DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY,
CHHATRAPATI SAMBHAJINAGAR.

CIRCULAR NO.SU/College/Clinical Laboratory Sci/NEP/48/2024

It is hereby inform to all concerned that, the syllabus prepared by the Committee and recommended by the Dean, Faculty of Science & Technology, the Hon'ble Vice-Chancellor has accepted the **New Syllabus of B.Sc.Clinical Laboratory Science –Ist and IInd semester under the scheme of National Education Policy-2020** in his emergency powers under section 12(7) of the Maharashtra Public Universities Act, 2016 on behalf of the Academic Council as appended herewith.

This is effective from the Academic Year 2024-25 and onwards.

All concerned are requested to note the contents of this circular and bring the notice to the students, teachers and staff for their information and necessary action.

University Campus,
Aurangabad-431 004.
REF.NO.SU/2024/9743-57
Date:- 21/11/2024

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Deputy Registrar,
Academic Section

Copy forwarded with compliments to :-

1] **The Principal of all concerned Colleges,**
Dr. Babasaheb Ambedkar Marathwada University,
2] **The Director, University Network & Information Centre, UNIC, with a request to upload this Circular on University Website.**

Copy to :-

1] The Director, Board of Examinations & Evaluation, Dr.Babasaheb Ambedkar Marathwada University, Chhatrapati Sambhajinagar.
2] The Section Officer,[B.Sc.Unit] Examination Branch, Dr.Babasaheb Ambedkar Marathwada University, Chhatrapati Sambhajinagar.
3] The Programmer [Computer Unit-1] Examinations, Dr.Babasaheb Ambedkar Marathwada University, Chhatrapati Sambhajinagar.
4] The Programmer [Computer Unit-2] Examinations, Dr.Babasaheb Ambedkar Marathwada University, Chhatrapati Sambhajinagar.
5] The In-charge,[E-Suvidha Kendra], Rajarshi Shahu Maharaj Pariksha Bhavan, Dr.Babasaheb Ambedkar Marathwada University, Chhatrapati Sambhajinagar.
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DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY, CHHATRAPATI SAMBHAJINAGAR

Faculty of Science & Technology

Course Structure and Curriculum
As per National Education Policy -2020

B.Sc. Clinical Laboratory Science

Ist & IInd semester

For Affiliated Colleges

Dean,
Faculty of Science & Technology

Chairman of the Committee

From the Academic Year 2024-25 & Onwards/-

B.Sc. Clinical Laboratory Science (CLS)

B.Sc. FIRST YEAR I SEMESTER

COURSE TYPE	COURSE CODE	COURSE NAME	TEACHING SCHEME (hr/wk)		CREDITS ASSIGNED		TOTAL CREDITS
			Theory	Practical	Theory	Practical	
MAJOR (CORE) M1 MANDARORY	DSC 1	Biochemistry	2		2		2+2=4
	DSC 2	Practicals based on M 1 DSC 1		4		4	
MAJOR (CORE) M2 MANDARORY	DSC 1	Microbiology	2		2		2+2=4
	DSC 2	Practicals based on M 2 DSC 1		4		4	
MAJOR (CORE) M3 MANDARORY	DSC 1	Haematology	2		2		2+2=4
	DSC 2	Practicals based on M 3 DSC 1		4		4	
Generic / Open Elective (GE / OE) [Choose any two from pool of courses] **It should be chosen compulsorily from the faculty other than that of major**	GE/OE - 1	**To be chosen from other faculty**	2				2
SEC (SKILL ENHANCEMENT COURSES){CHOOSE ANY ONE FROM POOL OF COURSES}	SEC-1	Clinical Pathology	1				1
	SEC-2	Practicals based on SEC-1		2		1	2
AEC, VEC,IKS	AEC-1	ENGLISH (COMMON FOR ALL FACULTY)	2		2		
	IKS-1	CHOOSE ANY ONE FROM POOL OF COURSES	2		2		
OJT/FP/CEP/RP	CC-1	HEALTH AND WELLNESS (COMMON FOR ALL FACULTY)		4		2	2

B.Sc. FIRST YEAR II SEMESTER

COURSE TYPE	COURSE CODE	COURSE NAME	TEACHING SCHEME (hr/wk)		CREDITS ASSIGNED		TOTAL CREDITS
			Theory	Practical	Theory	Practical	
MAJOR (CORE) M1 MANDARORY	DSC 3	Biochemistry-II	2		2		2+2=4
	DSC 4	Practicals based on M 1 DSC 3		4		4	
MAJOR (CORE) M2 MANDARORY	DSC 3	Microbiology	2		2		2+2=4
	DSC 4	Practicals based on M 2 DSC 3		4		4	
MAJOR (CORE) M3 MANDARORY	DSC 3	Haematology	2		2		2+2=4
	DSC 4	Practicals based on M 3 DSC 3		4		4	
Generic / Open Elective (GE / OE) [Choose any two from pool of courses] **It should be chosen compulsorily from the faculty other than that of major**	GE/OE - 2	**To be chosen from other faculty**	2				2
VSC (VOCATIONAL SKILL COURSES){CHOOSE ANY ONE FROM POOL OF COURSES}	VSC-1	Clinical Pathology	1				1
	VSC-2	Practicals based on SEC-1		2		1	2
AEC, VEC,IKS	AEC-2	ENGLISH (COMMON FOR ALL FACULTY)	2		2		
	VEC-2	CONSTITUTION OF INDIA(COMMON FOR ALL FACULTY)	2		2		
OJT/FP/CEP/RP	CC-1	YOGA EDUCATION AND FITNESS (COMMON FOR ALL FACULTY)		4		2	2

COURSE TYPE	**MAJOR (CORE) M1 MANDARORY**
COURSE CODE	**DSC 1**
COURSE NAME	**Biochemistry**
TEACHING SCHEME (hr/wk)	**Theory**
CREDITS ASSIGNED	**2**

General Biochemistry

1) Structure, components and their respective functions of following cells --- Human cell, Bacterial cell, Red blood cell	**2**	**6**
2) The composition of cell membrane of following cells: Eukaryotic and Procaryotic	**2**	**6**
3) Functions of cell membrane. Transportation of various substances through the cell membrane : Simple diffusion, facilitated of various substances. Uniport, symport & antiport types.	**3**	**10**
4) Buffer systems of the cell (Buffers and pKa values). Importance in maintaning normal pH of cellular constituents	**1**	**6**
5) Carbohydrate chemistry: Definition importance, classification, properties, structural formulae of various mono- and disaccharides, Isomerism, Digestion and absorption of carbohydrates.	**2**	**12**

Clinical Biochemistry

1) Basic laboratory principles and procedures: Introduction, Laboratory management system, Various types of Laboratories, laboratory set-up, Laboratory safety, First Aid measures. Responsibilities of technicians and students, Laboratory mathematics.	6	**15**
2) Solutions and reagents: Basic requirements, Reagent grade water, Preparation of Normal, Molar, Percent, Complex reagents, Buffers, Indicators and Primary standards.Use of diagnostic kits	**6**	**15**
3) Commonly used Equipments, Instruments and Procedures: General use, various components and their uses, principal on which working is based, and care and maintenance of: various types of balances, hot plate-magnetic stirrers, centrifuges, hot air ovens, incubators, water baths, dispensers, photometers, spectrophotometers, nephelometers, pH meters, flame photometer, water distillation apparatus, etc. Beer-Lambert's law, Standardization of photometers and biochemistry methods, End point and rate of reaction methods, turbidimetry and nephelometry.	**6**	**25**
4) Introduction to Clinical Biochemistry: Major factors responsible for causing diseases in humans.	**2**	**5**
	30	**100**

Reference books:

1) Text book of medical laboratory technology: Dr. P. B.

Godkar

2) Biochemistry by U. Satyanarayana
3) Shaum's outline Biochemistry

Note:

On the first day of the new semester the teacher should provide following information to the students –

1).Orientation to the subject 2) Syllabus topics 3) Internal and semester examination systems 4) Library reference work 5) Attendance requirement

COURSE TYPE	**MAJOR (CORE) M1 MANDARORY**
COURSE CODE	**DSC 2**
COURSE NAME	**Practicals based on M 1 DSC 1**
TEACHING SCHEME (hr/wk)	**4**
CREDITS ASSIGNED Practical	**4**

BIOCHEMISTRY – (PRACTICALS)

No. of hrs. / Week 4

Credits: 2

Topics

1) Introduction to the Biochemistry laboratory, responsibilities and related safety measures.

2) Introduction to various types of glassware and maintenance of glassware

3) Determination of normality of 10% sodium hydroxide and learning pipetting and dispensing techniques.

4) Standardization of 1.0ml volumetric pipette and learning use, care and maintenance of various balances.

5) Preparation of primary normal solution (IN sodium carbonate).

6) Preparation of normal solutions (1 N hydrochloric acid, 1 N sodium hydroxide and 2/3 N sulphuric acid)

7) Preparation of percent solution (V/V): 2% (V/V) acetic acid (WBC diluting fluid)

8) Preparation of molar solutions (M/15 Sodium phosphate solutions) for the preparation of a buffer solution: phosphate buffer (M/15, PH 7.45) Learning use, care and maintenance of a pH meter

9) Preparation of protein free filtrate, separation of serum and plasma from appropriate blood and Learning use, care and maintenance of a centrifuge.

10) Preparation of anticoagulated bulbs and learning use, care and maintenance of hot air oven water bath and incubator.

11) Preparation of a complex reagent (e.g. Benedict's qualitative reagent) and learning use, care and maintenance of hot plate and magnetic stirrer.

12) Learning operation of a photometer and care and maintenance.

13) Standardization of a photometer

14) Learning operation and care and maintenance of a spectrophotometer

15) Learning a multi-step quantitative method (Folin-wu's method)

16) Learning a mono-step method (GOD/POD)

17) Learning a turbidimetric method (Determination of CSF and urinary proteins)

Objectives:

At the end of semester I, students will learn the basic requirements of a biochemistry laboratory, preparation of various reagents and use, care and maintenance of glassware, reagents, equipments and instruments.

Reference books:

1) Text book of medical laboratory technology by Dr. P. B. Godkar

Instructions for teacher: Note:

It is necessary for the teacher to give orientation regarding the following on the first day -

1) Requirements for practicals: Journal, rough note book, lab coat, fractional weight box, other requirements and safety requirements.

2) Writing rough note book, SOP.Writing Journals.

COURSE TYPE	**MAJOR (CORE) M2 MANDARORY**	
COURSE CODE	**DSC 1**	
COURSE NAME	**Microbiology**	
TEACHING SCHEME (hr/wk)	**Theory**	**2**
CREDITS ASSIGNED	**Theory**	**2**

MICROBIOLOGY – (THEORY)

No. of hrs. / week	2
Credits:	2

Topics	**No of Hrs**	**% Wtg**
1) Introduction to Microbiology The science of microbiology, Biologic principle illustrated by microbiology, prokaryotic cell structure. Classification of Bacteria, The growth, survival and death of Microorganisms	**4**	**13**
2) Clinical Microbiology, Principles of diagnostic Medical Microbiology.	**2**	**7**
3) Microscopy: Optical principle, structure, use and applications of compound microscope, Dark ground illumination phase contrast microscope, Fluorescent microscope, Electron microscope.	**4**	**13**
4) Disinfection: Chemical.Sterilization. Physical methods of sterilization, Dry heat, Moist heat Filtration Techniques, Radiations, Indicators of sterilization.	**4**	**13**
5) Instrumentation: Structure, Principle and Application of Incubator, Hot-air oven, Autoclave, Inspissator, Filters, Water bath, pH meter, V.D.R.L. Shaker, Anaerobic jar, etc.	**4**	**13**
6) Staining Methods: Principle and Clinical significance.Gram staining, Acid- Fast staining, Metachromatic granule staining, India-ink preparation.	**3**	**11**
7) Aseptic techniques: Use of inoculating hood and laminar flow. Use and maintenance of Microscope.	**3**	**11**
8) Use and preparation of media: general purpose, enrichment, enriched, selective, transport and biochemical media.	**3**	**10**
9) Identification of Bacteria.	**3**	**9**
	30	100

Reference books:

1) Text book of Medical Laboratory Technology by Dr. P.B.Godkar
2) Microbiology by Dr. Ananthanarayana
3) Shaum's outline Microbiology

Note:

On the first day of the new semester the teacher should provide following information to the students –

1) Orientation to the subject 2) Syllabus topics 3) Internal and semester examination systems

4) Library reference work 5) Attendance requirement

COURSE TYPE	**MAJOR (CORE) M2 MANDARORY**
COURSE CODE	**DSC 2**
COURSE NAME	**Practicals based on M 2 DSC 1**
TEACHING SCHEME (hr/wk)	**4**
CREDITS ASSIGNED Practical	**4**

MICROBIOLOGY – (PRACTICALS)

No. of hrs. / Week 4
Credits: 2

Topics

1) Professional ethics and Responsibilities of students, Role of Laboratory technician in laboratory diagnosis.

2) Basic principles of laboratory work.

Clinical Bacteriology Laboratory and related techniques: Safety in the laboratory, Sterilization and disinfection, basic requirements

Personal safety against various accidents and hazards. Knowledge of first aid. Care in handling dangerous materials.

Glassware: Types and uses for microbiological purpose, Cleaning and Sterilization.

3) Principles of working of various laboratory instruments and their uses, care and Maintenance.

4) Microscopy: Compound microscope: Parts, function and care of the microscope.

5) Staining Procedures and quality control measures: Gram staining.

Ziehl- Neelson's staining. Metachromatic granule staining. India – ink preparation.

6) Special staining procedures: Chance's and Ringer method

Capsule staining, Fontana's method, Dorner's and Schaffer-Fulton's method.

7) Sterilization and disinfection.

Physical methods of sterilization: heat, filtration and radiations. Chemical disinfection.

Indicators of sterilization: Biological and chemical.

Disinfection of specimen, and laboratory equipments.

Objective:

At the end of semester I, students will learn basic requirements, techniques, safety, sterilization and disinfection, preparations and quality control in a microbiology laboratory

Reference book:

Text book of medical laboratory technology by Dr. P. B. Godkar

- **Instruction for teacher : Note:**

It is necessary for the teacher to give orientation regarding the following on the first day -

1) Requirements for practicals: Journal, rough note book lab coat, fractional weighed box, other requirements.
2) Writing rough note book, SOP \ and safety requirements.
3) Writing Journals.

COURSE TYPE	**MAJOR (CORE) M3 MANDARORY**
COURSE CODE	**DSC 1**
COURSE NAME	**Haematology**
TEACHING SCHEME (hr/wk)	**Theory**
CREDITS ASSIGNED Theory	**2**

HAEMATOLOGY – (THEORY)

No. of hrs. / week 2

Credits: 2

Topics	No of hrs	% Wtg
1) Introduction to 'Hematology' and hemotology section of a pathology laboratory .	**1**	**4**
2) Blood and hematopoietic system of the body	**2**	**6**
3) Components of blood and their functions, various techniques of blood collection, use of various anticoagulants, Effects of storage of blood on cell morplology, waste disposal.	**3**	**10**
4) Hemoglobin: synthesis, iron metabolism.Various hemoglobins.Determination of hemoglobin by various methods.	**3**	**10**
5) Erythropoiesis:Factors influencing erythropoiesis Red blood cells morphology.Total erythrocyte count by hemocytometry. Clinical significance.	**3**	**10**
6) Leucopoiesis:Factors influencing leucopoiesis. White blood cell morphology.Total leukocyte count by hemocytometry. Clinical significance.	**2**	**7**
7) Thrombopoiesis: Morphology of platelets. Determination of platelet count. Clinical significance.	**2**	**7**
8) Haematocrit:Determination by different methods Clinical significance.	**2**	**7**
9) Erythrocyte Indices--Calculations Clinical significance	**2**	**7**
10) Study of blood smears for differential leukocyte count and cell morphology. Clinical significance	**4**	**12**

11) Study of abnormal erythrocytes and leukocytes in peripheral blood smear	2	6
12) Determination of Erythrocyte Sedimentation rate Principle, various methods, clinical significance.	2	7
13) Study of complete Hemogram.	2	7
	30	100

Reference books:

1) Text book of Medical Laboratory technology by Dr. P. B. Godkar

2) Dacie and Lewis practical hematology

Note:

On the first day of the new semester the teacher should provide following information to the students –

1) Orientation to the subject 2) Syllabus topics 3) Internal and semester examination systems

4) Library reference work 5) Attendance requirement

COURSE TYPE	**MAJOR (CORE) M3 MANDARORY**
COURSE CODE	**DSC 2**
COURSE NAME	**Practicals based on M 3 DSC 1**
TEACHING SCHEME (hr/wk)	**Practical**
CREDITS ASSIGNED	**4**

HAEMATOLOGY – (PRACTICAL)

No. of hrs. / week	4
Credits	2

Topics

1) Introduction to Hematology Laboratory set-up and Laboratory safety.
2) Use of Hb, WBC and RBC pipettes and maintenance.
3) Use of improved Neubar's chamber and maintenance.
4) Preparation of blood smears and staining by Wright's stain. Observation of blood smears under microscope.
5) Use and maintenance of Westergren and Wintrobe's tubes
6) Determination of hemoglobin by copper sulphate and sahli's methods
7) Preparation of Drabkin's reagent and determination of hemoglobin.
8) Preparation of WBC diluting fluid and determination of total WBC count.
9) Determination of total RBC count.
10) Determination of PCV, MCV,MCH and MCHC
11) Determination of differential WBC count by using Wright's stain and Field's stains.
12) Study of blood smears for RBC morphology.
13) Determination of ESR by Westergren's methods.
14) Determination of ESR by Wintrobe's method.
15) Phlebotomy technique.
16) Determination of Platelet count.

Objective:

At the end of semester I students will get oriented to the hematology laboratory and will learn basic requirement, glassware, reagents, equipments, techniques and safety precautions in the laboratory.

Reference books:

1) Text book of medical laboratory technology by Dr. P. B.Godkar
2) Dacie and Lewis practical hematology

- **Instruction for teacher : Note:**

It is necessary for the teacher to give orientation regarding the following on the first day -

1) Requirements for practicals: Journal, rough note book lab coat, fractional weighed box, other requirements.
2) Writing rough note book, SOP \ and safety requirements.
3) Writing Journals.

COURSE TYPE	**SEC (SKILL ENHANCEMENT COURSES){CHOOSE ANY ONE FROM POOL OF COURSES}**
COURSE CODE	**SEC-1**
COURSE NAME	**Clinical Pathology**
TEACHING SCHEME (hr/wk)	**Theory**
CREDITS ASSIGNED Theory	**1**

CLINICAL PATHOLOGY (THEORY)

No. of hrs. / week : 1
Credits: 1

Topics	**No of Hrs**	**% Wtg**
1) Introduction to clinical pathology section of pathology laboratory: Various types of specimen analyzed in the laboratory and laboratory safety.	**1**	**6**
2) Introduction to Routine urine examination: Role of kidneys in the maintenance of homeostasis. Formation of urine, Composition of normal urine, hormonal regulation of kidney function.	**1**	**6**
3) Collection of urine, containers, storage, changes in composition after storage,Preservatives.	**1**	**12**
4) Physical examination of urine, various aspects and clinical significance.	**1**	**12**
5) Chemical examination of urine, various aspects and clinical significance.	**1**	**6**
6) Determination of other urinary substances for special circumstances (Porphyries, porphobilinogen, phenyl pyruvic acid, etc) and clinical significance.	**1**	**6**
7) Chemical examination of urine by using urine-strips.	**1**	**10**
8) Microscopic examination of urine-various findings.	**2**	**12**
9) Chemical examination of urinary calculi	**1**	**6**
10) Pregnancy test	**1**	**6**
11) Routine sputum examination: General consideration	**1**	**6**
12) Physical and Microscopic examination of sputum.	**1**	**6**
13) Routine sputum examination (Complete)	**2**	**6**
Reference books:	**1 5**	**100%**

1) Text books of medical laboratory technology by Dr. P. B. Godkar.
2) John Bernard Henry's clinical diagnosis and management by laboratory methods

Note:

On the first day of the new semester the teacher should provide following information to the students –

1) Orientation to the subject 2) Syllabus topics 3) Internal and semester examination systems 4) Library reference work 5) Attendance requirement

COURSE TYPE	**SEC (SKILL ENHANCEMENT COURSES){CHOOSE ANY ONE FROM POOL OF COURSES}**
COURSE CODE	**SEC-2**
COURSE NAME	**Practicals based on SEC-1**
TEACHING SCHEME (hr/wk)	**Practical 2**
CREDITS ASSIGNED	**1**

CLINICAL PATHOLOGY – (PRACTICALS)

No. of hrs. / week 4

Credits: 2

Topics

1) Introduction, Laboratory safety
2) Routine urine examination: General consideration.
3) Physical examination of urine.
4) Chemical examination of urine by chemical methods.
5) Chemical examination of urine by uristix methods.
6) Microscopic examination of urine.
7) Routine urine examination (complete)
8) Routine sputum examination: General consideration.
9) Physical examination of sputum.
10) Microscopic examination of sputum.
11) Routine sputum examination (complete)
12) Examination of urinary stones
13) Pregnancy tests (various types)

Objectives:

At the end of semester - I students will learn basic requirements and techniques of laboratory tests in clinical pathology and microscopic

examinations.

Reference books:

Text book of Medical Laboratory Technology by Dr. P. B. Godkar.

Instructions for teacher: Note:
It is necessary for the teacher to give orientation regarding the following on the first day -

1) Requirements for practicals: Journal, rough note book, lab coat, fractional weight box, other requirements and safety requirements.
2) Writing rough note book, SOP.Writing Journals.

B.Sc. (CLS)

B.Sc. FIRST YEAR II SEMESTER

COURSE TYPE	COURSE CODE	COURSE NAME	TEACHING SCHEME (hr/wk)		CREDITS ASSIGNED		TOTAL CREDITS
			Theory	Practical	Theory	Practical	
MAJOR (CORE) M1 MANDARORY	DSC 3	Biochemistry-II	2		2		2+2=4
	DSC 4	Practicals based on M 1 DSC 3		4		4	
MAJOR (CORE) M2 MANDARORY	DSC 3	Microbiology	2		2		2+2=4
	DSC 4	Practicals based on M 2 DSC 3		4		4	
MAJOR (CORE) M3 MANDARORY	DSC 3	Haematology	2		2		2+2=4
	DSC 4	Practicals based on M 3 DSC 3		4		4	
Generic / Open Elective (GE / OE) [Choose any two from pool of courses] **It should be chosen compulsorily from the faculty other than that of major**	GE/OE - 2	**To be chosen from other faculty**	2				2
VSC (VOCATIONAL SKILL COURSES){CHOOSE ANY ONE FROM POOL OF COURSES}	VSC-1	Clinical Pathology	1				1
	VSC-2	Practicals based on SEC-1		2		1	2
AEC, VEC,IKS	AEC-2	ENGLISH (COMMON FOR ALL FACULTY)	2		2		
	VEC-2	CONSTITUTION OF INDIA(COMMON FOR ALL FACULTY)	2		2		
OJT/FP/CEP/RP	CC-1	YOGA EDUCATION AND FITNESS (COMMON FOR ALL FACULTY)		4		2	2

COURSE TYPE	Generic / Open Elective (GE / OE) [Choose any two from pool of courses] **It should be chosen compulsorily from the faculty other than that of major**
COURSE CODE	GE/OE - 1
COURSE NAME	**To be chosen from other faculty**
TEACHING SCHEME (hr/wk)	Theory
CREDITS ASSIGNED Theory	2

COURSE TYPE	**AEC, VEC,IKS**
COURSE CODE	AEC-1
COURSE NAME	**ENGLISH (COMMON FOR ALL FACULTY)**
TEACHING SCHEME (hr/wk)	Theory2
CREDITS ASSIGNED Theory	2

COURSE TYPE	AEC, VEC,IKS
COURSE CODE	IKS-1
COURSE NAME	**CHOOSE ANY ONE FROM POOL OF COURSES**
TEACHING SCHEME (hr/wk)	THEORY 2
CREDITS ASSIGNED	2

COURSE TYPE	OJT/FP/CEP/RP
COURSE CODE	CC-1
COURSE NAME	HEALTH AND WELLNESS (COMMON FOR ALL FACULTY)
TEACHING SCHEME (hr/wk)	Practical 4
CREDITS ASSIGNED Practical	2

THESE COURSES ARE TO BE CHOOSEN FROM UNIVERSITY DATA BASE

SEMESTER II

COURSE TYPE		**MAJOR (CORE) M1 MANDARORY**
COURSE CODE		**DSC 3**
COURSE NAME		**Biochemistry-II**
TEACHING SCHEME (hr/wk)	**Theory**	**2**
CREDITS ASSIGNED	**Theory**	**2**

Biochemistry-II

	no of hrs	% wtg
1) **Training the technician:** Preparation of specimen collection, patient preparation, Basic steps for drawing a blood specimen, specimen collection, patient after care, specimen rejection criteria, hemolysis of blood, chemical tests affected by hemolysis, arterial puncture, deciding specimen types and anticoagulants, preservation, transportation, changes in specimen on storage, use of vacutainers, various types and advantages of vacutainers, physiological factors affecting the composition of body fluids.	**6**	**20**
2) **Chemistry of carbohydrates:** Carbohydrates, Definition, Important functions, Classification, Properties of carbohydrates, Isomerism, Epimers, Digestion of carbohydrates, Absorption of carbohydrates, Metabolism of carbohydrates, general metabolism, Glycolysis, glycogenesis, HMS- pathway, Gluconeogenesis and Lipogenesis, the Cori cycle, formation of Ketone bodies, Role of hormones, deranged glucose metabolism, Detection of diabetes, types of diabetic, criteria for diagnosis of diabetis, Diabetic profile tests, hypoglycemia, diabetes self-testing, Importance of determination of Insulin, pro-insulin and C-peptide assays, Determination of urinary, plasma and other body fluid glucose, various methods, merits, demerits, clinical significance, use of semi-automated method for determination of plasma glucose, importance of determination of micro-albuminurea and glycosylated hemoglobin.	**6**	**20**
3) **Chemical tests in kidney disease:** General consideration, Urea metabolism, Creatine- metabolism, Lohmann reaction, Importance of nucleic acids, nucleotide, nucleotides bases, formation of nucleoside and nucleotide, Structure of DNA, Structure of RNA, denaturation of DNA, nucleoproteins and Uric acid metabolism, various Laboratory tests for the determination of blood/Plasma/ Serum ,urea, creatinine & uric acid.	**6**	**20**

4) **Chemistry of proteins:** Definition, importance, structure of proteins, classification of proteins, amino acids present in proteins, Important properties of proteins and amino acids, Structure-function relationship of proteins, various types of proteins, plasma proteins, function of plasma proteins, role of other proteins, Digestion and absorption of proteins, amino acid metabolism, body's amino acid pool sources and utilization, disorder affecting amino acid metabolism,	**6**	**20**
5) **Enzymes:** Introduction, enzymes as catalysts, enzyme specificity, enzyme catalysis, the nature of enzyme catalysis, active site of enzymes, factors which affect enzyme activity, enzyme kinetics, Lineweaver-Burk plot, enzyme inhibitors, reversible inhibition, competitive inhibitors, noncompetitive inhibitors, irreversible inhibition, organic positive modifiers, inorganic negative modifiers, co- enzymes, isoenzymes, enzyme classification and nomenclature, enzyme- end point reaction methods, clinical significance, units for measuring enzyme activity,	**6**	**20**
	30	**100%**

Reference books:

1) Text book of Medical Laboratory Technology by Dr. P.B.Godkar
2) Biochemistry by U. Satyanarayana
3) Shaum's outline Biochemistry

Note:

On the first day of the new semester the teacher should provide following information to the students –

1) Orientation to the subject 2) Syllabus topics 3) Internal and semester examination systems

4) Library reference work 5) Attendance requirement

COURSE TYPE	**MAJOR (CORE) M1 MANDARORY**
COURSE CODE	**DSC 4**
COURSE NAME	**Practicals based on M 1 DSC 3**
TEACHING SCHEME (hr/wk)	**Practical**
CREDITS ASSIGNED Practical	**2**

BIOCHEMISTRY – (PRACTICALS)

No. of hrs. / week 4

Credits: 2

Topics

1) Standardization of Benedict's qualitative reagent.
2) To identify reducing substances in urine.
3) Quantitative determination of urine glucose by Benedict test.
4) Determination of plasma glucose by Folin-Wu's method.
5) Determination of plasma glucose by Glucose Oxidase method.
6) Demonstration of glucose tolerance test
7) Determination of plasma urea by DAM method.
8) Determination of plasma urea by Berthelot reaction method.
9) Determination of serum creatinine by alkaline picrate method.
10) Determination of urine creatinine by alkaline picrate method.
11) Determination of serum uric acid by Henry-Caraway's method.
12) Determination of serum uric acid by uricase method.
13) Determination of urine uric acid..
14) Determination of serum proteins, albumin, globulins, A/G ratio.
15) Determination of urine and CSF proteins.
16) Standardization & determination of SGPT by end point reaction method.
17) Standardization & determination of SGOT by end point reaction method.
18) Standardization and determination of serum alkaline phosphates by end point reaction method.
19) Standardization & determination of serum acid phosphates by end point reaction method.
20) Standardization & determination of serum amylase by end point reaction method.
21) Standardization & determination of Serum LDH by end point reaction method.

Reference textbook:

COURSE TYPE		**MAJOR (CORE) M2 MANDARORY**
COURSE CODE		**DSC 3**
COURSE NAME		**Microbiology**
TEACHING SCHEME (hr/wk)	**Theory**	**2**
CREDITS ASSIGNED	**Theory**	**2**

MICROBIOLOGY (THEORY)

No. of hrs. / week · **2**
Credits: **2**

Topics	**No of Hrs /**	**% Wtg**
(1) Cultivation of microorganisms Normal flora	**5**	
(2) Microbial metabolism	**5**	
(3) Pathogenesis of bacterial infection	**5**	
(4) Introduction to diagnostic medical microbiology and identification of bacteria.	**3**	
(5) Study of Gram negative bacilli:Morphological, Cultural and Biochemical study of E.coli, Pseudomonas, Klebsiella, Proteus sp, Serratia sp, Enterobacter sp, Providencia sp, Citrobacter sp	**12**	
	30	

Reference book:

(1) Ananthnarayana's Text Book of Microbiology
(2) Jawetz, Melnick and Adelberg's Medical Microbiology
(3) Text book of Medical Laboratory Technology by Dr. P.B.Godkar
(4) Shaum's outline - Microbiology

Note:

On the first day of the new semester the teacher should provide following information to the students –

1) Orientation to the subject 2) Syllabus topics 3) Internal and semester examination systems
4) Library reference work 5) Attendance requirement

Text book of Medical Laboratory Technology by Dr. P. B. Godkar

- **Instruction for teacher : <u>Note:</u>**

It is necessary for the teacher to give orientation regarding the following on the first day -

1) Requirements for practicals: Journal, rough note book lab coat, fractional weighed box, other requirements.
2) Writing rough note book, SOP \ and safety requirements.
3) Writing Journals.

COURSE TYPE	**MAJOR (CORE) M2 MANDARORY**
COURSE CODE	**DSC 4**
COURSE NAME	**Practicals based on M 2 DSC 3**
TEACHING SCHEME (hr/wk) Practical	**4**
CREDITS ASSIGNED Practical	**2**

MICROBIOLOGY – (PRACTICAL)

No. of hrs. / week **4**
Credits **2**

Topics

1) Preparation of various types of media and quality control
(a) Preparation of nutrient agar
(b) Preparation of culture plates
(c) Preparation of agar slants

2) Sterilization of nutrient agar, culture plates and agar slants
3) Study of following important biochemical properties of bacteria
(a) Bile solubility test
(b) Catalase test
(c) Hydrogen sulphide production
(d) Indole test
(e) Nitrate reduction test
(f) Oxidase test
(g) Oxidation Fermentation test
(h) Urease test
(i) Voges-Proskaur(VP) test
(j) Methyl red test
4) Study of Biochemical reactions on TSI agar slants
5) Study of following Gram negative rods in pure cultures
(a) E.coil

(b) Klebsiella sp
(c) Pseudomonas sp
(d) Serratia marcescens sp
(e) Proteus sp
(f) Enterobacter sp
(g) Providencia sp
(h) Citrobacter sp
(i) Salmonella sp
(j) Shigella sp
(k) Vibrio sp
6) Antibiotic sensitivity test.

Reference books:

Text book of Medical Laboratory Technology by Dr. P. B. Godkar

- **Instruction for teacher :**

Note:

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2) Writing rough note book, SOP \ and safety requirements.
3) Writing Journals.

COURSE TYPE	**MAJOR (CORE) M3 MANDARORY**
COURSE CODE	**DSC 3**
COURSE NAME	**Haematology**
TEACHING SCHEME (hr/wk)	**Theory 2**
CREDITS ASSIGNED	**2**

HAEMATOLOGY (THEORY)

No. of hrs. / week 2

Credits: 2

Topics	**No of Hrs**	**% Wtg**
1) Clinical significance of complete blood count,absolute eosinophil count, reticulocyte count and platelet count.	**3**	**10**
3) Introduction to hemostasis and coagulation,Mechanism of coagulation The intrinsic pathways The extrinsic pathways	**3**	**10**
5) The final common pathway of blood clotting, conversion of fibrinogen to fibrin	**2**	**7**
6) The fibrinolytic system and first line tests in acute haemostatic failure	**2**	**7**
7) Routine coagulation tests and clinical significance	**6**	**20**
Bleeding time, Coagulation time, Clot retraction and clot lyses time, Prothrombin Time, Plasma recalcification time, Partial thromboplastine time, Activated partial thromboplastim time , Thrombin time , Thromboplastin generation test, Protamine sulphate test, Platelet aggregation test.		
8) Introduction to Immunohematology	**3**	**10**
9) Human blood group systems.	**1**	**3**
10) ABO antibodies, inheritance of the ABO blood groups and formation of A, B and H antigens	**2**	**7**
11) Rhesus blood group system, Rh antigen, Rh and Preganancy	**1**	**3**
12) Other blood group systems	**2**	**7**
13) Blood grouping and Rh typing, laboratory test principles	**1**	**3**
14) Determination of Du by tube method	**1**	**3**
15) Indirect and Direct coomb's tests	**1**	**3**
16) The compatibility test and determination of anti – D antibody titre	**2**	**7**
Reference books:	**30**	**100**

%

1) Text book of medical laboratory Technology by Dr. P. B. Godkar
2) Dacie and Lewis practical hematology

Note:

On the first day of the new semester the teacher should provide following information to the students –

1) Orientation to the subject 2) Syllabus topics 3) Internal and semester examination systems

4) Library reference work 5) Attendance requirement

COURSE TYPE		**MAJOR (CORE) M3 MANDARORY**
COURSE CODE		**DSC 4**
COURSE NAME		**Practicals based on M 3 DSC 3**
TEACHING SCHEME (hr/wk)		**Practical, 4**
CREDITS ASSIGNED	**Practical**	**2**

HAEMATOLOGY – (PRACTICALS)

SEMESTER- II

No. of hrs. / week	4
Credits	2

Topics

1) Orientation to Phlebotomy & revision of study of blood smears
2) Determination of absolute eosinophil count
3) Determination of platelet count
4) Determination of bleeding time.
5) Determination of clotting time.
6) Determination of clot retraction and lysis time.
7) Determination of prothrombin time.
8) Determination of plasma recalcification time.
9) Determination of partial thromboplastin time (PTT).
10) Determination of activated partial thromboplastin time (APTT).
11) Determination of thrombin time.
12) Protamine sulphate test.
15) Qualitative test for ABO grouping with antisera.
16) Determination of ABO grouping by tube method.
17) Determination of D (Rho) antigen on human red blood cells.
18) Indirect antiglobulin (Coomb's) test.
19) The compatibility test.
20) Antiglobulin cross-matching.
21) Quantitative determination of anti-D antibody titre.
22) Determination of fibrinogen.

Reference books:

1) Text book of medical laboratory technology by Dr. P.B.Godkar

- **Instruction for teacher : Note:**

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2) Writing rough note book, SOP \ and safety requirements.
3) Writing Journals.

COURSE TYPE	**VSC (VOCATIONAL SKILL COURSES){CHOOSE ANY ONE FROM POOL OF COURSES}**
COURSE CODE	**VSC-1**
COURSE NAME	**Clinical Pathology**
TEACHING SCHEME (hr/wk)	**Theory 1**
CREDITS ASSIGNED Theory	**1**

CLINICAL PATHOLOGY (THEORY)

No. of hrs. / week	1	
Credits	1	
Topics	**No of Hrs**	**% Wtg**
1) Introduction to Parasitology and safety in the laboratory.	**1**	**6**
2) Classification of human parasites (Based on the life cycles)	**1**	**6**
3) Protozoal infections, Life cycles of E.hitolytica and G. lamblia in man. Amebiasis, Giardiasis and related laboratory tests: stool examination results. **(2)**	**2**	12
4) Helminths. Life cycles of nematohelminths and platyhelminths. Related laboratory tests: Stool examination results.	**3**	**20**
5) Rootine stool examination: collection, precautions, preservatives, containers, storage, Gross examination.	**1**	**10**
6) Physical and chemical examination of feces and related clinical significance. **(1)**	**1**	10
7) Microscopic examination of stool specimen by routine and concentration methods and waste disposal	**2**	**12**
8) Routine examination of CSF, Formation of CSF, normal composition, specimen collectionphysical, chemical and microscopic examination of CSF and related clinical significance.	**2**	**12**

9) Semen examination: Physiology of seminal fluid, Brief anatomy of male reproductive system, normal composition of semen, specimen collection, preservation. Physical, chemical and microscopic examination of semen and related clinical significance,	2	12
pregnancy test. Study of cavity fluids: Peritoneal, Plural, Pericardial & Synovial.	**15**	**100**

Reference books:

1) Text book of Medical Laboratory Technology by Dr. P. B. Godkar.
2) John Bernard Henry's Clinical Diagnosis And Management By Laboratory Methods

Note:

On the first day of the new semester the teacher should provide following information to the students –

1) Orientation to the subject 2) Syllabus topics 3) Internal and semester examination systems
4) Library reference work 5) Attendance requirement

COURSE TYPE		**VSC (VOCATIONAL SKILL COURSES){CHOOSE ANY ONE FROM POOL OF COURSES}**
COURSE CODE		**VSC-2**
COURSE NAME		**Practicals based on VSC-1**
TEACHING SCHEME (hr/wk)	**Practical**	**2**
CREDITS ASSIGNED	**ractical**	**1**

CLINICAL PATHOLOGY – (PRACTICAL)

No. of hrs. / week 4
Credits 2

Topics

1. Introduction to routine examination of faeces: Specimen collection, containers, precautions, preservatives, storage
2. Gross and physical examination of stool
3. Chemical examination of faces: Determination of pH and occult blood
4. Microscopic examination of stool specimen (by routine and concentration method)
5. Physical and microscopic examination of CSF
6. Chemical examination of CSF. quantitative determination of glucose, proteins and Chlorides.
7. Routine examination of semen: Introduction, physical examination of semen
8. Quantitative determination of semen fructose
9. Microscopic examination of semen
10. Pregnancy test.

Reference books:

1) Text book of Medical Laboratory Technology by Dr. P. B. Godkar.

- **Instruction for teacher : <u>Note:</u>**

It is necessary for the teacher to give orientation regarding the following on the first day -

1) Requirements for practicals: Journal, rough note book lab coat, fractional weighed box, other requirements.
2) Writing rough note book, SOP \ and safety requirements.
3) Writing Journals.

COURSE TYPE		Generic / Open Elective (GE / OE) [Choose any two from pool of courses] **It should be chosen compulsorily from the faculty other than that of major**
COURSE CODE		GE/OE - 2
COURSE NAME		**To be chosen from other faculty**
TEACHING SCHEME (hr/wk)	Theory	**2**
CREDITS ASSIGNED	Theory	2

COURSE TYPE		AEC, VEC,IKS
COURSE CODE		AEC-2
COURSE NAME		ENGLISH (COMMON FOR ALL FACULTY)
TEACHING SCHEME (hr/wk)	Theory	**2**
CREDITS ASSIGNED	Theory	**2**

COURSE TYPE		AEC, VEC,IKS
COURSE CODE		VEC-2
COURSE NAME		CONSTITUTION OF INDIA(COMMON FOR ALL FACULTY)
TEACHING SCHEME (hr/wk)	Theory	**2**
CREDITS ASSIGNED	Theory	**2**

COURSE TYPE	OJT/FP/CEP/RP
COURSE CODE	CC-1
COURSE NAME	YOGA EDUCATION AND FITNESS (COMMON FOR ALL FACULTY)
TEACHING SCHEME (hr/wk)	Practical **4**
CREDITS ASSIGNED	Practical **2**

THESE COURSES ARE TO BE CHOOSEN FROM UNIVERSITY DATA BASE