FACULTY OF LIFE SCIENCES

SYLLABUS FOR THE BATCH FROM THE YEAR 2021 TO YEAR 2022

DIPLOMA COURSE IN MEDICAL LABORATORY TECHNOLOGY (SEMESTER I-II)

Examinations: 2021 - 22

GURU NANAK DEV UNIVERSITY AMRITSAR

DIPLOMA COURSE IN MEDICAL LABORATORY TECHNOLOGY
(SEMESTER SYSTEM) (ONE YEAR COURSE)
SYLLABUS FOR THE BATCH FROM THE YEAR 2021 TO YEAR 2022

SCHEME

Semester-I

PAPER	NAME	THEORY MARKS	PRACTICAL MARKS	TOTAL MARKS
I	**Cell Biology**	**70**	**30**	**100**
II	**Haematology -I**	**50**	**50**	**100**
III	**Principals of Biochemistry**	**70**	**30**	**100**
IV	**Basic Microbiology**	**70**	**30**	**100**
V	**Training and Project Report**	**-**	**-**	**100**

Semester-II

PAPER	NAME	THEORY MARKS	PRACTICAL MARKS	TOTAL MARKS
I	**Anatomy and Physiology**	**70**	**30**	**100**
II	**Haematology –II**	**50**	**50**	**100**
III	**Advanced Pathology**	**50**	**50**	**100**
IV	**Clinical Biochemistry and Community Medicine**	**50**	**50**	**100**

DIPLOMA COURSE IN MEDICAL LABORATORY TECHNOLOGY
(SEMESTER-I) (ONE YEAR COURSE)
SYLLABUS FOR THE BATCH FROM THE YEAR 2021 TO YEAR 2022

Paper-I CELL BIOLOGY (THEORY)

Time 3 Hrs. **Max. Marks : 100**
Theory : 70
Practical : 30

Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Section-A

Microscopic techniques: light and phase contrast microscopy, Electron microscopy (TEM and SEM), Fixation and Staining techniques.

Section-B

Types of cells, Cell Division, Mitosis and meiosis Plasma Membrane: Structure and molecular models, Structure of mitochondria.

Section-C

Endoplasmic reticulum and Golgi complex. Ribosomes: Types, their structure and functions. Protein synthesis and types of RNA

Section-D

Ribosomes: Types, their structure and functions. Protein synthesis and types of RNA

Books recommended:

1. Alberts, B. Bracy, P. Lewis, J. Raff, M. Roberts K and Watson, J. (eds) (2008). Molecular Biology of the Cell (5th Ed.), Garland Publishing, New York.
2. Copper, G.M. (2015). The Cell, Molecular Approach (7th Ed)ASM press Washington, D.C.
3. Chandra Roy, S and DE Kumar, K. (2001) Cell Biology. New Central Book Agency (P) Ltd. Kolkata
4. Darnell, J. Lodish, Baltimore, D. (2007). Molecular Cell Biology, 6th edition, Freeman, New York.

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(SEMESTER-I) (ONE YEAR COURSE)
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PAPER-I : CELL BIOLOGY (PRACTICAL)

Marks : 30

1. Different types of Microscopes and their working.
2. Study of permanent slides of prokaryotic and eukaryotic cell
3. Study of permanent slides of tissues.
4. Temporary preparation of Lacto bacillus from curd
5. Temporary preparation of fresh water Protozoa
6. Histological preparation of tissues

Note : Some changes can be made in the Practicals depending on the availability of material.

DIPLOMA COURSE IN MEDICAL LABORATORY TECHNOLOGY
(SEMESTER-I) (ONE YEAR COURSE)
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Paper-II : HEMATOLOGY-I (THEORY)

Time 3 Hrs. **Max. Marks : 100**
Theory : 50
Practical : 50

Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Section A

Introduction to Hematology :Definition and significance of hematology, Characteristics of good technician, Blood and its various components. Erthropoiesis: developmental series of RBC's, RBC's indices & Anomalies. Leucopoeisis: Developmental series of WBS's and its types & physiopedia . Thrombopoeisis: Developmental stages, pathological conditions.

Section B

Phlebotomy Techniques: Preparation of specimen collection material, lab request form, veinpuncture and its complications, Patient after care, Specimen rejection criteria for blood specimen, changes in blood on keeping, maintenance of specimen, identification & transport of the specimen, Haemolysis of blood, separation of serum & plasma, effects of storage on blood cell morphology, universal precautions. Anticoagulants

Section C.

Hemoglobin:Its structure and derivatives, estimation of haemoglobin, CBC , Blood film prepration & staining methods,Differential count, ESR,PCV.

Section D

Hemocytometry: types of Hemocytometers, ruled area, RBC's Count, Total leucocyte count, platelet count ,absolute eosinophil count.

Books Recommended:

1. Godkar, PB and Godkar, DP (2008) Text Book of Medical Laboratory Technology, 2nd edition Bhalani Publishing House, Mumbai, India.
2. Martin R. Howard & Peter J Hamilton (2013)Text Book of Hematology, 4 th edition, Churchill Livingstone.

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PAPER-II : HEMATOLOGY-I (PRACTICAL)

Marks : 50

1. Basic requirements for Hematology laboratory.
2. Glassware for Hematology.
3. Equipments for Hematology.
4. Anticoagulant vial preparation.
5. Complete Blood Count.
6. Determination of Hemoglobin.
7. TRBC count by Hemocytometer.
8. TLC by Hemocytometer.
9. Differential Leukocyte count.
10. Determination of Platelet Count.

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(SEMESTER-I) (ONE YEAR COURSE)
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Paper-III : PRINCIPLES OF BIOCHEMISTRY (THEORY)

Time 3 Hrs. **Max. Marks : 100**
Theory : 70
Practical : 30

Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Section A

Introduction of Biochemistry, Definition, Classification and Chemistry of Carbohydrates including proteoglycans.

Section B

Fat, Protein & Amino acid, Water & Fat soluble Vitamins.

Section C

Enzymes (Classification, factors regulating, inhibitors, clinical application)
Buffers, Molarily, indicators, Radioisotopes, Radiation hazard, RA.

Section D

Overview of Iron, Calcium, Iodine, Flourine. Overview of Nucleic Acids & Uric Acid.

Books Recommended

1. Nelson D Land Cox MM. (2013) Lehninger Principles of Biochemistry, 6th Edition. Macmillan Worth Publishers, New Delhi.
2. Berg JM, Tymoczko JL, Gatto GJ and Stryer L (2015) Biochemistry,8th Edition, WH Freeman & Co., New York.
3. Bender DA, Botham KM, Kennelly PJ, Rodwell VW and Weil PA (2015) Harper's Illustrated Biochemistry, 30th Edition, McGraw Hill Medical Canada

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(SEMESTER-I) (ONE YEAR COURSE)
SYLLABUS FOR THE BATCH FROM THE YEAR 2021 TO YEAR 2022

Paper-III : PRINCIPLES OF BIOCHEMISTRY (PRACTICAL)

Marks : 30

1. Introduction to Biochemistry Laboratory: General Glassware, Equipment: use of analytical balance and general safety measures
2. Cleaning of glassware: preparation of chromic acid
3. Calibration of Laboratory equipment
4. Preparation of distilled water
5. Preparation of 1N NaOH
6. Preparation of 1N HCl
7. Preparation of normal saline
8. Use of pH meter and preparation of Buffer.
9. Use of Centrifuge with different types of Rotor
10. Use of spectrophotometer and colorimeter.
11. To find the absorption maxima of a dye.
12. To find the absorption maxima of aromatic amino acids.
13. Volumetric analysis- acid base titration

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(SEMESTER-I) (ONE YEAR COURSE)
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Paper-IV : BASIC MICROBIOLOGY (THEORY)

Time 3 Hrs. **Max. Marks : 100**
Theory : 70
Practical : 30

Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Section A

Introduction to Bacteriology, virology and mycology, immunology, medical microbiology molecular microbiology. General account of Bacteria, fungi, protozoa, viruses, their morphology.

Section B

Microscopy and staining, microbiological techniques, pour plating, spreading, streaking serial dilution, methods of sterilization, media preparation, types of media (synthetic, natural, enrichment, selective)

Section C

Pure cultures & cultural characteristics: Mixed culture, selective methods, natural selection of microorganisms, maintenance & preservation of cultures, culture collection and cataloging of pure cultures, colony characteristics & characteristics of broth cultures.

Section D

PARASITOLOGY - Introduction & classification of medically important parasites, Brief review of Intestinal & Tissue protozoa (E.histolylica, Giardia Primary Amoebic meningoencephalitis) - Malarial parasite, Tapeworms, Flukes of liver, and other tissue nematodes.

Books Recommended:

1. Stanier, R.Y. Adelberg, E.A. and Ingraham, J.L. (1984), General Microbiology, IV edn. Mac Millan Press.
2. Pelczar, M.J. Chan, E.C.S. and Krieg, N.R. (1986), Microbiology, V Ed. McGraw Hill.
3. Prescott. L.M. Harley J.P. and L. Kreig D.A. (1990). Microbiology, WCB Publishers.
4. Rosenberg, E & Cohen I.R. (1983). Microbial Biology. H.S. International Editions.

DIPLOMA COURSE IN MEDICAL LABORATORY TECHNOLOGY
(SEMESTER-I) (ONE YEAR COURSE)
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Paper-IV : BASIC MICROBIOLOGY (PRACTICAL)

Marks : 30

1. To study different lab apparatuses used in microbiology.

2. To study various techniques of sterilization.

3. To prepare media & its sterilization.

4. To prepare agar slants/deeps.

5. Serial dilution for enumeration of microorganisms.

6. To study various cultural techniques like pour plating, spreading & streaking.

7. To study the morphology cell structure of microorganisms through staining procedures.

   a. Simple staining

   b. Gram staining

   c. Negative staining

8. To count the no. of microorganisms by Haemocytometer.

9. Faeces examination

10. Determination of Malarial Parasite.

Paper-V : TRAINING AND PROJECT REPORT

Marks : 100

The students will be required to submit a Project Report based on Laboratory Training in some Pathological Lab / Hospital / Nursing Home etc. of one Month and Viva will be conducted by the internal examiner.

DIPLOMA COURSE IN MEDICAL LABORATORY TECHNOLOGY
(SEMESTER-II) (ONE YEAR COURSE)
SYLLABUS FOR THE BATCH FROM THE YEAR 2021 TO YEAR 2022

PAPER-I : ANATOMY AND PHYSIOLOGY (THEORY)

Time 3 Hrs. **Max. Marks : 100**
Theory : 70
Practical : 30

Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Section A

Brief study of Alimentary and digestive system: - Diseases of mouth and Oesophagus, Gastritis, Peptic ulceration, Appendicitis microbial diseases, food poisoning, hernia, Intestinal abstrictions & malabsorption. Accessory Digestive glands: Salivary glands- mumps, Liver – hepatitis, liver failure, cirrhosis. Pancreas- pancreatitis, Gall Bladder- Gall stones, jaundice.

Section B

Brief study of Circulatory System: - Diseases of Blood vessels- Atheroma, Atherosclerosis, Disorders of Blood Pressure - Hyper & Hypotension and cardiovascular diseases.

Section C

Brief study of Urinary system- Brief anatomical description of constituent parts, Functions of urinary system, Role of kidney in Urine formation and maintaining blood volume .

Section D

Brief study of Respiratory System: - Upper respiratory tract infection, Bronchi, Asthma, Pneumonia, Lung abscess, Tuberculosis, Lung Collapse

Books Recommended

1. Drake, R., Vogl, W. and Mitchell, A. (2004). Gray's Anatomy for Students. Churchil, Livingstone, USA.
2. Marieb, E.N. (2014). Human Anatomy and Physiology. Dorling Kindersley (India) Pvt. Ltd.,
3. Ross and Willson (2012). Anatomy and Physiology. ELBS Publication.
4. Tortora, G.J. and Henderson, S.R. (2012). Principles of Anatomy and Physiology. Harper Collins College Publishers.

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PAPER-I : ANATOMY AND PHYSIOLOGY (PRACTICAL)

Marks : 30

1. Estimation of Bleeding time, clotting time.

2. Estimation of Hemoglobin concentration,

3. Blood cell counts- RBC Count, Total leukocyte count, Differential leukocyte count

4. Osmotic fragility of RBC,

5. Estimation of ESR

6. To record Heart rate and pulse rate

7. To record Blood pressure

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PAPER-II : HAEMATOLOGY-II (THEORY)

Time 3 Hrs. **Max. Marks : 100**
Theory : 50
Practical : 50

Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Section A

Coagulation and mechanism of coagulation: Hemostasis, Coagulation mechanism, Coagulation factors, Routine coagulation Tests, Automated coagulation analyzer.

Section B

Hematological Disorders: Anemia, various types of anemias., Thalassemia, Polycythemia, Leukemia & its classification. .

Section C

Blood Banking: (i) Collection of Blood (ii) Storage of Blood (iii) ABO & Rh Blood Group System by Slide Method & Tube Method (iv) Cross- Maching (v) Blood Transfusion and its Reactions, (vi)blood components(vii)Direct & Indirect Coomb's test (HDN)

Section D

Immunology :(i) Types of immunity(ii) Antigen & Antibodies; structure, classification & characteristics (iii) Primary & secondary lymphoid organs(iv)cytokines(v)Affinity & avidity.

Books Recommended:

1. Godkar, PB and Godkar, DP (2008) Text Book of Medical Laboratory Technology, 2nd edition Bhalani Publishing House, Mumbai, India.
2. Martin R. Howard & Peter J Hamilton (2013) Text Book of Haematology, 4th edition, Churchill Livingstone

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PAPER-II : HEMATOLOGY-II (PRACTICAL)

Marks : 50

1. Determination of ESR by Wintrobes.

2. Determination of ESR by Westergeren's method.

3. Determination of PCV by Wintrobes

4. Erythrocyte Indices- MCV, MCH, MCHC.

5. Reticulocyte count.

6. Absolute Eosinophil count.

7. Morphology of Red Blood Cells.

8. Determination of Bleeding Time

10. Determination of clotting time

DIPLOMA COURSE IN MEDICAL LABORATORY TECHNOLOGY
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PAPER-III : ADVANCED PATHOLOGY (THEORY)

Time 3 Hrs. **Max. Marks : 100**
Theory : 50
Practical : 50

Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Section A

General Pathology Cell injury, inflammation & repair adaptation, hemodynamic, infectious diseases, nutritional diseases, genetic diseases, neoplasia and occupational diseases.

Section B

Histopathology: introduction to histology, sample collection, Fixation, Dehydration, Impregnation & Embedding techniques .

Section C

Microtomy: Types of micromes, Honning, Stropping, Section cutting, Staining procedures

Section D

Body Fluids: Urine: Method of Collection Normal Constituents Physical Examination Chemical Examination Stool Examination: Method of Collection Normal Constituents and appearance Abnormal Constituents (Ova, Cyst) C.S.F. Examination Physical Examination Chemical Examination Microscopy Cell 1 Count Staining Semen Analysis Collection Examination Special Test

Books Recommended

1. Textbook of Pathology by Harsh Mohan (2015). Jaypee Brothers Medical Publishers (P) Ltd. New Delhi, india

2. Muir's Textbook of Pathology (2014) edited by C. Simon Herrington. CRC press USA

3. Textbook of Pathology (2004) by V Krishna. Orirnt Longman Pvt. Ltd, India

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PAPER-III : ADVANCED PATHOLOGY (PRACTICAL)

Marks : 50

1. Study of various types of microscope, Use & care of Microscope

2. Mounting and staining Techniques

3. Maintenance of records and slides

4. Urine Examination – Collection and Preservation of urine

5. Physical, chemical, Microscopic Examination

6. Sputum Examination.

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PAPER-IV : CLINICAL BIOCHEMISTRY AND COMMUNITY MEDICINE (THEORY)

Time 3 Hrs. **Max. Marks : 100**
Theory : 50
Practical : 50

Instructions for the Paper Setters:
Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Section A

Biochemical Test Profile (Quantitative Determination of Blood Plasma & Serum) Acid Phosphatase (ACP), Alkaline Phosphatase (ALP), Amino Acids, Bilirubin, Cholesterol, Creatinine, Creatinine Phosphokinase (CPK), SGOT, SGPT, Uric Acid, Urea, TSH.

Section B

Biochemical Test Profile (Quantitative determination of Urine)
Amylase, Calcium, Chlorides, Creatinine, Sodium, Potassium, Glucose, Proteins, Urea nitrogen, Uric Acid.

Section C

Biochemical Test Profile (Quantitative Determination of CSF**)** Chloride Glucose, Proteins.
Sterilization Techniques
Definition & Methods, Principles, bacteriological filtration, irradiation, tyndallisation.

Section D

Bio-Medical Waste Management Sanitation in Public Health. Food and Nutrition: Collection of different food samples: Cereals, Pulses, Vegetables, Roots and tubers, Fats and oils, Animal foods including milk Food-borne diseases of Public Health importance.

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PAPER-IV : CLINICAL BIOCHEMISTRY AND COMMUNITY MEDICINE (PRACTICAL)

Marks : 50

I. Principles and working of laboratory instruments.

II. Importance and methods of cleaning of glass apparatus.

III. Calibration of apparatus and glasswares.

IV. Prepration and standardization of volumetric solutions.

V. Verification of Beer Lamber's Law

VI. Preparation of buffer solution & measurement of their pH.

VII. Determination of blood sugar level of plasma (or serum)

a) **Orthotouluidine method,**
b) **Glucose oxidase method**

VIII. Determination of Serum total cholesterol.