7.7 Handling frustration in team</p>
8	<p>Task management:</p> <p>8.1 Introduction</p> <p>8.2 Task identification</p> <p>8.3 Task planning, Organizing and Execution</p> <p>8.4 Closing the task</p>
9	<p>Student may perform the following task as practical / hands on practice:</p> <p>1. SWOT Analysis- - Analysis yourself with respect to your strength and weakness, opportunities and threats. Following points may be useful for doing SWOT-</p> <p>1.1 Past experience</p> <p>1.2 Achievements</p> <p>1.3 Failures</p> <p>1.4 Feedback from others</p> <p>2. Undergo a test on reading skill/ memory skill administered by the teacher</p> <p>3. Solve the puzzles</p> <p>4. Group wise social activity like Tree Plantation, Blood donation, environment protection, distribution of cloths to poor, awareness camp like cleanliness in slump area etc.</p> <p>5. Deliver seminar on given topic.</p> <p>6. Watch/ listen an informative session on social activities. Make report on topic of your interest using audio / visual aids. Make a report on the programme</p> <p>7. Conduct an interview of a personality and write a report on it</p> <p>8. Discuss a topic in a group and prepare minutes of discussion. Write through description of the topic discussed.</p> <p>9. Arrange an exhibition, displaying flow-charts, posters, paper cutting, photographs etc on the topic given by teacher</p> <p>Note: please note that these are the suggested assignments on the given contents/ topics. These assignments are the guide lines to the subject teachers. However the subject teachers are free to design any assignment relevant to the topic.</p>

REFERENCE BOOKS			
Sl. No	Books	Author	Publisher
1	Adams Time Management	Marshal Cooks	Viva Books
2	Basic Management Skills for All	E.H. Mc Grath, S.J.	PHI
3	Body Language	Allen Pease	Sudha Publications Pvt Ltd
4	Creativity and Problem Solving	Lowe and Phil	Kogan Page (I) Pvt Ltd
5	Decision making & Problem Solving	Adair, J	Orient Longman
6	Develop your Assertiveness	Bishop, Sue	Kogan Page (I) Pvt Ltd
7	Make Every Minute Count	Marion E Haynes	Kogan Page (I) Pvt Ltd
8	Organizational Behaviour	Steven L mcShane and Mary Ann Glinow	Tata McGraw Hill
9	Organizational Behaviour	Stephen P. Robbins	PHI
10	Presentation Skill	Micheal Hatton	ISTE N Delhi
11	Stress Management Through Yoga and		Sterling Publisher Pvt Ltd

12	meditation	Richard Hale, Peter Whilom Chakravarty, Ajanta Harding ham, A	Kogan Page (I) Pvt Ltd Rupa & Company Orient Longman
13	Target Setting and goal Achievement		
14	Time Management Working in Team		

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12. PROFESSIONAL PRACTICE-II

Course: Diploma in Medical Laboratory Technology		Credit: 1	
Subject of Study: Professional Practice-II.		Evaluation Scheme:	
Subject Code: MLT P412		Internal:	25
Subject Offered in : DMLT Part-II 4th Semester		External Exam.	nil
Contact Periods: 1PR / Week		Total Marks 25	
Subject: Practical		Duration: 17 weeks	
AIM:			
<ol style="list-style-type: none"> 1. Develop the Soft skill 2. Application of different software in biomedical Engineering. 3. Design of Electronic circuit using software. 4. PCV design using software. 			

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

DETAIL SUBJECT CONTENT	
Sl. No	List of Experiments/ Jobs
1	Installation & Application of different diagnostic software
2	Verification of medical prescription for the diagnostic test.
3	Simulation of different Electronic circuit using Spice software
4	Familiar with the use of Matlab software
5	Installation & Application of data acquisition software
6	Design of PCV using Software
7	Introduction to outsourcing

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NOTE THE FOLLOWING REQUIREMENTS:

1. During this semester Minimum one guest lecture by industry / medical personnel
2. Minimum one Hospital/ Industrial visit
3. Minimum one Hospital/ Industrial Training on hardware/ soft ware used in medical field.

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