

SYLLABUS

DIPLOMA IN MEDICAL LABORATORY TECHNOLOGY

Conducted by

**PREMLILA VITHALDAS POLYTECHNIC
S.N.D.T. Women's University
Santacruz (W)
Mumbai-400 049**

Revision 3

April 9, 2012

SYLLABUS FORMAT

DIPLOMA IN MEDICAL LABORATORY TECHNOLOGY

SCHEME: SEMESTER I

Paper Code	Subject	L	P/T	D	TP	TW	P/V	T	Credits
1001	General Chemistry	4	*P-6	2	50	50+50	50	200	6
1002	Physics	3	P-2	2	50	50+50	50	200	4
1003	Anatomy-Physiology	3	P-2	2	50	50+50	50	200	4
1004	Biology	3	P-2	2	50	50+50	50	200	4
1005	SLC	2	-	2	50	50	-	100	2
Total		15	12					900	20

* PRACTICAL IS OF THREE HOURS

SCHEME: SEMESTER II

Paper Code	Subject	L	P/T	D	TP	TW	P/V	T	Credits
2001	Organic Chemistry	4	P-4	2	50	50+50	50	200	6
2002	Physics	3	P-2	2	50	50+50	50	200	4
2003	Anatomy-Physiology	3	P-2	2	50	50+50	50	200	4
2004	Biology	3	P-2	2	50	50+50	50	200	4
2005	SLC	2	-	2	50	50	-	100	2
2006	Personality Development	2	-	2	50	50	-	100	2
Total		15	10					1000	22

SCHEME: SEMESTER III

Paper Code	Subject	L	P/T	D	TP	TW	P/V	T	Credits
3001	Biochemistry	2	P-2	2	50	50+50	50	200	3
3002	Microbiology	3	P-4	2	50	50+50	50	200	5
3003	Haematology	2	P-4	2	50	50+50	50	200	4
3004	SLC	2	--	2	50	50	-	100	2
3005	Computer Applications	--	P-4	2	-	50	50	100	2
3006	Book Keeping	2	---	2	50	50	-	100	2
3007	Environmental Sciences	2	-	2	50	50	-	100	2
--	#Phlebotomy	-	P-4	-	-	-	-	-	-
Total		13	18					1000	20

It will be offered as an audit course.

SCHEME: SEMESTER IV (UNIVERSITY EXAMINATION)

Paper Code	Subject	L	P/T	D	TP	TW	P/V	T	Credits
4001	Biochemistry	3	P-6	2	50	50+50	50	200	6
4002	Microbiology	3	P-6	2	50	50+50	50	200	6
4003	Haematology	2	P-4	2	50	50+50	50	200	4
4004	Clinical Pathology	2	P-4	2	50	50+50	50	200	4
4005	SLC	2	-	2	50	50	-	100	2
--	#Phlebotomy	-	P-4	-	-	-	-	-	-
Total		12	24					900	22

It will be offered as an audit course.

SCHEME: SEMESTER V (UNIVERSITY EXAMINATION)

Paper Code	Subject	L	P/T	D	TP	TW	P/V	T	Credits
5001	Biochemistry	3	P-4	2	50	50+50	50	200	5
5002	Microbiology	3	P-6	2	50	50+50	50	200	6
5003	Haematology	2	P-2	2	50	50+50	50	200	3
5004	Clinical Pathology	2	P-4	2	50	50+50	50	200	4
5005	Histopathology	2	P-4	2	50	50+50	50	200	4
5006	Automated Instrumentation	--	P-2	-	-	50	-	50	1
Total		12	20					1050	23

SCHEME: SEMESTER VI- INTERNSHIP CREDITS :20

The students are rotated in following sections for three and half weeks in the laboratories of hospitals.

No.	Subject	Credits	Marks
1	Biochemistry	3	100
2	Microbiology & Serology	5	100
3	Hematology & Blood Banking	6	100
4	Clinical pathology	3	100
5	Histopathology & Cytology	3	100
		20	500

Key: L = Lectures/Week, T= Tutorial, P= Practical/s, TW = Term Work (Internal Assessment), TP= Term Paper (Semester Examination), D = Duration of Term Paper, Cr= Credits

SCHEME: SEMESTER I

Paper Code	Subject	L	P/T	D	TP	TW	P/V	T	Credits
1001	General Chemistry	4	*P-6	2	50	50+50	50	200	6
1002	Physics	3	P-2	2	50	50+50	50	200	4
1003	Anatomy-Physiology	3	P-2	2	50	50+50	50	200	4
1004	Biology	3	P-2	2	50	50+50	50	200	4
1005	SLC	2	-	2	50	50	-	100	2
Total		15	12					900	20

* PRACTICAL IS OF THREE HOURS

Semester – I
General Chemistry (Theory)
Credits: 4 (4 Hrs./ Week)

Sr.No.	Topic	Sub-topics	No. of Hrs.	Weightage of Marks(%)
1	Structure of Atom	Subatomic particles, At no., At mass no., At mass, Electronic theory of valency, Electrovalency, simple covalency, co-ordinate covalency, Electronic configuration and its pictorial representation.	6	9
2	Chemical Periodicity	Periodic law, Periodic Table, Inert gases, Normal elements, Transition elements, Periodic properties, Characteristics of s, p, d & f block elements.	7	9
3	Radioactivity	Isotopes & Isobars, Nuclear Stability, Radioactivity and properties of radiations, Radioactive series, Half life period, Nuclear fission, Nuclear fusion, Atomic transmutation and artificial radioactivity, Radioactive isotopes – preparation and uses.	8	12
4	Chemical Bonding and Molecular Shape	Orbital develop in bond formation, Sigma and Pi bonds, Hydrogen bond, Co-ordination and Complexation, Chelation.	3	8
5	Ionic Equilibrium	Arrhenius theory of electrolytic dissociation, degree of dissociation and factors affecting it, Solubility product, Common-ion effect.	4	8
6	Acids and Bases	Definitions, properties & Equivalent weights of acids and bases, Neutralization, Titration, Normality, Molarity, Preparation of Standard solutions, pH-	7	9

		Definition, Calculation and significance, Buffer solutions.		
7	Chemical Kinetics	Law of mass action, Chemical equilibrium, Equilibrium constant, Le Chatelier's principle, Factors affecting chemical equilibrium and rates of the reactions, working of acid-base indicators, Order and Molecularity of the reaction, 1 st , 2 nd and Zero order reactions, Pseudomonomolecular reactions.	4	9
8	Oxidation and Reduction	Electronic concept of Oxidation & Reduction, Half cell & Half cell potential, Standard Half cell, Std. Hydrogen electrode, E.M.F. of a half and of a complete cell and its calculation, Redox titrations.	5	9
9	Electrochemistry	Conductors, Electrolytes, Electrolysis, Specific electrolysis mechanisms, Faraday's laws of electrolysis, specific, Molar & Equivalent conductances.	5	9
10	States of matter	Definition & composition of matter, Intermolecular space and Intermolecular Force, Various states of matter – distinction, Solids – Allotropy & sublimation, Liquids – surface tension and viscosity, Gases – Kinetic theory of gases and Critical temperature, Critical pressure and Critical volume.	6	9
11	Adsorption and Colloids	Adsorption – Definition, Characteristic features and applications, Distinction between true solution colloid, Preparation, properties and applications of colloids.	5	9

		TOTAL	60	100
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Semester – I
General Chemistry (Practical)
Credits: 2 (6 Hrs. / Week)

Sr. No.	Topic	No. of Hrs.
1	Use of valency in writing Molecular Formulae of compounds.	3
2	Study of Bunsen Burner, Parts & Flames of the burner	3
3	Qualitative Analysis of the water soluble and insoluble salts containing Pb^{2+} , Cu^{2+} , Cd^{2+} , Sn^{2+} , Bi^{3+} , Al^{3+} , Cr^{3+} , Fe^{2+} , Fe^{3+} , Ni^{2+} , Co^{2+} , Zn^{2+} , Mn^{2+} , Ba^{2+} , Ca^{2+} , NH_4^{1+} , K^{1+} , Na^{1+} , Cl^{1-} , I^{1-} , NO_3^{1-} , SO_4^{2-} , CO_3^{2-} , S^{2-} , PO_4^{3-}	60
4	Volumetric Analysis Preparation & Standardization of 0.1 N (approx) HCl solution with std. 0.1 N Na_2CO_3 solution.	3
5	Preparation & Standardization of 0.1N (approx) NaOH solution with std. 0.1N Succinic acid solution, Preparation & Standardization of 0.1N (approx) H_2SO_4 solution with Std. NaOH solution.	6
6	Preparation & Standardization of 0.1N KMnO_4 solution (approx) with std. 0.1N $\text{Na}_2\text{C}_2\text{O}_4$ solution Preparation & Standardization of 0.1N (approx) $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$ solution with Std. KMnO_4 solution.	6
7	Preparation & standardization of 0.1N (approx) $\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$ solution with std 0.1N $\text{K}_2\text{Cr}_2\text{O}_7$ solution.	3
8	Purification Techniques Sublimation, Crystallization, Distillation.	6
	TOTAL	90 Hrs. (30 Practicals)

Semester – I
Physics (Theory)
Credits: 3 (3 Hrs / Week)

Sr. No.	Topic	No.of Hrs.	Weightage of Marks(%)
1	Units and dimensions	7	16
2	Graph	2	6
3	Rate of variation	5	12
4	Viscosity	5	12
5	Concept of pressure	4	8
6	Work, Power & Energy	4	8
7	Rotational motion	4	8
8	Vibration of bodies	3	6
9	Surface tension	4	8
10	Temperature and its measurement	3	6
11	Heat	4	10
	TOTAL	45	100

Semester – I
Physics (Practical)
Credits: 1 (1 Practical 2 hrs./Week)

Sr. No.	Topic	No.of Hrs.
1	To study the use of Vernier caliper.	4
2	To study the use of screw gauge	2
3	To study the use of Analytical balance.	4
4	To study the use of traveling microscope	2
5	To verify the Boyle's law – using the U-tube manometer	4
6	To study the use of thermometer.	4
7	To determine the specific heat of the solid by the method of mixture.	4
8	To study the use of instruments- magnetic stirrer, centrifuge, Balance, hot air oven, constant temperature water bath.	6

	TOTAL	30
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Semester - I
Anatomy – Physiology (Theory)
Credits: 3 (3 Hrs. / Week)

Sr. No.	Topic	No. of Hrs.	Weightage of Marks(%)
1	Scope of Anatomy & Physiology	2	2
2	Introduction to the Body as a Whole	3	6
3	A General Review of Diseases	2	6
4	Elementary tissues of the body	4	8
5	Digestive system	5	10
6	Study of Diseases related to Digestive System	1	6
7	Respiratory System	4	8
8	Study of Diseases related to Respiratory System with special reference to Tuberculosis	1	4
9	Excretory System	5	12
10	Study of Diseases related to Kidney with Special reference to Renal Function Tests and Dialysis Techniques	2	4
11	Reproductive system	4	10
12	A Review of Sexually Transmitted Diseases	2	4
13	A General Review of HIV/ AIDS	2	4
14	Skeletal System	4	10
15	Central Nervous System	3	6
16	Study of Diseases Related to Nervous System	1	2
	TOTAL	45	100

Semester - I
Anatomy – Physiology (Practical)
Credits: 1(1 Practical 2 hrs. /Week)

Sr. No.	Topic	No. of Hrs.
1	Introduction to Body as a Whole	4
2	Fundamental Tissues of the Body	4
3	Digestive system	2
4	Skeletal System	4
5	Central Nervous System	4
6	Respiratory System	2
7	Excretory System	2
8	Urine Examination	2
9	Reproductive System	4
10	Family Planning Procedures	2
	TOTAL	30

Semester - I
Biology (Theory)
Credits: 3 (3 Hrs. / Week)

Sr. No.	Topic	No. of Hrs.	Weightage of Marks(%)
1	Introduction and Relation of Biology to D.M.L.T.	1	---
2	Structure of Animal and Plant Cell	7	6
3	Cell Division	4	6
4	Basic Tissues	2	6
5	External Features of Frog and Rabbit	3	8
6	Digestive System of Frog and Rabbit	4	10
7	Respiratory System of Frog and Rabbit	3	10
8	Circulatory System of Frog and Rabbit	5	10
9	Excretory System of Frog and Rabbit	4	10
10	Nervous System of Frog and Rabbit	5	10
11	Reproductive System of Frog	3	10
12	Development of Frog	2	8
13	Introduction to Microbiology and Pathology	2	6
	TOTAL	45	100

Semester - I
Biology (Practical)
Credits: 1 (1 Practical 2 hrs./Week)

Sr. No.	Topic	No. of Hrs.
1	Introduction and Relation of Biology to D.M.L.T.	2
2	External features of frog	2
3	Digestive system	2
4	Arterial system	2
5	Venous system	2
6	Urino-genital system	4
7	Animal classification- Invertebrates	10
8	Animal classification- Vertebrates	6
	TOTAL	30

Semester: I
Skills in Language Communication
Credits: 2 (2 Hrs. / Week)

Sr.No.	Topic	Sub-Topics	Hrs.	Weightage of Marks(%)
1.	Grammar	Parts of speech, tense, voice, medical words and terms, direct n indirect	8	28
2.	Comprehension passages	Listening/reading	10	60
3.	Vocabulary Enhancing	Synonyms/antonyms	2	4
4.	Oral Communication	Talking about day to day activities, viva preparation and presentation of viva	8	----
5.	Phonetics	Vowels & diphthongs	2	8
		TOTAL	30	100

SCHEME: SEMESTER II

Paper Code	Subject	L	P/T	D	TP	TW	P/V	T	Credits
2001	Organic Chemistry	4	P-4	2	50	50+50	50	200	6
2002	Physics	3	P-2	2	50	50+50	50	200	4
2003	Anatomy-Physiology	3	P-2	2	50	50+50	50	200	4
2004	Biology	3	P-2	2	50	50+50	50	200	4
2005	SLC	2	-	2	50	50	-	100	2
2006	Personality Development	2	-	2	50	50	-	100	2
Total		15	10					1000	22

Semester – II
Organic Chemistry (Theory)
Credits: 4 (4 Hrs / Week)

Sr. No.	Topic	Sub-topics	No.of Hrs.	Weightage of Marks(%)
1	Classification of Organic Compounds and their Nomenclature	Classification of Organic Compounds and Hydrocarbons, Functional groups, Isomerism, Homologous series, Empirical, Molecular and structural formulae, Organic Nomenclature.	5	7
2	Saturated Hydrocarbons	Sp ³ hybridization, Preparation & properties of Alkenes, Methane, Ethane, Cycloalkanes.	5	7
3	Unsaturated Hydrocarbons	Sp ² hybridization, Preparation & properties of Alkenes, Ethene, Dienes, Cis-Trans isomerism. Sp hybridization, Preparation, properties & uses of Acetylene.	5	8
4	Alcohols	Classification, preparation, properties & uses of alcohol, Methods of manufacture of Ethyl alcohol, Rectified Spirit, Absolute alcohol & Denatured alcohol.	3	7
5	Ethers	Preparation, properties & uses of Diethyl ether, Anesthetic ether, Vinyl ether, thioethers.	2	4
6	Halohydrocarbons	Preparation & properties of Alkyl halides, Grignard's reagent, preparation, properties and uses of	4	8

		Haloforms – Chloroform & Iodoform.		
7	Aldehydes and Ketones	Preparation & properties of Aldehydes & Ketones, Formaldehyde, Acetaldehyde, Acetone, Paraldehyde & Chloral hydrate.	4	7
8	Carboxylic acids	Classification, nomenclature, preparation and properties of Carboxylic acids, Formic acid, Acetic acid, Oxalic acid, Succinic acid, Tartaric acid, Lactic acid, Citric acid. Optical isomerism.	5	8
9	Derivatives of Carboxylic acids	Nomenclature, preparation & properties of Acid halides, Acid amides, Acid anhydrides & Esters.	2	5
10	Aliphatic Amines	Classification, Nomenclature, preparation & properties of Aliphatic amines, Quaternary Ammonium Salts.	2	5
11	Fats and Oils	Nomenclature, preparation, of Fats & Oils, Analysis – Saponification value, Acid value, Iodine value, Fixed oils – Arachis oil, Castor oil, Linseed oil, Sesame oil & Ethyl Oleate.	5	9
12	Carbohydrates	Classification & Qualitative tests of Carbohydrates, Glycosides, Structures of Glucose, Fructose, Sucrose, Lactose, Starch & cellulose.	3	9
13	Benzene and other Aromatic Compounds	Benzene – Structure, Molecular orbital diagram, preparation and properties, Substitution in Benzene, uses of Benzene, Aromatic compounds – Preparation, properties & uses of Nitrobenzene, Benzene Sulfonic acid, Chlorobenzene, Toluene, Aniline, Benzaldehyde, Phenol, Acetophenone,	13	12

		Benzoic acid, Salicylic acid, Derivatives of Salicylic acid, Cinnamic acid.		
14	Fused Ring Hydrocarbons	Nomenclature & properties of Naphthalene, Anthracene & Phenanthrene, steroidal skeleton.	2	4
		TOTAL	60	100

Semester – II
Organic Chemistry (Practical)
Credits: 2 (4 Hrs. / Week)

Sr. No.	Topic	No. of Hrs.
1	General Organic Spotting Oxalic acid, Acetone, Acetic acid, Ethyl alcohol, Chloroform, Citric acid, Glycerol, Benzoic acid, Benzaldehyde, Aniline, Nitrobenzene, Phenol, Salicylic acid.	30
2	Carbohydrate spotting Glucose, Fructose, Lactose, Sucrose, Starch.	14
3	Determination of the melting point of given Organic Solids	8
4	Determination of the boiling point of given Organic Liquids	8
	TOTAL	60 Hrs. (30 Practicals)

Semester – II
Physics (Theory)
Credits: 3 (3 Hrs / Week)

Sr. No.	Topic	No.of Hrs.	Weightage of Marks(%)
1	Current electricity	6	16
2	D.C.circuits	5	10
3	Circuit elements	4	8
4	Reflection of light	5	12
5	Refraction of light	5	12
6	Dispersion of light	4	8
7	Diffraction of light	2	4
8	Polarization of light	3	8
9	Mechanical waves	3	6
10	Electromagnetic waves	3	6
11	Optical instruments	5	10
	TOTAL	45	100

Semester – II
Physics (Practical)
Credits: 1 (1 Practical 2 hrs. /Week)

Sr. No.	Topic	No.of Hrs.
1	To determine the value of unknown resistance using Ohm's law	4
2	To verify the law of series combination of resistors	2
3	To verify the law of parallel combination of resistors	4
4	To verify the laws of reflection	2
5	To determine the refractive index if the material of the glass slab.	4
6	To study the variation in the angle of deviation with the angle of incidence.	4

7	To determine the refractive index of the liquid using concave mirror.	4
8	To study the instruments - Compound microscope, Photometer and spectrophotometer, P ^H meter, Distillation apparatus, De-ioniser.	6
	TOTAL	30

Semester - II
Anatomy – Physiology (Theory)
Credits: 3 (3 Hrs. / Week)

Sr. No.	Topic	No. of Hrs.	Weightage of Marks(%)
1	Circulatory System	6	12
2	Study of Diseases Related to Cardio-vascular System with Special Reference to Myocardial Infraction and High Blood Pressure	2	6
3	Blood	4	10
4	Study of Diseases Related to Blood with Special Reference to Anemias	2	6
5	Lymphatic System	2	4
6	Study of Cancer and Related Disorders	2	6
7	Endocrine system	4	8
8	Study of Diseases Related to Metabolism & Endocrinal Disorders with Special Reference to Diabetes Mellitus	4	10
9	Sensory organs	5	10
10	Accessory organs -Liver & Salivary Glands	4	8
11	Study of Hepatitis and Related Conditions	2	6
12	Nutrition	2	4
13	Study Deficiency Diseases with Emphasis on malnutrition	2	4
14	Study of Allergic Conditions and It's Manifestations	2	2
15	Health Education	2	4
	TOTAL	45	100

Semester - II
Anatomy – Physiology (Practical)
Credits: 1 (1 Practical 2 hrs./Week)

Sr. No.	Topic	No. of Hrs.
1	Blood	4
2	Basic Hematology	8
3	Lymphatic System	4
4	Endocrine System	2
5	Special Senses	2
6	Nutrition	2
7	Identification of Surgical Instruments	2
8	Recording Blood Pressure	4
9	Workshop on How to take ECG.	2
	TOTAL	30

Semester - II
Biology (Theory)
Credits: 3 (3 Hrs. / Week)

Sr. No.	Topic	No. of Hrs.	Weightage of Marks(%)
1	Introduction to Botany	1	----
-2	Morphology – Seed and seed germination	2	6
3	The Root	5	8
4	The Stem	7	8
5	The Leaf	4	8
6	Inflorescence	2	6
7	Flower	2	6
8	Pollination	1	6
9	Fertilization	2	6
10	Fruit and seed dispersal	2	6
11	Microbiology	5	8
12	Parasitism - adaptations	1	4
13	Life cycles of Parasites	5	20
14	Sterilization Methods	3	4
15	Staining techniques	3	4
	TOTAL	45	100

Semester - II
Biology (Practical)
Credits: 1 (1 Practical 2 hrs./Week)

Sr. No.	Topic	No. of Hrs.
1	Plant classification	2
2	Seed and seed germination	2
3	Roots	2
4	Stem	2
5	Leaf	2
6	Inflorescence	2
7	Flower	2
8	Fruit	2
9	Microbiology	6
10	Parasitology	8
	TOTAL	30

Semester: II
Skills in Language Communication
Credits: 2 (2 Hrs. / Week)

Sr.No.	Topic	Sub-Topics	Hrs.	Marks
1.	Grammar	Simple, compound, complex, punctuation, tense.	6	16
2.	Comprehension passages	Listening/Reading	8	40
3.	Vocabulary enhancing	Prefixes/suffixes	1	4
4.	Phonetics	Vowels & diphthongs	3	12
5.	Written communication	Parts & layouts, styles of letters, enquiry, reply to enquiry, making paragraph.	8	28
6.	Oral communication	Preparation and presentation of viva	4	-----
		TOTAL	30	100

Semester - II
Personality Development
Credits: 2 (2 Hrs. / Week)

Sr. No.	Topic	No. of Hrs.	Weightage of Marks(%)
1	Introduction to Personality Development	2	1
2	Practicing Speaking	3	2
3	Goal Setting	3	3
4	Action Plans	3	3
5	Communication	8	6
6	Human Relations	2	2
7	Job Interviews, Application Writing	3	3
8	Controlling Our Mind	3	3
9	Controlling Our Thoughts	3	2
	TOTAL	30	100

SCHEME: SEMESTER III

Paper Code	Subject	L	P/T	D	TP	TW	P/V	T	Credits
3001	Biochemistry	2	P-2	2	50	50+50	50	200	3
3002	Microbiology	3	P-4	2	50	50+50	50	200	5
3003	Haematology	2	P-4	2	50	50+50	50	200	4
3004	SLC	2	--	2	50	50	-	100	2
3005	Computer Applications	--	P-4	-	-	50	50	100	2
3006	Book Keeping	2	--	2	50	50	-	100	2
3007	Environmental Sciences	2	-	2	50	50	-	100	2
--	#Phlebotomy	-	P-4	-	-	-	-	-	-
Total		13	18					1000	20

It will be offered as an audit course.

SEMESTER III
BIOCHEMISTRY - THEORY
CREDITS: 2 (2 Hrs. /Week)

Sr. No.	Topics	Sub- Topic	Hrs.	Weightage of Marks (%)
1	Biochemistry Laboratory Principles & Procedures	Introduction Various types of Laboratories, Lab safety, Lab. First Aid, Responsibilities of technicians & students	5	10
2	Glassware	Composition, General types, Standardization of Glassware, Selection of Glassware, Care & Maintenance	4	8
3	Solutions & Reagents	Introduction and General Consideration, Preparation of Normal, Molar, Percent solutions, Buffer Solutions, Buffered Substrates, Indicators, Primary Standards, Other Complex Reagents	4	10
4	Equipments & Instruments	Balances, Hot air oven Centrifuge, Incubators Waterbath, Photometer, Colorimeter, Nephelometer, Spectrophotometer, pH meter, Distillation Plant, Deionizers, Automatic Dispensers and Dilutors, Principles, Care, Maintenance & specifications	11	44
5	Chemistry of Carbohydrates	Definition, Important functions, Classification, Monosaccharides, Oligosaccharides, Polysaccharides, Properties, Digestion, Absorption, Brief Metabolism, Glycolysis, Gluconeogenesis, Hexose Monophosphate Shunt Clinical Significance Blood Glucose Determination	4	20
6	Training the Technician	Basic Requirements Vacutainers, Collection, Testing, Specimen Stability	2	8
		TOTAL	30	100

SEMESTER III
BIOCHEMISTRY - PRACTICAL
CREDITS: 1 (1 Practical 2 hrs./Week)

Sr No.	Topics	Hrs.
1	Introduction to Biochemistry Laboratory Glassware, Safety measures, Maintenance	2
2	Standardisation of 1ml. Volumetric pipette	2
3	Preparation of Normal solutions of Acids & Alkalies Determination of Normality of 10 gm% NaOH	2
4	Preparation of 1N HCl from Conc.HCl	2
5	Preparation of 1N NaOH	2
6	Preparation of 2/3N H ₂ SO ₄ from conc.H ₂ SO ₄	2
7	Preparation of protein-free filtrate Preparation of anti-coagulated bulbs Sterilization of syringes & needles	4
8	Preparation of 200 ml phosphate buffer & determination of pH by using pH meter	4
9	Working of photometer, Standardization of photometer Working of spectrophotometer	6
10	Determination of unknown concentration of colored solution By photometer	2
11	Determination of CSF proteins by turbidimetric method	2
	TOTAL	30

SEMESTER III
MICROBIOLOGY - THEORY
CREDITS: 3 (3 Hrs/Week)

No.	Topic	Hrs.	Weightage of Marks(%)
1	Orientation to Diagnostic Microbiology	1	
2	History of Microbiology	1	2
3	Microscopy- Structure of compound microscope. Image formation, resolution, Definition, Chromatic and spherical aberrations. Care of microscope. Dark ground illumination. Fluorescent Microscopy Phase contrast microscope and electron microscope	6	16
4	Prokaryotic and eukaryotic cells. Bacterial Anatomy. Cell wall, Cell membrane, Capsule, Flagellum, Pili, Fimbriae. Function, demonstration.	6	16
5	Endospore – chemical composition, staining properties,	1	4
6	Differential Staining Procedures Making and staining of films. Preparing grease free slides and cover- slips. Preparation of smear. Gram staining, Acid fast staining, India Ink Preparation, Albert's Staining - Principle, Clinical significance, mechanism and QC	7	16
7	Classification of medically important bacteria	2	6
8	Sterilization and disinfection. – Definition. Classes of disinfectants and it's properties, Dry heat. Use of hot air oven. Moist heat. Use of Inspissator & Arnold steam sterilizer. Use of autoclave. Use of ionizing & non ionizing radiations	8	18
9	Growth and nutrition of bacteria Physical and chemical requirements. Growth curve.	2	2
10	Classification of media – general purpose, enriched, enrichment, selective and transport	1	4
11	Biochemical media – Use of MR-VP broth, Tryptone water, Simmon's citrate agar. Use of TSI agar and Christen's urea broth. Use of Nitrate broth, Nutrient gelatine and PPA agar, – Use of Oxidase and Catalase test.	6	10
12	Antimicrobial susceptibility Testing. Kirby Baur Method.	3	4
13	Universal Safety Precautions	1	2
	TOTAL	45	100

SEMESTER III
MICROBIOLOGY - PRACTICAL
CREDITS: 2 (4 Hrs. /Week)

NO.	TOPIC	Hrs.
1	Use of Compound Light Microscope Low, High And Oil- immersion lenses	2
2	Hanging Drop Preparation	2
3	Monochrome Staining	2
4	Gram Staining	4
5	Ziehl-Neelson Staining	4
6	India Ink Preparation	2
7	Albert's Staining	4
8	Fontana's Staining Method	2
9	Kirk-Patrik's Staining Method	2
10	Schaffer- Fulton Staining Method	2
11	Introduction and Use of Glassware	2
12	Use of Hot Air Oven, Arnold Steam Sterilizer, Inspissator	2
13	Use of Filters	2
14	Adjustment of pH	2
15	Preparation and Use of General Purpose Media Peptone Water, Nutrient Broth, Nutrient Agar Plate and Slant ,MacConkey Agar ,Muller Hinton Agar	6
16	Preparation and use of Biochemical Media MR-VP Broth, Tryptone Broth, Simmon's Citrate Agar	6
17	Preparation and use of Biochemical Media Nitrate Broth, Nutrient Gelatine, Triple Sugar Iron Agar, Phenylalanine Pyruvic Agar, Sugar Medium ,Motility Agar	8
18	Antimicrobial Susceptibility Testing by Kirby Baur Method Preparing McFarland Standard, Standardization of Inoculum Performing the Test. Interpretation and Reporting.	6
19	Universal Safety Precautions	2
	TOTAL	60

SEMESTER III
HAEMATOLOGY – THEORY
CREDITS: 2 (2 Hrs./Week)

No.	TOPIC	Hrs.	Weightage of Marks(%)
1	Introduction & Importance of Hematology in Diagnosis of diseases, Components of blood & their functions, Different Blood collection technique, Use of various anticoagulants, Effects of anticoagulant on cell morphology	2	12
2	Hemopoietic system of the body, General considerations, Normal sites for poiesis Erythropoeisis, Stages of RBC development influencing factors, Normal RBC morphology	4	16
3	Hemoglobin synthesis & Iron metabolism, Normal & Abnormal Hb with emphasis on clinical significance, Different methods to determine Hb & its important	2	8
4	Leucopoiesis, Factors influencing leucopoiesis, White blood cell morphology	4	8
5	Thrombopoiesis, Morphology of platelets	2	4
6	Total WBC, RBC & Platelets count by haemocytometry & their clinical significance	2	8
7	Hematocrit Determination by different methods & clinical significance, Blood indices, Calculations & Clinical significance	2	4
8	Blood smears Study of normal - abnormal erythrocytes & leucocytes with their clinical significance	2	12
9	Erythrocyte Sedimentation Rate Principle Different methods, Clinical significance	2	8
10	Reticulocyte count & Absolute eosinophil count with their clinical significance	2	8
11	Automation in Haematology Introduction & Basic Principle, Cell counting by impedance method & Advantages Coulter Counter	4	8
12	Study of complete Histogram & Laboratory diagnosis of Diseases	2	4
	TOTAL	30	100

SEMESTER III
HAEMATOLOGY - PRACTICAL
CREDITS: 2 (4 Hrs. / Week)

No.	TOPIC	Hrs.
1	Blood Collection by different methods Preparation of different reagent stain and anticoagulant	8
2	Estimation of Hb by different methods	4
3	Total WBC count Total RBC count	8
4	Preparation and staining of Blood Smear Different WBC count Identification of abnormal WBC and RBC	12
5	Estimation of PCV by different methods & Calculation of blood indices	8
6	Estimation of E.S.R. by different methods	8
7	Reticulocyte count / Ab Eosinophil Count Platelet count / Arneth count	4
8	Screening of Anaemia Smear Screening of Leukaemia Smear	4
9	Automation Study of Haemogram	4
	TOTAL	60

Semester: III
Skills in Language Communication
Credits: 2 (2 Hrs. / Week)

Sr. No.	Topic	Sub-Topics	Hrs.	Weightage of Marks(%)
1.	Grammar	Preposition/conjunction/tense/direct n indirect	4	04
2	Comprehension passage	Listening/reading	8	10
3.	Vocabulary enhancing	Synonyms/antonyms/homonyms	4	04
4.	Written communication	Developing paragraph, letter writing(formal n informal), essay writing, note-making.	8	07
5.	Oral communication	Description of an incident, dialogue, preparation and presentation of viva.	6	-----
		TOTAL	30	100

Semester: III
Computer Applications
Credits: 2 (4 Hrs. / Week)

NO.	Topic	Hrs.
1	Introduction to computers Definition, Function Areas of Application Parts of Computer	2
2	Classification of computer hardware Classification of Computers	4
3	Definition and description of Operating System Introduction to DOS	2
4	Introduction to Windows XP Features of Windows XP	4
5	Introduction to MS – Word and its use	16
6	Introduction to PowerPoint and its use	16
7	Introduction to MS – Excel and its use	10
8	Application of Computer in Medical Laboratory	6
	TOTAL	60

Semester: III
Book- keeping
Credits: 2 (2 Hrs. / Week)

Sr. No.	Topic	No. of Hrs.	Weightage of Marks (%)
1	Introduction To Book- Keeping Definition and Concept Nature and Importance Accounting Terms Principles of Double Entry	4	4
2	JOURNAL Classification of Accounts Rules for Accounting, Journalizing Exercises	4	4
3	LEDGER Introduction- Sub-division Of Ledger Mechanics of Posting, Balancing of Accounts, Exercises	5	32
4	Subsidiary Books Types and Recording Of Entries Posting to the Ledger	2	8
5	Subsidiary books CASH BOOK Exercises, Kinds of Cashbooks Recording of Entries, Bank Transaction, Bank Reconciliation And Contra entry	6	20
6	PETTY CASH BOOK Types of Petty Cash Book Simple, Analytical Balancing	2	8
7	Trial Balance – Method, Preparation	2	8
8	Final Accounts Preparation of Trading & Profit and Loss Accounts, Balance Sheet Adjustment Entries	5	16
	TOTAL	30	100

Semester: III
Environmental Studies
Credits: 2 (2 Hrs. / Week)

Sr. No.	Topic	No. of Hrs.	Weightage of Marks (%)
1	Current Environmental Concerns: Global Warming, Renewable Sources of Energy	4	4
2	Noise Pollution and Soil Pollution	4	8
3	Biomedical Wastes: Characteristics and Method of Disposal	5	32
4	Environmental Law	2	4
5	Physical, Chemical and Biological Characteristics of Water (testing for biological characteristics: Indicator Organisms)	6	20
6	Ecology	2	8
7	Rain water harvesting	2	8
8	Air Pollution: Causes and Effects	5	16
	TOTAL	30	100

SCHEME: SEMESTER IV (UNIVERSITY EXAMINATION)

Paper Code	Subject	L	P/T	D	TP	TW	P/V	T	Credits
4001	Biochemistry	3	P-6	2	50	50+50	50	200	6
4002	Microbiology	3	P-6	2	50	50+50	50	200	6
4003	Haematology	2	P-4	2	50	50+50	50	200	4
4004	Clinical Pathology	2	P-4	2	50	50+50	50	200	4
4005	SLC	2	-	2	50	50	-	100	2
--	#Phlebotomy	-	P-4	-	-	-	-	-	-
Total		12	24					900	22

It will be offered as an audit course.

SEMESTER IV
BIOCHEMISTRY: THEORY
CREDITS: 3 (3 HOURS/WEEK)

Sr. No.	Topic	No. of Hrs.	Weightage of Marks(%)
1	Chemistry of Carbohydrates Definition, Important Functions, Classification, Monosaccharides, Oligosaccharides, Polysaccharides, Properties, Absorption & Metabolism of Carbohydrates. Regulation of Blood Sugar Diabetes Mellitus, Urine & Blood Glucose Determination , GTT, Glycosylated hemoglobin	10	24
2	Chemical Tests in Kidney Disease General Consideration, Determination of Blood Urea Nitrogen, urea Metabolism, Determination of Serum Creatinine, Creatinine Metabolism, Determination of Uric Acid and Uric Acid Metabolism	11	26
3	Chemistry of Proteins Definition, Functions, Structures & Classification of Proteins, Properties of Proteins & Amino Acids, Summary of Protein Digestion, Amino Acid Metabolism, Determination of Serum Proteins	12	24
4	Enzymes Introduction, Enzymes as Catalysts, Enzyme Specificity, Enzyme Catalysis, Factors Affecting Enzyme Activity, Inorganic Positive and Negative Modifiers, Coenzymes, Isoenzymes, Enzyme Classification, Enzymes in Clinical Diagnosis, Uses of Enzymes, Laboratory Determinations	12	26
	TOTAL	45	

SEMESTER IV
BIOCHEMISTRY: PRACTICALS
CREDITS: 3 (6 HOURS/WEEK)

Sr. No.	Topics	Hrs.
1	Urinary Sugar Determination Quantitative Estimation of urinary sugar Qualitative estimation of urinary sugar Identification of reducing sugars in urine	6
2	Serum Glucose estimation by GOD-POD method Folin-Wu method for sugar determination	10
3	Urea Nitrogen Estimation , Blood Urea Nitrogen Estimation Urine Urea Nitrogen Estimation	8
4	Creatinine Estimation, Serum Creatinine Estimation Urine Creatinine Estimation	8
5	Uric acid Estimation, Serum Uric acid Estimation Urine Uric acid Estimation	6
6	Proteins Estimation, Serum Total Proteins, Serum Albumin Serum A/G ratio	8
7	Proteins Estimation, CSF & Urine Proteins	6
8	Enzyme Estimations, SGPT – Standardization SGPT- Determination	6
9	SGOT – Standardisation SGOT – Determination	6
10	Serum Alkaline phosphatase- Standardisation Serum Alkaline phosphatase – Determination	6
11	Serum Acid phosphatase – Standardisation Serum Acid phosphatase- Determination	6
12	Serum Amylase Estimation	6
13	Serum LDH Standardisation Serum LDH - Determination	6
14	Amino Acid Separation by Chromatography	2
	Total	90

SEMESTER IV
MICROBIOLOGY - THEORY
CREDITS: 3 (3 Hrs/Week)

No.	Topic	Hrs.	Weightage of Marks(%)
1	General considerations & philosophy of specimen collection, transportation & processing	1	4
2	Processing Urine for culture Anatomy of urinary tract & noncultural techniques used for the screening of significant bacteruria. Collection, Transport and culture.	2	8
3	Processing Stool for Culture. Anatomy of G_I tract & factors affecting colonisation of pathogens. Attributes of pathogens. Laboratory Diagnosis of Enteric fever, Bacillary Dysentery, Cholera. Other Agents involved with G-I tract Infections	4	8
4	Processing Throat Swab Collection, Transport and Culture for Laboratory Diagnosis of Sore throat, Diphtheria, Vincent's Angina and Pertusis	2	8
5	Processing Sputum for Culture Collection, Transport and Culture for Laboratory Diagnosis of Pnuemonia and Tuberculosis	2	8
6	Processing Blood for Culture General considerations. Choosing proper anticoagulant. Non-cultural techniques for blood culture. Routine Blood Culture. Laboratory diagnosis of Tularemia, Plague, Brucellosis, Recurrent fever, Weil's disease, Rat-bite fever, Sodoku	4	8
7	Processing Cerebrospinal Fluid for Culture Non cultural techniques for C.S.F. Microscopy, Limulus lysate test, CIEP, Latex agglutination tests. Biochemistry. Cultural Techniques for CSF.	5	8
8	Processing Genital Tract Material Laboratory Diagnosis of Gonorrhoea, Syphilis, Chancroid, Granuloma inguinale, LGV. Genital herpes	5	8
9	Processing Ear Swab Laboratory Diagnosis of Inclusion and Purulent Conjunctivitis	1	6
10	Processing Eye Swab Laboratory Diagnosis of Otitis Media	1	6
11	Processing Wound Swab for Culture	1	4
12	Lumen Dwelling Protozoa and Helminths	4	6
13	Tissue Dwelling Protozoa & Helminths	3	4
14	Mycobacteria & Actinomycetes	5	6
15	Enteric Gram -ve rods	2	4
16	Other Gram -ve rods	3	4

	TOTAL	45	100
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SEMESTER IV
MICROBIOLOGY - PRACTICAL
CREDITS: 3 (6 Hrs./Week)

NO.	TOPIC	Hrs.
1	Study of Lactose fermenters - E.coli, Klebsiella spp. & Enterobacter spp	6
2	Study of Proteus mirabilis and vulgaris	6
3	Study of Salmonella typhi, paratyphi A and paratyphi B	6
4	Study of Shigella shiga, flexneri, boydii and sonnie	12
5	Study of Serratia marcescens	6
6	Study of Vibrio cholarae	6
7	Study of Pseudomonas aeruginosa	6
8	Processing urine specimen	6
9	Processing an ear swab	6
10	Processing blood for culture	6
11	Processing stool specimen	6
12	Processing wound swab	6
13	Processing rectal swab	6
14	Processing sputum sample	6
	TOTAL	90

SEMESTER IV
HAEMATOLOGY – THEORY
CREDITS: TWO (2 Hrs. /Week)

No of Week	Topics	Hrs.	Weightage of Marks (%)
1	Clinical Significance, Interpretation and diagnosis of Sickle cell detection by different methods	2	4
2	Heinz body, G ₆ PD test	1	4
3	Clinical Significance, Interpretation and diagnosis of LE cell test,	1	4
4	Serum iron/TIBC test	1	4
5	Importance of normal & abnormal Hb in the diagnosis.	2	6
6	Hb electrophoresis, Osmotic fragility test	2	8
7	Laboratory diagnosis of Blood parasitic infections	2	8
8	Importance of bone marrow screening.	2	4
9	Classification & laboratory diagnosis of anemias	2	8
10	Classification & laboratory diagnosis of leukemia	2	8
11	Immuno Hematology – Introduction. Red cell antigen -antibody	2	8
12	ABO Rh blood - Laboratory investigation, DU test	2	8
13	Compatibility test, Coomb's test, Antibody titer test Antibody screening test	3	8
14	Blood banking - Blood donor selection and bleeding technique, Significance of investigation of blood bags Importance of different blood components, its uses and preservation	2	8
15	Blood transfusion technique, reactions & investigations.	2	4
16	Introduction to the HDN diseases & diagnosis. Automation in Blood Banking. Waste Management in Blood Bank	2	6
	TOTAL	30	100

SEMESTER IV
HAEMATOLOGY – PRACTICAL
CREDITS: TWO (4 Hrs./Week)

Sr.No	Topics	Hrs.
1	Sickling test, Solubility test, Heinz body preparation, G.P.D. estimation	2
2	Osmotic fragility, Nastroft test, L.E. cell Phenomena	2
3	Laboratory diagnosis of blood parasite	2
4	Fetal HB estimation	2
5	Serum iron and TIBC estimation	2
6	Bone marrow collection and smear preparation attaining technique	2
7	Cytochemical test	2
8	HB electrophoresis	2
9	Screening of anemia slide	2
10	Screening of leukemia slide	2
11	Absolute Eosinophil, Reticulocyte, Platelet & Arneth count	2
12	Immuno Hematology. Introduction. Laboratory reagent preparation	2
13	ABO -Rh blood group by different methods. D ^u test	4
14	Compatibility test & Coomb's test	4
15	Antibody titre test & Antibody screening test	4
16	Blood banking - Selection and Preparation of Donor, Bleeding technique, Transportation, storage & preservation of blood bags.	2
17	Preparation of different blood components, its uses and preservation	4
18	Blood transfusion technique	2
19	Lab investigation for blood transfusion reaction test	4
20	Lab . Diagnosis test for HDN disease	4
21	Function maintaining of blood bank equipment, Automation in Blood Banking, Waste management in blood banking	4
22	Complete Immuno hematological test	2
23	Automation in Hematology	2
	TOTAL	60

Semester - IV
Clinical Pathology (Theory)
Credits: 2 (2 Hrs. / Week)

Sr. No.	Topic	No. of Hrs.	Weightage of Marks(%)
1	Orientation to Clinical Pathology	1	
2	URINE EXAMINATION Introduction & clinical significance, Different Types of samples Collection & preservation	1	8
3	Physical Examination of urine	2	8
4	Chemical Examination of urine Clinical Significance of proteins & sugars Clinical Significance of Occult blood test & Ketone bodies, Clinical Significance of Test for bile pigments ,Test for bile salts,Test for urobilinogen	8	20
5	Microscopic Examination of urine	3	12
6	Study of urinary calculi	1	4
7	Pregnancy Tests	2	8
8	STOOLS EXAMINATION Clinical significance ,Collection & transportation, Preservatives	1	4
9	Physical Examination of stools Normal samples,Abnormal samples	1	4
10	Chemical Examination Occult blood test,Bile pigments, Stercobilinogen	1	4
11	Microscopic Examination Slide preparation,Saline,Iodine,Methylene blue Concentration methods, Sedimentation & floatation methods	3	8
12	Parasitology Protozoa, Helminths	6	20
	TOTAL:	30 Hours	

Semester - IV
Clinical Pathology (Practical)
Credits: 2 (4 Hrs. / Week)

Sr. No.	Topic	No. of Hrs.
1	Orientation to Clinical Pathology	2
2	URINE EXAMINATION Introduction & clinical significance, Different Types of samples Collection & preservation	2
3	Physical Examination of urine	4
4	Chemical Examination of urine Clinical Significance of proteins & sugars Clinical Significance of Occult blood test & Ketone bodies Clinical Significance of Test for bile pigments Test for bile salts, Test for urobilinogen	16
5	Microscopic Examination of urine	6
6	Study of urinary calculi	2
7	Pregnancy Tests	4
8	STOOLS EXAMINATION Clinical significance , Collection & Transportation, Preservatives	2
9	Physical Examination of stools Normal samples, Abnormal samples	2
10	Chemical Examination Occult blood test, Bile pigments, Stercobilinogen	2
11	Microscopic Examination : Slide preparation, Saline, Iodine Methylene blue, Concentration methods, Sedimentation & floatation methods	6
12	Parasitology : Protozoa, Helminthes	12
	TOTAL:	60 Hrs

Semester: IV
Sub: Skills in Language Communication
Credits: 2 (2 Hrs. / Week)

Sr.No.	Topic	Sub-Topics	Hrs.	Weightage of Marks (%)
1.	Grammar	Preposition, tense, voice, direct n indirect, auxiliaries	6	20
2.	Comprehension passages	Listening/reading	8	40
3.	Vocabulary enhancing	Medical words & terms/ homonyms.	3	12
4.	Written communication	Letter writing (formal) : application for a job, resume, a letter of permission, enquiry n reply to enquiry, order	9	28
5.	Oral communication	Enquiry, complaint, interaction with patient, preparation n presentation of viva	4	-----
		Total	30	

SCHEME: SEMESTER V (UNIVERSITY EXAMINATION)

Paper Code	Subject	L	P/T	D	TP	TW	P/V	T	Credits
5001	Biochemistry	3	P-4	2	50	50+50	50	200	5
5002	Microbiology	3	P-6	2	50	50+50	50	200	6
5003	Haematology	2	P-2	2	50	50+50	50	200	3
5004	Clinical Pathology	2	P-4	2	50	50+50	50	200	4
5005	Histopathology	2	P-4	2	50	50+50	50	200	4
5006	Automated Instrumentation	--	P-2	-	-	50	-	50	1
Total		12	20					1050	23

SEMESTER: V
SUBJECT: BIOCHEMISTRY (THEORY)
CREDITS: 3 (3 Hours/Week)

Sr. No.	Topics	Hrs.	Weightage of Marks (%)
1	KIDNEY FUNCTION TEST-General consideration, The kidneys,Formation of urine, Kidney function, Role of nephrons, Hormonal regulation, Laboratory tests aiding in the evaluation of kidney function test,Clinical significance	7	12
2	LIVER FUNCTION TEST- Introduction, The liver, Liver function. Bile pigment metabolism. Disordered bile pigment metabolism, Pre-hepatic jaundice, Hepatic jaundice, Post-hepatic jaundice, routinely performed liver function tests Clinical significance	7	12
3	CHEMISTRY OF LIPIDS- Definition, Importance, Classification & Properties. Digestion and absorption of lipids & Lipoprotein metabolism. Fredrickson's classification of lipoprotein. Lipid profile tests & Clinical significance	7	14
4	CARDIAC PROFILE TESTS - Cardiac profile tests, General consideration, Ischemic heart diseases, Artherosclerosis, Risk factor & Related laboratory tests	5	12
5	WATER AND MINERAL METABOLISM-General consideration, Body fluid distribution, Factors which influences distribution of body water,Mineral metabolism, Calcium and phosphorus metabolism, Laboratory tests – electrolytes(sodium, potassium, chloride) determination, Flame photometry, Iron selective electrode technology, Clinical significance	6	12
6	ACID BASE BALANCE- Diffusion of gases in the lungs, Action of buffer systems, Disturbances in acid – base balance, Laboratory determination	4	12
7	CHEMISTRY OF HORMONES- Introduction, regulation of action of hormones, General mechanism of actions, Classification of hormones, Hormones of thyroid gland , Hormones of the gonads, Hormones of anterior and posterior pituitary gland ,RIA and ELISA techniques	6	16
8	AUTOMATION- Historical aspects, Various types, Batch and random access analyses	3	10
TOTAL		45	100

SEMESTER: V
SUBJECT: BIOCHEMISTRY (PRACTICAL)
CREDITS: 2 (4 Hours/Week)

Sr.No	Topics	Hours
1	Determination of creatinine clearance	4
2	Determination of urea clearance	4
3	Liver function tests s. bilirubin (Malloy evelyn's , Jendrassic – Grof's method) , SGPT, SGOT , Alkaline phosphatase (Rate of reaction methods) , Thymol turbidity tests , Serum proteins (end point reaction method) , Gamma Gt (rate of reaction method) : Demonstration	16
4	Lipid profile tests Determination of s. total cholesterol (end point , enzymatic method) , HDL cholesterol (end point , enzymatic method) , S. triglycerides (end point , enzymatic method) , LDC – C,VLDL – C,Ratio of T. chol / HDL -C	16
5	Cardiac injury panel tests CPK (rate of reaction method) : Demonstration LDH (rate of reaction method) , SGOT (rate of reaction method) SHBD (rate of reaction method)	10
6	Determination of electrolytes in serum / urine/ CSF Calcium - (Cresolphalein complexone method), Inorganic phosphorus (Fiske- Subbarow's method or Uv linetic method),Sodium ,Potassium & Chloride - Flame photometry	8
7	Hormonal studies :demonstration of- determination of T3, T4, TSH, LH, FSH, by RIA and ELISA method	2
	TOTAL	60

SEMESTER V

MICROBIOLOGY - THEORY
CREDITS: 3 (3 Hrs/Week)

No.	Topic	Hrs.	Marks
1	Staphylococci	1	2
2	Streptococci	1	4
3	Neisseriae	1	2
4	Facultative & Aerobic Gram Positive Rods	1	4
5	Clostridia and Other Anaerobic Rods Anaerobic Cultivation	3	8
6	Spirochetes	1	2
7	Mycoplasma	1	2
8	Chlamydiae	1	2
9	Rickettsiae	1	2
10	Fungi & Laboratory Diagnosis of Mycoses	2	8
11	Immunology The Innate Immune System T- Cells & Cell Mediated Immunity B Cells & Humoral Immunity Antigen Antibody Reactions	10	24
12	Virology Introduction to Viruses Classification of Viruses Cultivation of Viruses Replication of Viruses Hepatitis Viruses Retroviruses & AIDS Prions	15	30
13	Automation in Microbiology	2	2
14	Quality Control & Quality Assurance in Microbiology Laboratory	5	8
	TOTAL	45	100

SEMESTER V

MICROBIOLOGY - PRACTICAL
CREDITS: 3 (6 Hrs/Week)

No.	Topic	Hrs.
1	Study of Staphylococci	6
2	Study of Streptococci	6
3	Study of Corynebacterium diphtheriae	6
4	Processing throat swab	6
5	Introduction to serology. Equipments and glassware used in serology	4
6	Antigen Antibody Reactions	4
7	Widal test	6
8	V.D.R.L. Test	4
9	RPR Test	4
10	RA Test	4
11	CRP Test	4
12	ASO Test	4
13	Tests for Hepatitis	6
14	Tests for HIV/AIDS	6
15	TORCH Test	2
16	Isolation and Identification of Fungi	6
17	Study of Candida albicans	6
18	Quality Control in Microbiology Laboratory	6
	TOTAL	90

SEMESTER V

HEMATOLOGY- THEORY
CREDITS: TWO (2 Hrs/Week)

Sr.No.	Topic	Hrs.	Weightage Of Marks (%)
1	Introduction to coagulase study, Hemostasis & Coagulation factor	2	4
2	Mechanism of coagulation. Intrinsic & Extrinsic Pathway. Fibrinolytic System	2	8
3	Laboratory Investigation in Coagulation Clinical significance & Interpretation. Platelet count	4	8
4	Bleeding time & Clotting time	1	8
5	Clot retraction and clot lysis time, Prothrombin time,	2	8
6	Plasma recalcification time Partial thrombo plastine time	1	8
7	Activated partial Thromboplastin time Thrombin time Identification of FDP.	2	8
9	Fibrinogen estimation and titer Platelet aggregation time Thromboplastin generation time	4	8
10	Different lab investigation in bleeding disorder	2	8
11	Automation in coagulase studies Basic Principles & working of different types of coagulometer	2	6
12	Profile- Immunohematology	2	6
13	Blood transfusion technique & management of transfusion reaction	2	8
14	Automation in Hematology	2	8
15	QC & Waste Management in Hematology	2	4
	TOTAL	30	100

SEMESTER V

HEMATOLOGY – PRACTICAL
CREDITS: ONE (2 Hrs/Week)

Sr. No	Topics	No of Hrs.
1	Laboratory safety & Introduction to Coagulase study	2
2	Laboratory reagent preparation for coagulation studies	2
3	Coagulase Investigation - Platelet count, Bleeding time- Clotting time	4
4	Clot retraction and clot lyses time,	2
5	Prothrombin time	2
6	Plasma recalcification time & Partial Thromboplastin time	2
7	Activated partial Thromboplastin time ,Thrombin time, Identification of FDP	4
8	Fibrinogens estimation and titre.	4
9	Thromboplastin generation time, Platelet aggregation time	2
10	Different laboratory investigation in bleeding disorder Automation in coagulase studies. Basic principle, Function, Advantages	4
11	Complete coagulase study	2
	TOTAL	30

SEMESTER V

HISTOPATHOLOGY- THEORY
CREDITS: 2 (2 Hrs/Week)

Sr.No.	Topic	Hrs.	Weightage of Marks (%)
1	Introduction & orientation to Histopathology and cytological techniques. Cell division. Basic steps in tissue processing.	2	4
2	Basic Histopathology techniques. Methods of examination of tissues & cells. Dissociation. Smear technique. Vital staining	2	4
3	Methods of tissue preparation. Preparation of paraffin sections. Celloidin embedding. Preparation of frozen section.	2	8
4	Fixation Reagents employed. Decalcification	2	8
5	Gross examination and fixation of tissue. Requirements and procedures.	2	4
6	Tissue processing. Manual Methods and use of automatic tissue processor. Types of cryostats.	2	8
7	Paraffin section cutting.	2	8
8	Theory of staining. Staining techniques.. Basic staining. Mountants. Mounting procedures	2	8
9	Frozen section techniques. Celloidin Section Cutting Technique	2	8
10	Special staining techniques.	2	8
11	Exfoliative cytology techniques. Clinical significance. Specimen collection Preparation of smear & fixation. Various staining techniques & Papanicolaou method	2	12
12	Museum techniques. Preparation of specimen. Storage of specimen Mounting of museum specimen	2	4
13	Immunohistochemistry Introduction. Electron microscopic techniques Recent advances Flow Cytometry. Enzyme Histochemistry.	2	8
14	Automation in Histopathology	2	4
15	Organization of Histopathology Laboratory & Waste Management	2	4
	TOTAL	30	100

SEMESTER V

HISTOPATHOLOGY- PRACTICAL
CREDITS: 2 (4 Hrs/Week)

Sr.No.	Topics	Hrs.
1	Use and care of equipment and glassware	4
2	Gross Examination of fresh-fixed specimens	4
3	Fixation Technique, Preparation of fixative	4
4	Different methods to be followed after fixatives	4
5	Decalcification technique Preparation of Decalcifying Reagents	4
6	Processing & Paraffin wax embedding Technique	4
7	Vacuum Impregnating Technique	4
8	Casting—Block making Technique	4
9	Manual Processing Technique Histokinet- Auto –Tissue processing Technique	4
10	Different types of Microtome, Microtome knives Honing -Stropping	4
11	Section cutting Technique	4
12	H & E Staining Technique	4
13	Special Staining Technique	4
14	Cytology- Smear preparation and Staining Technique	4
15	Museum Technique	4
	TOTAL	60

Semester - V

Clinical Pathology (Theory)
Credits: 2 (2 Hrs. / Week)

Sr. No.	Topic	No. of Hrs.	Marks % Weightage
1	Seminal Fluid Examination Anatomy of male reproductive system ,Clinical significance , Collection & transport	4	2
2	Seminal Fluid Examination Physical Examination ,Normal & abnormal samples ,Chemical Examination – Routine chemical tests alongwith special tests like eosin test & glucose ringer test	3	2
3	Seminal Fluid Examination Microscopic Examination ,Wet mount preparation, Smear preparation for morphological studies, Spermatozoa count	5	4
4	Anatomy & physiology of CSF Clinical significance of CSF collection Physical Examination of CSF Chemical Examination of CSF Microscopic Examination of CSF	4	5
5	Examination of Body Fluids Physiology of body fluid formation Physical, Chemical, microscopic examination Examination of pleural fluid, peritoneal fluid pericardial & synovial fluid	5	4
6	SPUTUM EXAMINATION Introduction & clinical significance Collection of samples Physical examination Microscopic examinations	6	5
7	Waste Management	1	1
8	Profile Studies - Urine	1	1
9	Profile Studies - Stool	1	1
	TOTAL	30Hours	

Semester - V

Clinical Pathology (Practical)
Credits: 2 (4 Hrs. / Week)

Sr. No.	Topic	No. of Hrs.
1	Seminal Fluid Examination Anatomy of male reproductive system Clinical significance Collection & transport	8
2	Seminal Fluid Examination Physical Examination Normal & abnormal samples Chemical Examination – Routine chemical tests alongwith special tests like eosin test & glucose ringer test	6
3	Seminal Fluid Examination Microscopic Examination Wet mount preparation Smear preparation for morphological studies Spermatozoa count	10
4	Anatomy & physiology of CSF Clinical significance of CSF collection Physical Examination of CSF Chemical Examination of CSF Microscopic Examination of CSF	8
5	Examination of Body Fluids Physiology of body fluid formation Physical, Chemical, microscopic examination Examination of pleural fluid, peritoneal fluid pericardial & synovial fluid	10
6	SPUTUM EXAMINATION Introduction & clinical significance Collection of samples Physical examination Microscopic examinations	12
7	Waste Management	2
8	Profile Studies - Urine	2
9	Profile Studies - Stool	2
	TOTAL	60 Hours

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SCHEME: SEMESTER VI- INTERNSHIP CREDITS :20

The students are rotated in following sections for three and half weeks in the laboratories of hospitals.

No.	Subject	Credits	Marks
1	Biochemistry	3	100
2	Microbiology & Serology	5	100
3	Hematology & Blood Banking	6	100
4	Clinical pathology	3	100
5	Histopathology & Cytology	3	100
		20	500

Key:

L = Lectures/Week

T= Tutorial

P= Practical/s

TW = Term Work (Internal Assessment)

TP= Term Paper (Semester Examination)

D = Duration of Term Paper

Cr= Credits