

**ADESH UNIVERSITY**

**BATHINDA**

**CERTIFICATE IN ANAESTHESIA TECHNOLOGY  
(CAT)**

**Duration of Course : 1 year**

**Eligibility : Matriculation with minimum 40% marks**

**No. of Seats : 30**

**Syllabus & Course Curriculum**

# **CERTIFICATE IN ANAESTHESIA TECHNOLOGY (CAT)**

## **SEMESTER I**

### **SUBJECT - 1: Anatomy and Physiology & Introductory Biology (Total No. of Hours 30/ Total marks 40)**

#### **Anatomy:-**

**(14hrs/18marks)**

1. Introduction to Anatomy & Histology, Structure of cell, epithelial tissue, Muscular tissue, nervous tissue.
2. Skeletal system-Structure of Bones, Types of bones, Bones of cranium, face, vertebral column, Upper & lower limbs, fracture of bones, movements of joints.
3. Muscular System- Structure and types of muscles in human body.
4. Circulatory system- Structure of heart, names and position of main blood vessels.
5. Digestive system- Parts of gastrointestinal tract and associated glands.
6. Respiratory system- Parts of respiratory system.
7. Urinary system- Parts of urinary system.
8. Skin & sense organs- Eye, Ear, Nose, Tongue(taste buds)
9. Nervous system- Parts of Brain, spinal cord. Cranial nerve, spinal cord, Peripheral nerves, Blood supply of Brain and spinal cord.
10. Reproductive system- male & female reproductive organs.
11. Endocrine Glands- Thyroid, Parathyroid, Adrenal, pituitary, pancreas and sex glands.

#### **Physiology**

**(12 hrs/16marks)**

1. Blood- Composition and functions of Blood, Hemoglobin, Blood groups, blood coagulation, body fluids, blood volume.
2. Cardiovascular System- Circulation of blood, function of heart and blood vessels, control of heart rate, pulse, regulation of blood pressure.
3. Respiratory System- Functions of lungs, mechanism of breathing & exchange of gases in the lungs, regulation of respiration, respiration disorder like anoxia, Hypoxia, dyspnea, lung function test.
4. Digestive systems- Digestion and absorption of food.
5. Excretory system- Structure and function of kidney and urinary bladder, mechanism of urine formation, Disorder of Kidney, ureter, urinary bladder.
6. Nervous system- Neurons & its functions, functions of CNS, ANS, physiology of vision, hearing sensation. Cerebrospinal Fluid (C.S.F), Cerebral Blood flow, cerebral perfusion pressure, intra cranial pressure.
7. Reproductive system- physiology and Female reproductive organs.
8. Endocrine Glands- functions of endocrine glands and hormones secreted by them.

#### **Introductory Biology**

**(4 hrs/6marks)**

1. Living World- Biology & its branches, characters of living organisms.
2. Cell & cell division:- cell as a basic unit of life, unicellular and multi cellular organisms, compound microscope, electron microscope.
3. Cell organelles & their functions-

4. Genetics- Continuity of life - heredity, variation; Chromosomes - sex linked inheritance; mutation  
DNA as a genetic material - its structure and replication; structure of RNA and its role in protein synthesis; Gene expression - transcription and translation in prokaryotes and eukaryotes

Scheme of Examination Theory: (one paper of 3 hours duration carrying 40 marks)

Type of Questions	Total No. of Questions	No. of Questions to be attempted	Marks (each Question)	Sub-total
Very Short Answer	6	4	2	8
Short Answer	6	4	4	16
Long answer	3	2	8	16
		<b>Total Marks</b>		<b>40</b>

**Subject: 2 Anaesthesia Equipment, Drugs & Techniques.**  
(Total No. of Hours 30/ Total marks 40)

**Anaesthesia Equipment (PART-A)**

(15hrs/20marks)

- Boyle's Machine & It's functioning
- Magill's breathing circuit, Bains breathing circuit, pediatrics anaesthesia circuit
- Gas cylinders & flow meters
- Carbon dioxide absorption canisters.
- Suction apparatus foot operated, electrically operated
- Ambu bag & laryngoscope, endo tracheal tubes
- catheters, face masks, ventimasks

**Drugs(PART-B)**

(15hrs/20marks)

- General Principles- Pharmacological classification of Drugs, Route of drug administration, precautions in administration, principles of drug toxicity, prevention & treatment of poisoning adverse drug reaction.
- Sedatives & hypnotics, barbiturates, morphine & others.
- Important groups of drugs- antimicrobial agents anti allergy drugs, anti-diuretics, NSAIDS.
- Pre-anesthetic medication
- Local-Anaesthetic agents
- Spinal anaesthetic agents
- General anaesthetic agents

Scheme of Examination Theory: (one paper of 3 hours duration carrying 40 marks)

Type of Questions	Total No. of Questions	No. of Questions to be attempted	Marks (each Question)	Sub-total
Very Short Answer	6	4	2	8
Short Answer	6	4	4	16
Long answer	3	2	8	16
		<b>Total Marks</b>		<b>40</b>

**Subject: 3 Biochemistry & Microbiology**  
(Total No. of Hours 30/ Total marks 40)

**BIOCHEMISTRY (PART-A) (15hrs/20marks)**

Estimation of calcium, sodium, potassium, glucose, ABG, BT& CT

**MICROBIOLOGY (PART-B) (15hrs/20marks)**

**CHAPTER 1: INTRODUCTION TO MICROBIOLOGY:**

Discovery of micro organisms. Classification and general characteristics of microorganisms, nutritional requirements of Micro-organisms.

**CHAPTER 2: PRINCIPLES OF MICROBIAL CONTROL:** Sterilization, importance of sterilization in OT techniques various methods-physical UV rays

**CHAPTER 3:** Biomedical waste management.

**CHAPTER 4:** Hospital acquired infections

Scheme of Examination Theory: (one paper of 3 hours duration carrying 40 marks)

Type of Questions	Total No. of Questions	No. of Questions to be attempted	Marks (each Question)	Sub-total
Very Short Answer	6	4	2	8
Short Answer	6	4	4	16
Long answer	3	2	8	16
		<b>Total Marks</b>		<b>40</b>

**Subject: 4 Communication & Soft Skills.**  
(Total No. of Hours 15/ Total marks 20)

**UNIT I (5hrs/7marks)**

**Essentials of Grammar:**

• Parts of Speech • Punctuation • Vocabulary Building • Phonetics

**UNIT II (5hrs/7marks)**

**Office Management:**

• Types of Correspondence • Receipt and Dispatch of Mail • Filing Systems  
• Classification of Mail. • Role & Function of Correspondence • MIS • Managing Computer

**UNIT III****(5hrs/6marks)****Group Discussion & Presentation:**

• Definition • Process • Guidelines • Helpful Expressions • Evaluation

(Note: Every student shall be given 15 minutes. of presentation time &amp; 45 minutes of discussion on his/ her presentation.)

Scheme of Examination Theory: (one paper of 1½ hours duration carrying 20 marks)

Type of Questions	Total No. of Questions	No. of Questions to be attempted	Marks (each Question)	Sub-total
Very Short Answer	3	2	2	4
Short Answer	3	2	4	8
Long answer	2	1	8	8
		<b>Total Marks</b>		<b>20</b>

**Subject: 5 Practical**

1. Anatomy- Identification of bones & other organs of the body & viva voice as theory syllabus
2. Physiology- venepuncture, finger pricking techniques, HB estimation, blood groups, HIV, BT, CT & viva voice
3. Anaesthesia equipment & drugs – Identification & demonstration of the working of equipments & viva voice
4. Study of parts of compound microscope
5. Instrument trolley setting for common anaesthetic procedures.
6. Estimation of calcium, sodium, potassium, glucose, ABG, BT& CT
7. Methods of scrubbing, donning of gown, gloves wearing, head covers & mask

**ADESH UNIVERSITY**

**BATHINDA**

**CERTIFICATE IN DIALYSIS TECHNOLOGY  
(CDT)**

**Duration of Course : 1 year**

**Eligibility : Matriculation with Minimum 40% marks**

**No. of Seats : 30**

**Syllabus & Course Curriculum**

**CERTIFICATE IN DIALYSIS TECHNOLOGY**

**SUBJECT - 1: Anatomy and Physiology & Introductory Biology**

**(Total No. of Hours 30/ Total marks 40)**

## **Anatomy:-**

**(14hrs/18marks)**

12. Introduction to Anatomy & Histology, Structure of cell, epithelial tissue, Muscular tissue, nervous tissue.
13. Skeletal system-Structure of Bones, Types of bones, Bones of cranium, face, vertebral column, Upper & lower limbs, fracture of bones, movements of joints.
14. Muscular System- Structure and types of muscles in human body.
15. Circulatory system- Structure of heart, names and position of main blood vessels.
16. Digestive system- Parts of gastrointestinal tract and associated glands.
17. Respiratory system- Parts of respiratory system.
18. Urinary system- Parts of urinary system.
19. Skin & sense organs- Eye, Ear, Nose, Tongue(taste buds)
20. Nervous system- Parts of Brain, spinal cord. Cranial nerve, spinal cord, Peripheral nerves, Blood supply of Brain and spinal cord.
21. Reproductive system- male & female reproductive organs.
22. Endocrine Glands- Thyroid, Parathyroid, Adrenal, pituitary, pancreas and sex glands.

## **Physiology** **hrs/16marks)**

**(12**

9. Blood- Composition and functions of Blood, Hemoglobin, Blood groups, blood coagulation, body fluids, blood volume.
10. Cardiovascular System- Circulation of blood, function of heart and blood vessels, control of heart rate, pulse, regulation of blood pressure.
11. Respiratory System- Functions of lungs, mechanism of breathing & exchange of gases in the lungs, regulation of respiration, respiration disorder like anoxia, Hypoxia, dyspnea, lung function test.
12. Digestive systems- Digestion and absorption of food.
13. Excretory system- Structure and function of kidney and urinary bladder, mechanism of urine formation, Disorder of Kidney, ureter, urinary bladder.
14. Nervous system- Neurons & its functions, functions of CNS, ANS, physiology of vision, hearing sensation. Cerebrospinal Fluid (C.S.F), Cerebral Blood flow, cerebral perfusion pressure, intra cranial pressure.
15. Reproductive system- physiology and Female reproductive organs.
16. Endocrine Glands- functions of endocrine glands and hormones secreted by them.

## **Introductory Biology** **hrs/6marks)**

**(4**

5. Living World- Biology & its branches, characters of living organisms.
6. Cell & cell division:- cell as a basic unit of life, unicellular and multi cellular organisms, compound microscope, electron microscope.
7. Cell organelles & their functions-

8. Genetics- Continuity of life - heredity, variation; Chromosomes - sex linked inheritance; mutation

DNA as a genetic material - its structure and replication; structure of RNA and its role in protein synthesis; Gene expression - transcription and translation in prokaryotes and eukaryotes

Scheme of Examination Theory: (one paper of 3 hours duration carrying 40 marks)

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Short Answer	6	4	4	16
Long answer	3	2	8	16
<b>Total Marks</b>			<b>40</b>	

**Subject: 2 Biochemistry**  
(Total No. of Hours 30/ Total marks 40)

- Standard solutions :- various standard solutions used, their preparation, storage of chemicals.  
**(6hrs/8 marks)**
- Osmosis, Diffusion, dialysis, surface tension. **(6hrs/8 marks)**
- Collection and recording of biological specimens, separation of serum and plasma preservation and disposal of biological materials.  
**(6hrs/8 marks)**
- Electrometric determination of Na<sup>+</sup> and K<sup>+</sup>, Cl<sup>-</sup>, Serum Phosphorus, Serum Ca<sup>++</sup>  
**(6hrs/8 marks)**
- Principal and procedure for estimation of Glucose, urea, uric acid, creatinine, bilirubin, total protein, Estimation of Hemoglobin, TLC,DLC,BT,CT. **(6hrs/8 marks)**

Scheme of Examination Theory: (one paper of 3 hours duration carrying 40 marks)

Type of Questions	Total No. of Questions	No. of Questions to be attempted	Marks (each Question)	Sub-total
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Short Answer	6	4	4	16
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<b>Total Marks</b>			<b>40</b>	



**Subject: 3 Introduction to Dialysis**  
(Total No. of Hours 30/ Total marks 40)

1. Dialysis- the concept brief history , definition, mechanism.
2. Components of dialysis- access, blood flow, anticoagulant, dialysate).
3. Water treatment
4. Components, functions and functional derangements of dialysis machines.
5. Assessment of patients prior, during and after dialysis.

Scheme of Examination Theory: (one paper of 3 hours duration carrying 40 marks)

Type of Questions	Total No. of Questions	No. of Questions to be attempted	Marks (each Question)	Sub-total
Very Short Answer	6	4	2	8
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Long answer	3	2	8	16
		<b>Total Marks</b>		<b>40</b>

**Subject: 4 Communication & Soft Skills. (Total No. of Hours 15/ Total marks 20)**

**UNIT I**

(5hrs/7marks)

**Essentials of Grammar:**

- Parts of Speech • Punctuation • **Vocabulary Building** • Phonetics

**UNIT II**

(5hrs/7marks)

**Office Management:**

- Types of Correspondence • Receipt and Dispatch of Mail • Filing Systems
- Classification of Mail. • Role & Function of Correspondence • MIS • Managing Computer

**UNIT III**

(5hrs/6marks)

**Group Discussion & Presentation:**

- Definition • Process • Guidelines • Helpful Expressions • Evaluation
- (Note: Every student shall be given 15 minutes. of presentation time & 45 minutes of discussion on his/ her presentation.)

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Type of Questions	Total No. of Questions	No. of Questions to be attempted	Marks (each Question)	Sub-total
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### **Subject: 5 Practical**

1. Anatomy- Identification of bones & other organs of the body & viva voce as theory syllabus
2. Physiology- vene puncture, finger pricking techniques, HB estimation, blood groups, RBS, HIV, BT, CT & viva voice
3. Demonstration of hemodialysis unit, machine, maintenance of hygiene in dialysis unit.
4. Visit and acquiring knowledge of water treatment plant, patient assessment, machine care- washing, cleaning.
5. Dialysis closure.

**ADESH UNIVERSITY  
BATHINDA**

**CERTIFICATE IN NEURO O.T.  
TECHNOLOGY  
(CNOTT)**

**Duration of Course : 1 year**

**Eligibility : Matriculation with Minimum 40% marks**

**No. of Seats : 30**

**Syllabus & Course  
Curriculum**

**CERTIFICATE IN NEURO O.T. TECHNOLOGY  
SEMESTER I**

**SUBJECT - 1: Anatomy and Physiology & Introductory Biology  
(Total No. of Hours 30/ Total marks 40)**

**Anatomy:-**

**(14hrs/18marks)**

23. Introduction to Anatomy & Histology, Structure of cell, epithelial tissue, Muscular tissue, nervous tissue.
24. Skeletal system-Structure of Bones, Types of bones, Bones of cranium, face, vertebral column, Upper & lower limbs, fracture of bones, movements of joints.
25. Muscular System- Structure and types of muscles in human body.

26. Circulatory system- Structure of heart, names and position of main blood vessels.
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32. Reproductive system- male & female reproductive organs.
33. Endocrine Glands- Thyroid, Parathyroid, Adrenal, pituitary, pancreas and sex glands.

**Physiology**  
**hrs/16marks)**

**(12**

17. Blood- Composition and functions of Blood, Hemoglobin, Blood groups, blood coagulation, body fluids, blood volume.
18. Cardiovascular System- Circulation of blood, function of heart and blood vessels, control of heart rate, pulse, regulation of blood pressure.
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**Introductory Biology**  
**hrs/6marks)**

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9. Living World- Biology & its branches, characters of living organisms.
10. Cell & cell division:- cell as a basic unit of life, unicellular and multi cellular organisms, compound microscope, electron microscope.
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12. Genetics- Continuity of life - heredity, variation; Chromosomes - sex linked inheritance; mutation  
DNA as a genetic material - its structure and replication; structure of RNA and its role in protein synthesis; Gene expression - transcription and translation in prokaryotes and eukaryotes

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	<b>Total Marks</b>		<b>40</b>	

**Subject: 2 Surgical Equipments & Techniques**  
(Total No. of Hours 30/ Total marks 40)

**UNIT1-** Sterilization & disinfections, Principles of autoclaving. Fumigation of O.T.

**(6hrs/8marks)**

**UNIT2-** General surgical principles & instruments. The surgical patient, operation room techniques Instruments used for preparing surgical instruments trolley- Cheatles forceps, rampely's sponge holding forceps, mayo's towel clip, esmach's bandage, simple tourniquet, pneumatic tourniquet.

**(6hrs/8marks)**

**UNIT3-** Incision making method & Instruments-bard parker knife handle, major abdominal incision, artery forceps & their types, kocher's forceps, electric cautery.

Retractions- single hook retractors, czerny's retractor, nerve hook retractor, morris retractors, deavers retractors.

**(6hrs/8marks)**

**UNIT4-** Wound management- Scissors & its types, sucking material & techniques, disinfectants, dressing procedure, different types of bandages, surgical needle & needle holders, types of suture materials.

**(6hrs/8marks)**

**UNIT5-** Surgical instruments used for neuro Surgery, Positioning of patient for neurosurgery, Common surgical procedures in neurosurgery.

**(6hrs/8marks)**

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	<b>Total Marks</b>	<b>40</b>
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**Subject: 3 Anaesthesia Equipment, Drugs & Techniques**  
(Total No. of Hours 30/ Total marks 40)

**Anaesthesia Equipment (PART-A)**  
(15hrs/20marks)

8. Boyle's Machine & It's functioning
9. Magill's breathing circuit, Bains breathing circuit, pediatrics anaesthesia circuit
10. Gas cylinders & flow meters
11. Carbon dioxide absorption canisters.
12. Suction apparatus foot operated, electrically operated
13. Ambu bag & laryngoscope, endo tracheal tubes
14. catheters, face masks, ventimasks
- 15.

**Drugs (PART-B)**  
(15hrs/20marks)

8. General Principles- Pharmacological classification of Drugs, Route of drug administration, precautions in administration, principles of drug toxicity, prevention & treatment of poisoning adverse drug reaction.
9. Sedatives & hypnotics, barbiturates, morphine & others.
10. Important groups of drugs- antimicrobial agents anti allergy drugs, anti-diuretics, NSAIDS.
11. Pre-anesthetic medication
12. Local-Anesthetic agents
13. Spinal anaesthetic agents
14. General anaesthetic agents

Scheme of Examination Theory: (one paper of 3 hours duration carrying 40 marks)

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	<b>Total Marks</b>		<b>40</b>	

**Subject: 4 Communication & Soft Skills. (Total No. of Hours 15/ Total marks 20)**

**UNIT I**  
(5hrs/7marks)

**Essentials of Grammar:**

- Parts of Speech • Punctuation • **Vocabulary Building** • Phonetics

**UNIT II****(5hrs/7marks)****Office Management:**

- Types of Correspondence • Receipt and Dispatch of Mail • Filing Systems
- Classification of Mail. • Role & Function of Correspondence • MIS • Managing Computer

**UNIT III****(5hrs/6marks)****Group Discussion & Presentation:**

- Definition • Process • Guidelines • Helpful Expressions • Evaluation
- (Note: Every student shall be given 15 minutes. of presentation time & 45 minutes of discussion on his/ her presentation.)

Scheme of Examination Theory: (one paper of 1½ hours duration carrying 20 marks)

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Long answer	2	1	8	8
		<b>Total Marks</b>		<b>20</b>

**Subject: 5 Practical**

1. Anatomy- Identification of bones & other organs of the body & viva voice as theory syllabus
2. Physiology- veni puncture, finger pricking techniques, HB estimation, blood groups, RBS, HIV, BT, CT & viva voice
3. Surgical instruments & machinery, identification & demonstration of working of the equipments & viva voice as theory syllabus
4. Anaesthesia equipment & drugs – Identification & demonstration of the working of equipments & viva voice
5. Study of parts of compound microscope
6. Instrument trolley setting for common surgical procedures.

**SYLLABUS FOR THE DIPLOMA IN MEDICAL LABORATORY  
TECHNOLOGY (DMLT)**

**SEMESTER- ONE**

**ANATOMY**

**Total marks: 40**

**Total Hrs: 30**

Elementary knowledge of each system

**Unit I** Digestive System

**(6Hrs/8 marks)**

**Unit II** Nervous system & Sensory System

**(6Hrs/8 marks)**

**Unit III** Circulatory System Muscular System

**(6Hrs/8 marks)**

**Unit IV** Excretory System & Respiratory System

**(6Hrs/8 marks)**

**Unit V** Reproductive System & Endocrine System

**(6Hrs/8 marks)**

**Scheme of Theory Examination:**

**(Each paper is of 3 hours duration & carries 40 marks)**

Type of Questions	Total No. of Questions	No. of Questions to be attempted	Marks (each Question)	Sub-total
Very Short Answer	6	4	2	8
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# MICROBIOLOGY - I

**Total marks: 40**

**Total Hrs: 30**

## **Unit I**

**(6Hrs/8 marks)**

Safety measures in microbiology; Care and maintenance of microbiology laboratory; instruments used in laboratory: Laminar air flow, Incubator, Centrifuge Machine, Quebec colony Counter, Spectrophotometer

## **Unit II**

**(6Hrs/8 marks)**

Introduction to Microbiology

The scope of microbiology, the history of microbiology: Louis Paster and Robert Koch

Classification of micro-organisms: Bacteria, Viruses, fungi & Protozoa

Structure & Morphological classification of bacteria

Growth & nutrition of Bacteria.

## **Unit III**

**(6Hrs/8 marks)**

Staining Techniques

Simple staining and Differential Staining: Gram Staining and Acid fast Staining Negative

Staining & Albert staining. Wet Mount and Hanging Drop technique Light

Microscopy in detail

## **Unit IV**

**(6Hrs/8 marks)**

Culture Media:

Classification of media: Simple , Differential, Indicator, Transport, Liquid & Solid media

## **Unit V**

**(6Hrs/8 marks)**

Sterilization Techniques

Control of microorganisms by physical and chemical agents. Autoclave and hot air oven

Sterilization and preparation of culture media.

## **Scheme of Theory Examination:**

**(Each paper is of 3 hours duration & carries 40 marks)**

<b>Type of Questions</b>	<b>Total No. of Questions</b>	<b>No. of Questions to be attempted</b>	<b>Marks (each Question)</b>	<b>Sub-total</b>
Very Short Answer	6	4	2	8
Short Answer	6	4	4	16
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		<b>Total Marks</b>		<b>40</b>

# CELL BIOLOGY

Total marks:40

Total Hrs:30

## Unit I

(6Hrs/8 marks)

Living World

Introduction; Biology and its Branches; relationship with other sciences; scientific methods in biology; historical breakthroughs.

Origin and evolution of life: theories of evolution; evidence of evolution.

## Unit II

(6Hrs/8 marks)

Diversity of life

Variety of living Organisms, Systematic; need, history and types of classification (artificial,natural,polygenetic); biosystematics; binomial nomenclature; two kingdom system, five kingdom system, their merits and demerits, Botanical gardens, Herbarium, Zoological Parks and Museum

## Unit III

(6Hrs/8 marks)

Cell and its Structure

Introduction; Cell: the Basic unit of Life; Prokaryotic and Eukaryotic Cell: its ultrastructure

Tissue: Epithelial, Connective, Muscle & Nervous

## Unit IV

(6Hrs/8 marks)

Cell Division and Cellular Movement

Cell division: mitosis and meiosis

Cellular movement: Endocytosis and Exocytosis

## Unit V

(6Hrs/8 marks)

Molecules of Cell

Inorganic and Organic (in brief)

Carbohydrates, Proteins, Lipids, Enzymes, Nucleic Acids

## Scheme of Examination Theory:

(Each paper is of 3 hours duration & carries 40 marks)

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## HEMATOLOGY-I

**Total marks:40**

**Total Hrs:30**

**(10**

### **Unit I**

#### **Hrs/13 Marks)**

Introduction to Hematology: Definition, importance, important equipments and chemicals, various tests performed, Laboratory Organization

Blood: Definition, Composition, Formation: Erythropoiesis, Leucopoiesis, Thrombopoiesis, Disorders of blood. Morphology Of Normal Blood Cells: Normal morphology and Morphology in Diseases

### **Unit II**

**(10**

#### **Hrs/13 Marks)**

Anticoagulants: Definition, Uses, Different types, Mode of action, Merits and Demerits

Enumeration of Blood cells: RBC count, WBC count, Platelet count, DLC value, Hb, MCH, MCV, MCHC, ESR, PCV

### **Unit III**

**(10**

#### **Hrs/13 Marks)**

Collection and Preservation of Blood: Different methods of Collection, Preservation, changes in Stored blood

Blood Film: Different types, methods of preparation, Staining: Romanowsky, MGG, Leishmann –Giemsa, Jenner-Giemsa

Blood Banking: Blood group system, ABO Grouping method, Rh Grouping methods, Blood transfusion and compatibility testing.

### **Scheme of Theory Examination:**

**(Each paper is of 3 hours duration & carries 40 marks)**

Type of Questions	Total No. of Questions	No. of Questions to be attempted	Marks (each Question)	Sub-total
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Short Answer	6	4	4	16
Long answer	3	2	8	16
		<b>Total Marks</b>		<b>40</b>

## BIOCHEMISTRY - I

**Total marks:40**

**Total Hrs:30**

### **Unit I**

**Hrs/ 10 marks)**

Introduction to medical lab technology: General introduction Role of medical lab technologists, ethics, responsibility, safety measures and first aid.

Cleaning and care of general laboratory glassware and equipment.

Distilled water: Types of distilled water plants, preparation & storage

### **Unit II**

**Hrs/ 10 marks)**

Analytical Balance: Principle, Working & maintenance; Preparation of reagents: Formulation and preparation; Standard solutions: Various std. solutions used, their preparation; storage of chemicals.

Definitions: Mole, molar and normal solutions (preparation, Standardization)

### **Unit III**

**Hrs/ 10 marks)**

Units of measurements: S.I units: Definitions, conversions, units like nm, Angstrom, Microlitre, millilitre, Litre, enzyme unit; Measurement of volume: Strength, Normality, Molarity, Molality: volumetric apparatus, calibration of volumetric apparatus.

### **Unit IV**

**(7Hrs/ 10 marks)**

pH ( Definition)

Buffer solutions (Definition, preparation of important solutions),

pH indicators (pH papers, universal & other indicators),

Principle & working of pH meter

Colorimeter (Principle and working)

Scheme of Theory Examination:

(Each paper is of 3 hours duration & carries 40 marks)

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Short Answer	6	4	4	16
Long answer	3	2	8	16
		<b>Total Marks</b>		<b>40</b>

## **SEMESTER –TWO**

### **INTRODUCTORY BIOLOGY**

#### **Unit I Study of Cell & Its organelles**

Cell organelles and their functions

Nucleus, mitochondria, plastids, endoplasmic reticulum, Golgi complex, lysosomes, microtubules, centriole, vacuole, cytoskeleton, cilia and flagella, Ribosomes

#### **UNIT II**

Morphology of Plants - root, stem and leaf, their structure and modification  
Morphology of animals - salient features of earthworm, cockroach and rat

#### **Unit III**

Continuity of life - heredity, variation, Mendel's laws of inheritance.

Chromosomes - bacterial cell and eukaryotic cell. Chromosomal Mutations: Change in the structure of chromosome: types of structural changes in chromosomes. DNA & RNA as a genetic material - its structure & Differences between DNA & RNA

Basics Principles of Recombinant DNA technology, Brief introduction of cloning, gene bank, DNA fingerprinting, Genomics, transgenic plants, animals and microbes.

#### **Unit V**

Enzymes (Properties, chemical nature and mechanism of action) vitamins, Hormones and steroids.

### **HISTOTECHNOLOGY**

#### **Unit I**

Introduction to Histotechnology

Histology: Automated histology equipments, Procedures in examination of Tissue preparation, Fixation and decalcification, Processing, section cutting.

#### **Unit II**

Laboratory Equipment, its uses and maintenance laboratory hazards and safety precautions.

#### **Unit III**

Micro tomes various types, their working principle and maintenance

Microtome Knives and Knife sharpening  
Practical section cutting, cutting faults and remedies

#### **Unit IV**

Routine staining procedures, mounting and mounting media  
Dye chemistry, theory and practice of staining  
Use of controls in various staining procedures

#### **Unit V**

Collection, processing and staining of cytological specimen

### **HAEMATOLOGY**

#### **Unit – I**

Quality assurance in haematology

#### **Unit- II**

Hb : Definition ,synthesis and breakdown

#### **Unit –III**

Haemoglobinometry- various methods of estimation of Hb, errors involved and standardization of instrument for adaptation for Hb estimation

#### **Unit IV**

Haemocytometry: Procedure for cell count(visual and electronic), Red cell count, leukocyte count, platelet count. Errorsinvolved and means to minimize such errors. Erythrocyte sedimentation rate, factors influencing ESR, various methods of estimation and their significance

#### **Unit V**

Haemocrit value by macro and micro methods their merits and demerits

#### **Unit VI**

Examination of urine  
Examination of biological fluids such as CSF and semen

## **BIOCHEMISTRY**

### **Unit I**

Radio isotopes and their use in biochemistry. Osmosis, dialysis, surface tension

### **Unit II**

Urine analysis(Qualitative)for sugar, proteins, bile pigments, Ketone bodies, porphobilinogen, faecal occult blood, bile salts  
Individual Methods like Blood Sugar, Blood Urea, Serum Creatinine, total protein, Serum Calcium and Phosphorus, serum Uric Acid, serum Electrolytes

### **Unit III**

Collection and recording of biological specimens, separation of serum plasma preservation and disposal of biological samples/materials

### **Unit IV**

Basic statistics (mean, SD, CV, normal distribution, probability)

### **UNIT V**

Acids and Bases  
Volumetric analysis preparation of standard acid and base solutions, chloride estimation

## **MICROBIOLOGY**

### **Unit I**

Bacteriology  
Bacterial genetics

## **Unit II**

### Special Bacteriology

#### Processing of Specimen & isolates

#### Brief introduction about the specimens

- Throat swab
- Urine sample
- CSF sample
- Sputum sample
- Blood Sample
- Stool

#### Water sample testing

## UNIT III

### Mycology

#### Intoduction, Classification of Dermatophytes, Candida, Cryptococcus

#### Lab diagnosis of fungal infection

## **Unit IV**

### Virology

#### Brief introduction, classification, structure & cultivation of viruses. Rabies, Polio, Hepatitis, HIV, Influenza.

## **Unit V**

### Parasitology

#### General introduction, Brief introduction of plasmodium, E. Histolytica. Giardia, Ascaris. Ancylostoma, Taenia, E. Vermicularis, H. Nana.



**ADESH UNIVERSITY  
BATHINDA**

**Diploma in Operation Theatre Technology  
(DOTT)**

**Duration of Course : 1 year**

**Eligibility : 10+2 Any Stream with minimum 40% marks**

**No. of seats : 70**

# **Syllabus & Course Curriculum**

**DIPLOMA IN O.T. TECHNOLOGY  
SEMESTER I**

**SUBJECT - 1: Anatomy and Physiology & Introductory Biology  
(Total No. of Hours 30/ Total marks 40)**

**Anatomy:- (14hrs/18marks)**

34. Introduction to Anatomy & Histology, Structure of cell, epithelial tissue, Muscular tissue, nervous tissue.
35. Skeletal system-Structure of Bones, Types of bones, Bones of cranium, face, vertebral column, Upper & lower limbs, fracture of bones, movements of joints.
36. Muscular System- Structure and types of muscles in human body.
37. Circulatory system- Structure of heart, names and position of main blood vessels.
38. Digestive system- Parts of gastrointestinal tract and associated glands.

39. Respiratory system- Parts of respiratory system.
40. Urinary system- Parts of urinary system.
41. Skin & sense organs- Eye, Ear, Nose, Tongue(taste buds)
42. Nervous system- Parts of Brain, spinal cord. Cranial nerve, spinal cord, Peripheral nerves, Blood supply of Brain and spinal cord.
43. Reproductive system- male & female reproductive organs.
44. Endocrine Glands- Thyroid, Parathyroid, Adrenal, pituitary, pancreas and sex glands.

### **Physiology**

**(12 hrs/16marks)**

25. Blood- Composition and functions of Blood, Hemoglobin, Blood groups, blood coagulation, body fluids, blood volume.
26. Cardiovascular System- Circulation of blood, function of heart and blood vessels, control of heart rate, pulse, regulation of blood pressure.
27. Respiratory System- Functions of lungs, mechanism of breathing & exchange of gases in the lungs, regulation of respiration, respiration disorder like anoxia, Hypoxia, dyspnea, lung function test.
28. Digestive systems- Digestion and absorption of food.
29. Excretory system- Structure and function of kidney and urinary bladder, mechanism of urine formation, Disorder of Kidney, ureter, urinary bladder.
30. Nervous system- Neurons & its functions, functions of CNS, ANS, physiology of vision, hearing sensation. Cerebrospinal Fluid (C.S.F), Cerebral Blood flow, cerebral perfusion pressure, intra cranial pressure.
31. Reproductive system- physiology and Female reproductive organs.
32. Endocrine Glands- functions of endocrine glands and hormones secreted by them.

### **Introductory Biology**

**(4 hrs/6marks)**

13. Living World- Biology & its branches, characters of living organisms.
14. Cell & cell division:- cell as a basic unit of life, unicellular and multi cellular organisms, compound microscope, electron microscope.
15. Cell organelles & their functions-
16. Genetics- Continuity of life - heredity, variation; Chromosomes - sex linked inheritance; mutation  
DNA as a genetic material - its structure and replication; structure of RNA and its role in protein synthesis; Gene expression - transcription and translation in prokaryotes and eukaryotes

Scheme of Examination Theory: (one paper of 3 hours duration carrying 40 marks)

<b>Type of Questions</b>	<b>Total No. of Questions</b>	<b>No. of Questions to be attempted</b>	<b>Marks (each Question)</b>	<b>Sub-total</b>
Very Short Answer	6	4	2	8
Short Answer	6	4	4	16

Long answer	3	2	8	16
	<b>Total Marks</b>		<b>40</b>	

**Subject: 2 Surgical Equipments & Techniques**  
(Total No. of Hours 30/ Total marks 40)

**UNIT1-** Sterilization & disinfections, Principles of autoclaving. Fumigation of O.T.  
(6hrs/8marks)

**UNIT2-** General surgical principles & instruments. The surgical patient, operation room techniques Instruments used for preparing surgical instruments trolley- handles forceps, rampely's sponge holding forceps, mayo's towel clip, esmach's bandage, simple tourniquet, pneumatic tourniquet.  
(6hrs/8marks)

**UNIT3-** Incision making method & Instruments-bard parker knife handle, major abdominal incision, artery forceps & their types, kocher's forceps, electric cautery.  
Retractions- single hook retractors, czerny's retractor, nerve hook retractor, morris retractors, deavers retractors.  
(6hrs/8marks)

**UNIT4-** Wound management- Scissors & its types, sucking material & techniques, disinfectants, dressing procedure, different types of bandages, surgical needle & needle holders, types of suture materials.  
(6hrs/8marks)

**UNIT5-** Surgical instruments used for neuro Surgery, Positioning of patient for neurosurgery , Common surgical procedures in neurosurgery.  
(6hrs/8marks)

Scheme of Examination Theory: (one paper of 3 hours duration carrying 40 marks)

Type of Questions	Total No. of Questions	No. of Questions to be attempted	Marks (each Question)	Sub-total
Very Short Answer	6	4	2	8
Short Answer	6	4	4	16
Long answer	3	2	8	16
	<b>Total Marks</b>		<b>40</b>	

**Subject: 3 Anaesthesia Equipment, Drugs & Techniques.**  
(Total No. of Hours 30/ Total marks 40)

**Anaesthesia**  
(15hrs/20marks)

**Equipment**

**(PART-A)**

16. Boyle's Machine & Its functioning
17. Magill's breathing circuit, Bains breathing circuit, pediatrics anaesthesia circuit
18. Gas cylinders & flow meters
19. Carbon dioxide absorption canisters.
20. Suction apparatus foot operated, electrically operated
21. Ambu bag & laryngoscope, endo tracheal tubes
22. catheters, face masks, ventimasks
- 23.

## Drugs

**(PART-B)**

**(15hrs/20marks)**

15. General Principles- Pharmacological classification of Drugs, Route of drug administration, precautions in administration, principles of drug toxicity, prevention & treatment of poisoning adverse drug reaction.
16. Sedatives & hypnotics, barbiturates, morphine & others.
17. Important groups of drugs- antimicrobial agents anti allergy drugs, anti-diuretics, NSAIDS.
18. Pre-anesthetic medication
19. Local-Anesthetic agents
20. Spinal anaesthetic agents
21. General anaesthetic agents

Scheme of Examination Theory: (one paper of 3 hours duration carrying 40 marks)

Type of Questions	Total No. of Questions	No. of Questions to be attempted	Marks (each Question)	Sub-total
Very Short Answer	6	4	2	8
Short Answer	6	4	4	16
Long answer	3	2	8	16
<b>Total Marks</b>				<b>40</b>

## Subject: 4 Pathology & Microbiology

**(Total No. of Hours 30/ Total marks 40)**

### **PATHOLOGY**

**(PART-A)**

**(15hrs/20marks)**

#### **CHAPTER 1:**

CELL INJURY AND ADAPTATION: Causes of cell injury. Mechanism of cell injury, ischaemic & hypoxic injury, chemical injury, reversible injury, necrosis, cellular adaptation of growth & Differentiation atrophy, hypertrophy, metaplasia, hyperplasia, classification of tumors, premalignant lesion, diagnosis of cancer.

**CHAPTER 2:**

ACUTE AND CHRONIC INFLAMMATION Acute vascular changes. phagocytosis  
Chemical mediators of inflammation. Definition and causes of chronic  
inflammation. Granulomatous inflammation, system manifestations of  
inflammation ,

**CHAPTER 3:**

DISORDERS OF VASCULAR FLOW AND SHOCK: Oedema, hyperemia or  
congestion, thrombosis, embolism. Infarction shock, Ischemia, Over hydration,  
dehydration.

**CHAPTER 4:**

THE RESPONSE TO INFECTION Categories of infectious agents, host barriers  
to infection, how disease is caused, inflammatory response to infectious agents

**CHAPTER 5:**

THE HAEMATOPOIETIC AND LYMPHOID SYSTEM: Haemorrhage. various type  
of Anaemia, leucopenia, leucocytosis, bleeding disorders coagulation mechanism  
,maintenance of blood volume. Abnormalities of pH of blood.

**MICROBIOLOGY (PART-B)****(15hrs/20marks)**

**CHAPTER 1: INTRODUCTION TO MICROBIOLOGY:** Discovery of micro  
organisms. Classification and general characteristics of microorganisms,  
nutritional requirements of Micro-organisms.

**CHAPTER 2: PRINCIPLES OF MICROBIAL CONTROL:** Sterilization, importance  
of sterilization in OT techniques various methods-physical UV radiation, alcohols  
and heavy metals, Autoclave structure functioning control and indicators

**CHAPTER 3:** Biomedical waste management.

**CHAPTER 4:** Hospital acquired infections

Scheme of Examination Theory: (one paper of 3 hours duration  
carrying 40 marks)

Type of Questions	Total No. of Questions	No. of Questions to be attempted	Marks (each Question)	Sub-total
Very Short Answer	6	4	2	8
Short Answer	6	4	4	16
Long answer	3	2	8	16
<b>Total Marks</b>				<b>40</b>

**Subject: 5 Communication & Soft Skills. (Total No. of Hours 15/ Total marks 20)**

## UNIT I

(5hrs/7marks)

### Essentials of Grammar:

- Parts of Speech
- Punctuation
- **Vocabulary Building**
- Phonetics

## UNIT II

(5hrs/7marks)

### Office Management:

- Types of Correspondence
- Receipt and Dispatch of Mail
- Filing Systems
- Classification of Mail.
- Role & Function of Correspondence
- MIS
- Managing Computer

## UNIT III

(5hrs/6marks)

### Group Discussion & Presentation:

- Definition
  - Process
  - Guidelines
  - Helpful Expressions
  - Evaluation
- (Note: Every student shall be given 15 minutes. of presentation time & 45 minutes of discussion on his/ her presentation.)

Scheme of Examination Theory: (one paper of 1½ hours duration carrying 20 marks)

Type of Questions	Total No. of Questions	No. of Questions to be attempted	Marks (each Question)	Sub-total
Very Short Answer	3	2	2	4
Short Answer	3	2	4	8
Long answer	2	1	8	8
		<b>Total Marks</b>		<b>20</b>

## Subject: 6 Practical

7. Anatomy- Identification of bones & other organs of the body & viva voice as theory syllabus
8. Physiology- venepuncture, finger pricking techniques, HB estimation, blood groups, HIV, BT, CT & viva voice
9. Pathology- Identification of Tissue slides, Common diagnostic tests- widal, Blood & Urine Routine tests.

10. Surgical instruments & machinery, identification & demonstration of working of the equipments & viva voice as theory syllabus
11. Anaesthesia equipment & drugs – Identification & demonstration of the working of equipments & viva voice
12. Study of parts of compound microscope
13. Instrument trolley setting for common surgical procedures.

**ADESH UNIVERSITY  
BATHINDA**

**Diploma in Radiological Imaging & Technology  
(DRIT)**

**Duration of Course : 1 year**

**Eligibility : 10+2 Any Stream with minimum 40% marks**

**No. of seats : 50**

# **Syllabus & Course Curriculum**

**Diploma in Radiology & Imaging Technology( DRIT)**

**SEMESTER I**

**SUBJECT - 1: Anatomy and Physiology & Related Pathology & Introductory  
Biology**

**Part I**

**(Total No. of Hours 30/ Total marks 40)**

**Theory**

**INTRODUCTORY BIOLOGY**

**(10 HRS/10**

**MARKS)**



## **Unit I Living World**

**(3 hours)**

Biology & Its Branches; characters of living organisms, (elementary idea of metabolism, homeostasis, )

Variety of living organisms, , status of bacteria and virus;

## **Unit II Cell and Cell Division**

**(3 hours)**

Cell as a basic unit of life - prokaryotic and eukaryotic cell; unicellular and multicellular organisms; Ultrastructure of prokaryotic and eukaryotic cell - cell organelles and their functions – Brief introduction to Molecules of cell; inorganic and organic materials - water, salt, mineral ions, carbohydrates, lipids, amino acids, proteins, nucleotides, nucleic acids (DNA and RNA); Enzymes; vitamins, hormones and steroids.

## **Unit III Genetics**

**(2**

**hours)**

Continuity of life - heredity, variation;

Chromosomes – STRUCTURE, variations, sex linked inheritance; mutation and chromosomal aberrations;

Brief of Gene expression - transcription and translation, oncogenes.

## **Unit IV Basic Cell pathology**

**(2 hours)**

• Definition, cell growth – cell deformities – cell damage- defence mechanism cell repair. Inflammation

Neoplasia:

• Benign & malignant including its mode of growth and metastasis.

## **ANATOMY AND PHYSIOLOGY**

**20 HOURS/ 30**

### **MARKS**

#### **Musculo-Skeletal System**

- Muscular System: Skeletal Muscles: Major skeletal muscles of the head, neck, thorax, abdomen and upper and lower limbs, Structure & Types of muscle in human body

- General Osteology: General morphology of bones; structural classification of bones; identification and naming of individual bones of the skeleton; Types of bones, Major Important Bones , bones of skull, lower and upper extremities, Pelvic girdle, shoulder girdle, Thoracic cage
- Bony joints.
- Cardiovascular System Heart, Blood, Arteries, Veins, circulation of blood, pulse, blood pressure, blood volume, Blood groups, Rh. Importance

Scheme of Examination Theory: (one paper of 3 hours duration carrying 40 marks)

Type of Questions	Total No. of Questions	No. of Questions to be attempted	Marks (each Question)	Sub-total
Very Short Answer	6	4	2	8
Short Answer	6	4	4	16
Long answer	3	2	8	16
<b>Total Marks</b>				<b>40</b>

## **SUBJECT - 2: Anatomy and Physiology & Related Pathology & Introductory Biology**

### **PART II**

**(Total No. of Hours 30/ Total marks 40)**

**UNIT I** - Structure of the Body-tissues.

**(6hrs/ 8 marks)**

**UNIT II** - Digestive System, : Parts of gastrointestinal tract and associated glands

Mouth - oesophagus – stomach – small intestine – large intestine – spleen, liver  
Gall Bladder – Pancreas.

Nutrition & Metabolism : BMR, Calories, Vitamins, Minerals

**(6hrs/ 8 marks)**

**UNIT III** - Respiratory System - Nose & Larynx, Trachea – Lungs

•Urinary System - Kidney – Uterus – Bladders, Prostate, Urethra

**(6hrs/ 8 marks)**

**UNIT IV** - Nervous System: Brain – Meninges – Ventricles – Spinal cord and nerves, physiology of neuromuscular junction

Anatomical introduction to skin & Sense organs : Eye, Ear Nose

**(6hrs/**

**8 marks)**

**UNIT V** - Reproductive System: Female & Male Reproductive Organs

Endocrine System- • Pituitary glands – Pineal gland – Thymus gland – Thyroid and parathyroid glands, Supra-renal glands & their action.  
**(6hrs/ 8 marks)**

Scheme of Examination Theory: (one paper of 3 hours duration carrying 40 marks)

Type of Questions	Total No. of Questions	No. of Questions to be attempted	Marks (each Question)	Sub-total
Very Short Answer	6	4	2	8
Short Answer	6	4	4	16
Long answer	3	2	8	16
<b>Total Marks</b>				<b>40</b>

**SUBJECT: 3 General and Radiation Physics (Total No. of Hours 30/ Total marks 40)**

**UNIT 1-** A.C. D.C. current, RMS value, peak value  
**(3hrs/4marks)**

**UNIT 2-** Electromagnetic Induction – laws , fields, influence  
**(3hrs/4marks)**

**UNIT3-** Transformer- Principal Construction and Losses of Step Down and High Tension Transformers.  
**(3hrs/4marks)**

**UNIT 4-** Diode valves and its use as rectifiers, full wave rectifiers half wave rectifiers solid- state rectifiers, its various rectifying circuits using X-ray machines.  
**(3hrs/4marks)**

**UNIT 5-**Production of x-rays and its properties, X-ray tube- stationery anode and rotating anode & therapy tubes. X-ray circuit, interlocking circuits, relays and timers. Various units used for measuring radiation Roentgen, rad and rem.  
**(3hrs/4marks)**

**UNIT 6-** Interaction of x-rays with matter. (photo electric, compton and pair production)

**(3hrs/4marks)**

**UNIT 7-** Quality and quantity of X-rays, HVT, linear absorption, coefficient, Gird cones, filters, L.B.D. F.F>D, focal spot size etc.  
**(3hrs/4marks)**

**UNIT 8-** Inverse square law, scattered radiations and appliances used to reduce it.

**(3hrs/4marks)**

**UNIT 9** -Radiation hazards protection against it, film badge pocket ionization chamber, maximum permissible dose.

**(3hrs/4marks)**

**UNIT 10-** Alpha, Beta & Gamma rays, X-ray film, X-ray tube calibration, solarization, sensitometer and densitometer, radiation protection devices- Lead shield, lead chair, lead apron, lead goggles, Thyroid and gonad shield, lead gloves etc.

**(3hrs/4marks)**

Scheme of Examination Theory: (one paper of 3 hours duration carrying 40 marks)

Type of Questions	Total No. of Questions	No. of Questions to be attempted	Marks (each Question)	Sub-total
Very Short Answer	6	4	2	8
Short Answer	6	4	4	16
Long answer	3	2	8	16
<b>Total Marks</b>				<b>40</b>

**SUBJECT - 4: Dark Room Techniques (Total No. of Hours 30/ Total marks 40)**

**UNIT 1-** Photographic Process Light image- image produce by radiation- light sensitive material – Latent image formation

**(3hrs/4marks)**

**UNIT 2-** Film materials

The structure of X-ray films resolving power  
film- sensitivity of film contrast of films

X-ray Films Storage

Storage of unexposed films and protection to exposed films.

**(3hrs/4marks)**

**UNIT 3-** Screens

Construction of intensifying screen-choice of fluorescent materials –intensifying factors details

-sharpness-speed, screen contract-care of intensifying screen & rare earth screens.

**(3hrs/4marks)**

**UNIT 4-** Cassettes

Cassettes designs- care of cassette- mounting of intensifying screen in the cassette. Various

types of cassettes, definition, structure of cassettes.

**(3hrs/4marks)**

**UNIT 5-** Factors affecting the developer

Types of developer and fixer- factors affecting the use of fixer.

**(3hrs/4marks)**

**UNIT6-** Silver recovery methods. Components of PQ & MQ developer and fixers, replenisher etc.

Film rising and washing and drying, Intermediate rinse- washing and drying

Film processing and equipment Manual and automatic processing method.

**(3hrs/4marks)**

**UNIT 7-** Dark Room Design

Outlay and material used. Entrance, Safelight Ventilation, Construction of wall dry bench &

wet bench etc.

**(3hrs/4marks)**

**UNIT 8-** The Radiographic Image

The sharpness, contrast, details definition, viewing conditions.

**(3hrs/4marks)**

**UNIT 9-** Miscellaneous

Trimming, identification of films legends-records filling- report distribution.

**(3hrs/4marks)**

**UNIT 10-** Film Artifacts

Photographic and radiation artifacts.

Factors affecting the quality control of a radiograph.

**(3hrs/4marks)**

Scheme of Examination Theory: (one paper of 3 hours duration carrying 40 marks)

Type of Questions	Total No. of Questions	No. of Questions to be attempted	Marks (each Question)	Sub-total
Very Short Answer	6	4	2	8
Short Answer	6	4	4	16
Long answer	3	2	8	16
		<b>Total Marks</b>		<b>40</b>

**Subject: 5 Communication & Soft Skills. (Total No. of Hours 15/ Total marks 20)**

**UNIT I**

**(5hrs/7marks)**

**Essentials of Grammar:**

- Parts of Speech • Punctuation • **Vocabulary Building** • Phonetics

**UNIT II**  
**(5hrs/7marks)**

**Office Management:**

- Types of Correspondence • Receipt and Dispatch of Mail • Filing Systems
- Classification of Mail. • Role & Function of Correspondence • MIS • Managing Computer

**UNIT III**  
**(5hrs/6marks)**

**Group Discussion & Presentation:**

- Definition • Process • Guidelines • Helpful Expressions • Evaluation
- (Note: Every student shall be given 15 minutes. of presentation time & 45 minutes of discussion on his/ her presentation.)

Scheme of Examination Theory: (one paper of 1½ hours duration carrying 20 marks)

Type of Questions	Total No. of Questions	No. of Questions to be attempted	Marks (each Question)	Sub-total
Very Short Answer	3	2	2	4
Short Answer	3	2	4	8
Long answer	2	1	8	8
<b>Total Marks</b>				<b>20</b>

**Practical:**

- Introduction of the various parts and structure in human body on charts and models.
- Identification of Bones and skeleton
- Surface making of human body
- Identification of bones & parts on X ray films
- Visit to pathology museum for identification common pathology lesions
- Visit to antomy museum for identification of various parts of the human body.

In Dark room:

- How the dark room light be tested for safety
- Formation of duplicate and negative radiograph

- To prepare the developer and fixer
- Load unload and processing of X-rays film.
- Overdeveloped film reduction.
- Verification of inverse square law
- Calibration of x-rays machines
- To check the lead apron for any crack
- Find out whether the glass in the screen is lead glass or ordinary glass
- To survey the X-ray control for radiation

**SYLLABUS FOR B.Sc MLT**  
**SEMESTER I**  
**ENGLISH**

**Total Hrs:80**  
**Total Marks:80**

**Behavioural objectives:**

Ability to speak and write proper English  
Ability to read and understand English  
Ability to understand and practice medical terminology.

**UNIT I**

**(20Hrs/20Marks)**

**READING & COMPREHENSION**

Review of selected materials

**UNIT II**

**(20Hrs/20Marks)**

**WRITING SKILLS**

Paragraph

Letter writing

Note making

Description

The use of paragraphs

Essay writing

**UNIT III**

**(20Hrs/20Marks)**

Precise-writing and abstracting

Report writing

Medical Terminology Use of dictionary

**UNIT IV**

**(20Hrs/20Marks)**

**APPLIED GRAMMAR**

Correct usage

Structure of sentence & Paragraph

Active & Passive Voice

Errors & Omissions

**Text books recommended ( Latest Edition )**



V.R.Narayana, Sharma Strengthen your writing, New Delhi, Orient Longman  
 When and Martin – Grammer and composition, Delhi, Chand & Co.  
 Shashikumar V., D’Souza P.V, Spoken English, New Delhi, Tata Mergaw Hill  
 Dorland’s pocket Medical dictionary, New Delhi; Oxford & IBH Publishing  
 Co.

### SCHEME OF EXAMINATION

<b>Type of Questions</b>	<b>No. of Questions</b>	<b>Marks</b>	<b>Sub Total</b>
SEC-A (Reading)	<b>3</b> <b>Compositions</b> <b>(Each carry</b> <b>10 marks)</b>	3 × 10	30
SEC-B (writing)	<b>1 Letter, 1</b> <b>Precise, 1</b> <b>Article/</b> <b>paragraph</b> <b>(Each carry</b> <b>10marks</b>	3 × 10	30
SEC-C (Long Essay)	<b>Voice,</b> <b>Errors &amp;</b> <b>Omissions</b> <b>(Each carry</b> <b>10 marks)</b>	2 × 10	20
<b>Grand Total</b>			<b>80</b>

## HUMAN ANATOMY

**Total Hrs:80**  
**Total Marks:80**

**UNIT I** (10

**Hrs/10Marks)**

**The human body as a whole**

Definitions, Subdivisions of Anatomy, Terms of location and position, Fundamental Planes, Vertebrate structure of man, organization of the Body Cells, Tissues.

**UNIT II** (10

**Hrs/10Marks)**

**Locomotion and support.**

The Skeletal system : Types of bones , structures and growth of bones, Divisions of the skeleton, Appendicular skeleton , Axial skeleton, name of all the bones and their parts, joints- classification, types of movements with examples.

**UNIT III** (10

**Hrs/10Marks)**

**Nervous system.**

Central nervous system: Spinal Cord, Anatomy, functions, reflex- Arc, Meninges. The Brain- Hind Brain, Midbrain, Forebrain. Brief structure, location, functions, and Peripheral nervous system. Injuries to spinal cord and brain.

**UNIT IV** (10

**Hrs/10Marks)**

**Sensory System:** Anatomical introduction to skin & Sense organs : Eye, Ear  
Nose

**UNIT V** (10

**Hrs/10Marks)**

**Circulatory system:**

Heart : size, location, coverings, chambers, Blood supply, Nerve supply, the blood vessels, General plan of circulation, pulmonary circulation – Names of arteries and veins and their positions – lymphatic system – general plan.

**UNIT VI** (10

**Hrs/10Marks)**

**Respiratory system:**

Organs of Respiratory System – Conducting portion – Nose: nasal cavity, Para nasal air sinuses, Larynx, trachea, bronchial tree. Respiratory portion: Pleurae and lungs, Brief knowledge of parts and position.

#### **UNIT VII**

**(10Hrs/10Marks)**

##### **Digestive system:**

Components of Digestive system, Alimentary tube, Anatomy of organs of digestive tube, mouth, tongue, tooth, salivary glands, liver, Biliary apparatus, pancreas, Names and positions and brief functions.

#### **UNIT VIII**

**(10**

**Hrs/10Marks)**

##### **Excretory system.**

Kidneys- location, gross structure, excretory ducts, ureters, Urinary bladder, Urethra.

#### **UNIT IX**

**(10**

**Hrs/10Marks)**

##### **Reproductive system**

Male Reproductive System: Testis, Duct system. Female Reproductive System: Ovaries, Duct system, Accessory organs.

#### **UNIT X**

**(10**

**Hrs/10Marks)**

##### **Endocrine system.**

Name of all endocrine glands their positions, Hormones and their functions- Pituitary, Thyroid parathyroid, Adrenal glands, Gonads & Islets of pancreas.

#### **Practical:**

Histology:

General slides.

1. Hyaline Cartilage.
2. Fibro Cartilage.
3. Elastic Cartilage.
4. T.S. & L.S. of Bone
5. Blood Vessels.
6. Tonsil
7. Spleen
8. Thymus
9. Lymph node

10. Epithelial Tissue
11. Skeletal and Cardiac Muscle
12. Peripheral nerve and optic nerve.

Systemic slides:

1. G.I.T – all
2. R.S. – Lung, Trachea
3. Kidney
4. Endocrine glands – Adrenal, Pancreas, Pituitary, Thyroid and Parathyroid
5. Uterus, Ovary, Testis

### **Text Books & Reference Books Recommended (Latest Edition )**

1. Human Anatomy Regional and Applied . Vol. 1, Vol.2 & Vol.3  
B.D.Chaurasia C.B.S.Publishers, New Delhi
2. Hand Book of General Anatomy B.D.Chaurasia C.B.S.Publishers,New Delhi
3. Text Book of Human Histology Inderbir Singh Jaypee Brothers, Medical Publishers, Delhi
4. Clinically Oriented Anatomy Keith L. Moore Williams and Wilkins, Baltimore
5. Gray's Anatomy Susan Standring Elsevier Churchill Livingstone, Edinburg

### **SCHEME OF EXAMINATION**

<b>Type of Questions</b>	<b>No. of Questions</b>	<b>Marks</b>	<b>Sub Total</b>
SEC-A (Short Answer)	<b>10 questions. Each carry 2 marks</b>	10 × 2	20
SEC-B (Short Essay)	<b>6 (to attempt 5) Each carry 6 marks</b>	5 × 6	30
SEC-C (Long)	<b>4 (to attempt 3)</b>	3 × 10	30

Essay)	<b>Each carry 10 marks</b>		
<b>Grand Total</b>			<b>80</b>

## HAEMATOLOGY-I

**Total Hrs:80  
Total Marks:80**

### UNIT I

**(20Hours/20Marks)**

Blood collection

Anticoagulants used in Haematology

Normal values in Haematology

Basic Haematological Techniques

- a. RBC count
- b. Haemoglobin estimation
- c. Packed cell volume
- d. Calculation of absolute indices
- e. WBC counts-Total and differential.
- f. Absolute eosinophil count
- g. Platelet count
- h. Erythrocyte sedimentation rate
- i. Reticulocyte count

Preparation of blood films

Stains used in Haematology

Morphology of red cells

Morphology of Leukocytes and platelets

### UNIT II

**(20Hours/20Marks)**

Bone marrow

- a. Techniques of aspiration, preparation and staining of films
- b. Bone marrow biopsy

Preparation of buffy coat smears

### **UNIT III**

**(20Hours/20Marks)**

Laboratory methods used in the investigation of anaemias

- a. B 12 and folate assay
- b. Schilling test
- c. Serum iron and iron binding capacity

### **UNIT IV**

**(20Hours/20Marks)**

Laboratory methods used in investigation of haemolytic anaemias

- a. Osmotic fragility
  - b. Investigation of G-6 PD deficiency
  - c. Test for sickling
  - d. Estimation on of Hb-F, Hb-A2
  - e. Plasma haemoglobin and Haptoglobin, demonstration of hachmosiderin in urine
  - f. Haemoglobin electrophoresis
  - g. Test for auto immune hemolytic Anaemia.
- Measurements of abnormal Hb pigments

### **Practical:**

Hb Estimation-Sahli's method & Cyanmethhaemoglobin method

RBC Count

Retic Count

Preparation of blood smears and staining with Leishman stain

WBC Count

WBC –Differential Count

Platelet Count

Absolute Eosinophil Count

ESR- Westergreens & Wintrobe's method,

PCV.

Sickling test-Demonstration

Bone Marrow Smear preparation & staining procedure- Demonstration

Demonstration of Malarial Parasite.

### Reference books ( Latest Edition )

- 1 Practical Pathology P. Chakraborty Gargi Chakraborty New Central Book Agency, Kolkotta
2. Text Book of Haematology Dr. Tejinder Singh Arya Publications, Sirmour (H.P)
3. Text Book of Medical Laboratory Technology Praful Godkar Bhalani Publication House, Mumbai
4. Practical Haematology Sir John Dacie Churchill Livingstone,London
5. Todd & Sanford, Clinical Diagnosis & Management by Laboratory Methods John Bernard Henry All India travellar Booksellar, Delhi.

### SCHEME OF EXAMINATION

Type of Questions	No. of Questions	Marks	Sub Total
SEC-A (Short Answer)	<b>10 questions. Each carry 2 marks</b>	10 × 2	20
SEC-B (Short Essay)	<b>6 (to attempt 5) Each carry 6 marks</b>	5 × 6	30
SEC-C (Long Essay)	<b>4 (to attempt 3) Each carry 10 marks</b>	3 × 10	30
<b>Grand Total</b>			<b>80</b>

### MICROBIOLOGY – I

**Total Hrs:80**

**Total Marks:80**

**UNIT I (16 HOURS/16 MARKS)**

**Origin and evolution of Microbiology –**  
History of Microbiology

**UNIT II(16 HOURS/16 MARKS)**

**Microscopy & Morphology of Bacteria –**  
**Microscopy**

Principles of Various microscopes:

Light, Dark-field, Phase contrast, Fluorescent and Electron microscopes-  
SEM,TEM

**Morphology of Bacteria**

Study of bacteria: Various Staining techniques, preparation of Stains., bacterial morphology

Bacterial anatomy : Gram Positive & Negative Cell wall, bacterial capsule ,  
Flagella Bacterial Spore

**UNIT III (16 HOURS/16 MARKS)**

**Growth, nutrition & metabolism of bacteria:**

Bacterial growth: Bacterial Cell Division, Bacterial Growth Curve, Generation Time, Bacterial Count, Bacterial Kinetics: Batch & Continuous Culture

Measurement of Growth and environmental factors affecting Growth.

Bacterial nutrition: Nutritional groups, Common Nutritional requirements

**UNIT IV (16 HOURS/16 MARKS)**

Sterilization and disinfection

**UNIT V (16 HOURS/16 MARKS)**

Culture media and Culture methods

Identification of bacteria

Bacterial taxonomy

**Practical**

Handling and maintenance of instruments required for routine lab work.

Motility of bacteria



Various staining Techniques Simple stains – Gram stain, Zeihl – Nelsen’s stain, modified ZN stain, Albert Stain, India INK

Stool Examination for ova & Cyst

Demonstration of culture media and Antibiotic sensitivity test

**Book Recommended:**

Clinical Microbiology ;J.Stokes and G.L. Ridgeway; William & Wilkins

Introduction in Medical Microbiology; Anant- Narainyan; Indian

Practical Medical Microbiology; Mackie and Mc Cathey

**SCHEME OF EXAMINATION**

<b>Type of Questions</b>	<b>No. of Questions</b>	<b>Marks</b>	<b>Sub Total</b>
SEC-A (Short Answer)	<b>10 questions. Each carry 2 marks</b>	10 × 2	20
SEC-B (Short Essay)	<b>6 (to attempt 5) Each carry 6 marks</b>	5 × 6	30
SEC-C (Long Essay)	<b>4 (to attempt 3) Each carry 10 marks</b>	3 × 10	30
<b>Grand Total</b>			<b>80</b>

# **ADESH UNIVERSITY BATHINDA**

## **BSc in Radiological Imaging & Technology (BSc-RIT)**

**Duration of Course : 3 years**

**Eligibility : 10+2 Medical with minimum 45% marks  
Or**

**10+2 Any stream with Diploma in Radiological Imaging &  
Techniques**

**No. of Seats : 30**

## **Syllabus & course curriculum**

### **Semester One**

### **Human Anatomy & Physiology- I**

**(Total No. of Hours 80/ Total marks 80)**

**UNIT 1** Introduction to Anatomy :Structure cell and elementary tissues of body  
**(2hrs/2marks)**

**UNIT 2** Tissues: Macroscopic and microscopic studies of epithelial tissue, general connective tissue, cartilaginous tissue, bone tissue, muscle tissue, nervous tissue and the integument; major functional advantages of each tissue type.

**(5hrs/5marks)**

**UNIT 3** Introduction to Circulatory System: Structure & function of heart and main blood vessels, Blood: Cells, normal count & functions circulation of blood, pulse, blood pressure, blood volume, Steps of coagulation, Blood groups, Rh factor & their Importance.

**(16hrs/16marks)**

**UNIT 4** Introduction to Lymphatic System: Circulation of lymph, lymph Vessels, Lymph Nodes and lymphoid organs, their structure and functions.

**(2hrs/2marks)**

**UNIT 5** Introduction to digestive System: Parts of gastrointestinal tract and associated glands, Digestion & Absorption of food , function of liver, gall bladder & Pancreas.

**(9hrs/9marks)**

**UNIT 6** Introduction to Respiratory System: Parts of Respiratory System, Structure & function of lungs, Physiology of respiration, disorders like Anoxia, Dyspnoea Cyanosis etc, Artificial respiration

**(5hrs/5marks)**

**UNIT 7** Introduction to Urinary System: structure & function of kidney , ureters, urinary bladder and urethra. Physiology of urinary system.

**(5hrs/5marks)**

**UNIT 8** Introduction to Reproductive System: Anatomy of Male & Female reproductive organs , spermatogenesis, physiology of ovulation, menstruation, fertilization.

**(9hrs/9marks)**

**UNIT 9** Anatomical introduction to skin & Sense organs : Eye, Ear, Nose, Tongue.

**(3hrs/3marks)**

**UNIT 10 \*** Introduction to Nervous System: Parts of brain, spinal cord, Peripheral functions of CNS and Anatomic Nervous systems, Cerebrospinal fluid- formation, composition and function.

**(16hrs/16marks)**

**UNIT 11** Name of endocrine glands and hormones secreted by them – major actions.

**(3hrs/3marks)**

**UNIT 12** Nutrition & Metabolism : BMR, Calories, Vitamins, Minerals

**(5hrs/5marks)**

Scheme of Examination Theory: (one paper of 3 hours duration carrying 80 marks)

Type of Questions	Total No. of Questions	No. of Questions to be attempted	Marks (each Question)	Sub-total
Very Short Answer	10	10	2	20
Short Answer	6	5	6	30
Long answer	4	3	10	30
<b>Total Marks</b>			<b>80</b>	

## **SUBJECT 2- Basic Pathology & Microbiology**

(Total No. of Hours 32/ Total marks 40)

### **PATHOLOGY (PART – A)**

(16hrs/ 20 marks)

BASIC PATHOLOGY- \* Cell injury and adaptation:- atrophy, hypertrophy, metaplasia, hyperplasia, classification of tumors, premalignant lesion.

- Types of inflammation & system manifestations of inflammation
- Bone Marrow Density Tests (BMD)

### **MICROBIOLOGY (PART – B)**

(16hrs/ 20 marks)

CHAPTER 1: INTRODUCTION TO MICROBIOLOGY: Discovery of micro organisms. Classification and general characteristics of microorganisms, nutritional requirements of Micro-organisms.

CHAPTER 2: PRINCIPLES OF MICROBIAL CONTROL: Sterilization, importance of sterilization in OT techniques various methods-physical UV radiation, alcohols and heavy metals, Autoclave structure functioning control and indicators.

CHAPTER 3: Biomedical waste management.

CHAPTER 4: Hospital acquired infections

Scheme of Examination Theory: (one paper of 3 hours duration carrying 40 marks)

Type of Questions	Total No. of Questions	No. of Questions to be attempted	Marks (each Question)	Sub-total
Very Short Answer	5	5	2	10
Short Answer	4	5	5	20
Long answer	2	1	10	10
<b>Total Marks</b>			<b>40</b>	

## **SUBJECT 3- Patient care & hospital administration**

(Total No. of Hours 48/ Total marks 40)

**UNIT 1.**  
**hrs/20marks)**

**(36**

- Hospital structure and organization
- Principles of Patient Care. - professionalism, projecting professional image, professional and personal qualities (both essential and desirable), roles, ethics and legal implications of practice of the radiographer. Basic health care needs of individuals seeking medical imaging and radiographic therapeutic health services
- Communication and Relational Skills - development of appropriate communication skills with patients, verbal and non-verbal communication, appearance and behaviour of the radiographer.
- Moving and lifting patients - hazards of lifting and manoeuvring patients, rules for correct lifting, transfer from chair or trolley to couch and vice-versa, safety of both “Lifter” and “the Lifted” must be emphasised. Highlight on handling of geriatric, paediatric and trauma patients. handling female patients, practice in pregnancy.
- Radiological contrast media - classification, need for radiological contrast media, methods of administration, dosage, reactions to contrast media, role of the imaging department and the radiographer in management of patient with contrast reaction

**UNIT 2**  
**hrs/10marks)**

**(4**

Communicable diseases (special reference to AIDS), cross infection and prevention, patient hygiene, personal hygiene, departmental hygiene, handling of infectious patients in the department, application of asepsis, inflammation and infection processes.

**UNIT 3**  
**hrs/5marks)**

**(4**

Patient vital signs - temperature, pulse, respiration and blood pressure - normal values and methods of taking and recording them.

**UNIT 4**

**(4hrs/5marks)**

Medico-legal considerations - radiographers clinical and ethical responsibilities, misconduct and malpractice ;

Scheme of Examination Theory: (one paper of 3 hours duration carrying 40 marks)

Type of Questions	Total No. of Questions	No. of Questions to be attempted	Marks (each Question)	Sub-total
Very Short Answer	5	5	2	10

Short Answer	4	5	5	20
Long answer	2	1	10	10
	<b>Total Marks</b>			<b>40</b>

**SUBJECT 4- Introduction to Radiology & Dark Room**  
**(Total No. of Hours 80/ Total marks 80)**

**UNIT 1 Dark Room  
marks)**

**(10 hrs/ 10**

The processing area ,Dark room design, construction, illumination, entrance safe lighting - types  
Storage, shelving of films ,Cleaning and maintenance

**UNIT 2 X-Ray film  
marks)**

**(10 hrs/ 10**

Composition of single and double coated radiographic films, structure of emulsion, film characteristics (speed, base + fog, gamma, latitude) ;  
Latent image formation ;  
Image intensifiers and cassettes (structure and function) ; types of image intensifiers and relative advantage, loading and unloading of cassettes and their care/maintenance ; effects of kV and mA on variation of emitted radiation intensity, determination of relative speeds, film contrast, film screen contact.  
Film storage, handling.

**UNIT 3 Film Processing**

**(10hrs/10marks)**

Principles : Acidity, alkalinity, pH, the processing cycle, development, developer solution, Fixing, fixer solution, washing, drying replenishment, checking and adjusting Replenishment rates, manual and automatic processing  
Silver recovery  
Auto and manual chemicals

**UNIT 4 Equipment for Film Processing  
(10hrs/10marks)**

Functions of various components  
Film roller transport - transport time, film feed system,  
Importance and relation to temp, fixed and variable time cycles.  
Care and maintenance (cleaning routine and methods of cleaning).

**UNIT 5 Factors affecting Image Quality  
(10hrs/10marks)**

Meaning of radiographic image contrast, density, resolution, sharpness, magnification and distortion of image, noise and blur.  
Radiographic illuminators and viewing conditions, visual acuity and resolution.  
Quality assurance of the related equipment and its benefits w.r.t visual assessment.

**UNIT 6 Portables and Mobiles  
(10hrs/10marks)**

Types of mobile units, mobile image intensifiers, advantages and limitations, radiation protection.

**UNIT 7 Radiation Protection  
(10hrs/10marks)**

Radiation monitoring devices (film badge and TLD), radiation shielding devices available for protecting staff, patient and public and how to use them. (Methods of Radiation Protection of patients, radiation workers and public).

**UNIT 8 Fundamentals of Radiation Therapy  
(10hrs/10marks)**

Scheme of Examination Theory: (one paper of 3 hours duration carrying 80 marks)

Type of Questions	Total No. of Questions	No. of Questions to be attempted	Marks (each Question)	Sub-total
Very Short Answer	10	10	2	20
Short Answer	6	5	6	30
Long answer	4	3	10	30
		<b>Total Marks</b>		<b>80</b>

**Practical**

1. Anatomy : Detailed Osteology and Arthrology: Naming and identification of osteological features of individual human bones; naming, identification and application of classifications to the major joints of the human body; examples of variability in the human skeleton.
2. Basic Pathology & Microbiology : (Technical details to be avoided), Techniques of sterilization, Identification of Tissue slides , Bone Marrow Density test
3. Radiology : Demonstration & Identification of Dark Room Equipments & Techniques, Film Processing,
4. Viva voce.

**ADESH UNIVERSITY  
BATHINDA**

# **BSc in Operation Theatre Technology (BSc OTT)**

**Duration of Course : 3 years**

**Eligibility : 10+2 Medical with minimum 45% marks**

**Or**

**10+2 any stream with Diploma in OT Technology**

**No. of Seats : 30**

## **Syllabus & Course Curriculum**

### **SYLLABUS**

**BSc. Operation Theatre Technology , ADESH UNIVERSITY**

### **SEMESTER 1**

**Subject 1 – Human Anatomy & Physiology**

**(Total No. of Hours 80/ Total marks 80)**

**UNIT 1.** Introduction to Anatomy :Structure cell and elementary tissues of body  
**(10 hrs/10 marks)**

**UNIT 2.** Skeletal System: Bones, Types of bones, Major Important Bones.

- Muscular System: Structure &Types of muscle in human body, bones of lower and upper extremities, Pelvic girdle, Thoracic cage, **joints**.



**(10 hrs/10 marks)**

**UNIT 3 .** Introduction to Circulatory System: Structure & function of heart and main blood vessels, Blood: Cells, normal count & functions, circulation of blood, pulse, blood pressure, blood volume, Steps of coagulation, Blood groups, Rh. Importance.

- Introduction to Lymphatic System: Circulation of lymph, lymph Vessels, Lymph Nodes and lymphoid organs, their structure and functions.

**(10 hrs/10 marks)**

**UNIT 4** Introduction to digestive System: Parts of gastrointestinal tract and associated glands, Digestion & Absorption of food , function of liver, gall bladder & Pancreas.

- Nutrition & Metabolism : BMR, Calories, Vitamins, Minerals

**(10 hrs/10 marks)**

**UNIT 5** Introduction to Respiratory System: Parts of Respiratory System, Structure & function of lungs, Physiology of respiration, disorders like Anoxia, Dyspnoea Cyanosis etc, Artificial respiration

**(10 hrs/10 marks)**

**UNIT 6.** Introduction to Urinary System: structure & function of kidney , ureters, urinary bladder and urethra. Physiology of urinary system.

**(10 hrs/10 marks)**

**UNIT 7.** Introduction to Reproductive System: Anatomy of Male & Female reproductive organs , spermatogenesis, physiology of ovulation, menstruation, fertilization.

- Name of endocrine glands and hormones secreted by them – major actions

**(10 hrs/10 marks)**

**UNIT 8** Anatomical introduction to skin & Sense organs : Eye, Ear Nose.

Introduction to Nervous System: Parts of brain, spinal cord, Peripheral functions of CNS and Anatomic Nervous systems, Cerebrospinal fluid- formation, composition and function.

**(10 hrs/10 marks)**

Scheme of Examination Theory: (one paper of 3 hours duration carrying 80 marks)

Type of Questions	Total No. of Questions	No. of Questions to be attempted	Marks (each Question)	Sub-total
Very Short Answer	10	10	2	20
Short Answer	6	5	6	30
Long answer	4	3	10	30

	<b>Total Marks</b>	<b>80</b>
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**Subject 2 Biochemistry**  
(Total No. of Hours 80/ Total marks 80)

**UNIT 1** Proteins- Structure of proteins, Amino acids, Essential, Amino acid, Protein Metabolism, Formation of urea, Creatinine, **(20 hrs/20 marks)**

**UNIT 2** Carbohydrate :- Classification, Properties , Metabolism, Glycolysis, Glycogenolysis, Gluconeogenesis and Hormonal regulation of blood sugar levels, Diabetes Mellitus, Glycosuria, **(20 hrs/20 marks)**

**UNIT 3** Lipids – Definition, Classification, Metabolism, Triglycerides, Cholesterol, Plasma Lipoproteins, Ketone bodies and ketonuria. **(20 hrs/20 marks)**

**UNIT 4.** Gastric Juice – Constituents & Bile pigments, Bile Salts, and Gastric function Test. **(10 hrs/10 marks)**

**UNIT 5.** Electrolytes in Body fluids : Sodium, Potassium, Calcium, Phosphorus and Chlorides, determination and Clinical significance. **(10 hrs/10 marks)**

Scheme of Examination Theory: (one paper of 3 hours duration carrying 80 marks)

Type of Questions	Total No. of Questions	No. of Questions to be attempted	Marks (each Question)	Sub-total
Very Short Answer	10	10	2	20
Short Answer	6	5	6	30
Long answer	4	3	10	30
	<b>Total Marks</b>			<b>80</b>

**Subject 3 Applied Basic Science**  
(Total No. of Hours 48/ Total marks 40)

**Unit I**  
**Living World** **(14 hrs/12 marks)**  
Biology & Its Branches; relationships with other sciences; scientific methods in Biology;

historical breakthroughs; scope of biology and career options; role of Biology in dispelling myths and misbeliefs; characters of living organisms, (elementary idea of metabolism, transfer of energy at molecular level, open and closed systems, homeostasis, growth and reproduction, adaptation, survival, death).  
Origin and evolution of life - theories of evolution; evidence of evolution; sources of variations ( mutation, recombination, genetic drift, migration, natural selection); concept of species; speciation and isolation (geographical and reproductive); origin of species.

## **Unit II**

### **Cell and Cell Division marks)**

**(14 hrs/12**

Cell as a basic unit of life - discovery of cell, cell theory, cell as a self - contained unit;

prokaryotic and eukaryotic cell; unicellular and multicellular organisms; tools and techniques ( compound microscope, electron microscope and cell fractionation); Ultrastructure of prokaryotic and eukaryotic cell - cell wall, cell membrane - unit membrane concept (fluid mosaic model); membrane transport; cellular movement (exocytosis, endocytosis);

cell organelles and their functions - nucleus, mitochondria, plastids, endoplasmic reticulum, Golgi complex, lysosomes, lysosomes, microtubules, centriole, vacuole, cytoskeleton, cilia and flagella, ribosomes.

Molecules of cell; inorganic and organic materials - water, salt, mineral ions, carbohydrates, lipids, amino acids, proteins, nucleotides, nucleic acids (DNA and RNA);

Enzymes (Properties, chemical nature and mechanism of action); vitamins, hormones and steroids.

## **Unit III**

### **BIO STATISTICS marks)**

**(20 hrs/16**

Introduction to basic statistical concepts: methods of statistical analysis; and interpretation of data

Behavioural Objectives: Understands statistical terms.

Possesses knowledge and skill in the use of basic statistical and research methodology.

Chapter – I : Introduction : Meaning, definition, characteristics of statistics.

Importance of the study of statistics. Branches of statistics.

Chapter - II : Measure of Central Tendency

Need for measures of central tendency

Definition and calculation of mean - ungrouped and grouped

Meaning, interpretation and calculation of median ungrouped and grouped.

Meaning and calculation of mode.  
 Comparison of the mean, and mode.  
 Guidelines for the use of various measures of central tendency.  
 Chapter - IV : Measure of Variability  
 The range, the average deviation.  
 The variance and standard deviation.  
 Calculation of variance and standard deviation ungrouped and grouped.  
 Properties and uses of variance and SO  
 Chapter -V : Probability and Standard Distributions.  
 Meaning of probability of standard distribution.

Scheme of Examination Theory: (one paper of 3 hours duration carrying 40 marks)

Type of Questions	Total No. of Questions	No. of Questions to be attempted	Marks (each Question)	Sub-total
Very Short Answer	5	5	2	10
Short Answer	4	5	5	20
Long answer	2	1	10	10
		<b>Total Marks</b>		<b>40</b>

## **Subject 4 Introduction to OT Technique.**

**(Total No. of Hours 80/ Total marks 80)**

**UNIT 1.** Environment:- Structure of the Operation Theatre, Anaesthesia Room, Sterilizer Room, Recovery Room, Store Room, Changing Room, Scrub Room.

- Control of Infection :- Theatre Dress, Cap and Mask, Scrubbing Technique, Donning a Gown, Gloving, Theatre Cleaning,

**(16 hrs/16**

**marks)**

**UNIT 2** Sterilization and Disinfection of OT & Equipments- Definition, Methods , cleaning agents detergents, Mechanical washing, ultrasonic cleaner, lubrication inspection and pitfalls, Various methods of chemical treatment- formalin, glutraldehyde etc, thermal. Hot Air oven- dry heat, Autoclaving, steam Sterilization water etc, UV treatment.

**(16 hrs/16 marks)**

**UNIT 3** Duty of the OT Staff - Assessment, Implementation , Evaluation, Preparing Mayo Trolley, assisting the surgeon

- \* Position for Surgery and uses,
- \* Preparation of Operation Site,
- \* Suture Materials:- Absorbable, No absorbable, Adhesive Skin Closure, Staples, Suture Needles

\* Incisions:- Incisions to Expose abdominal viscera (16 hrs/16 marks)

**UNIT 4** Disposable Materials, Radiation Sources, Hazards. (16 hrs/16 marks)

**UNIT 5.** General Instruments (16 hrs/16 marks)

Scheme of Examination Theory: (one paper of 3 hours duration carrying 80 marks)

Type of Questions	Total No. of Questions	No. of Questions to be attempted	Marks (each Question)	Sub-total
Very Short Answer	10	10	2	20
Short Answer	6	5	6	30
Long answer	4	3	10	30
	<b>Total Marks</b>			<b>80</b>

### **Subject 5 – Practical**

5. Anatomy : Detailed Osteology and Arthrology: Naming and identification of osteological features of individual human bones; naming, identification and application of classifications to the major joints of the human body; examples of variability in the human skeleton.
6. Biochemistry : Estimation of Serum Bilirubin , Electrolytes, Serum cholesterol, HDL, LDL, VLDL, Triglycerides, Liver Function Test, Renal Function Test, Bone Marrow Density test  
Determination of Blood urea, Uric acid and Creatinine, blood glucose
7. Introduction to OT : Observation & Demonstration of Preparation of OT for surgery, Preparation of OT Staff, Methods of sterilisation in OT- Autoclaving, Fumigation Identification of **General set** of instruments.

**Syllabus For M.Sc in Clinical Microbiology in Laboratory Technology**

**SEMESTER I**

**Human Anatomy**

**Total Hours: 48 Hrs  
Total Marks: 40marks**

**UNIT I**

**(6Hours/5Marks)**

Introduction of anatomy and Histology, Elementary Histology of cell, Tissues of the body organs and system.

**UNIT II**

**(6Hours/5Marks)**

**Skeletal System**

Development of bones, types of bones, Micro-anatomical and gross structure of bones, Osteology of human skeleton and various movement of joints.

**Muscular System**

Structure and type of muscles in human body, important muscles and their group action.

**UNIT III**

**(6Hours/5Marks)**

**Circulation System**

Structure of heart and blood vessels, Systemic circulation, pulmonary circulation, Portal circulation, and coronary circulation.

**Lymphatic System**

Lymph vessels, Lymph nodes and Lymphoid organs, their structure and functions.

**UNIT IV**

**(6Hours/5Marks)**

**Digestive System**

Gastrointestinal tract and associated glands (Salivary Glands, Liver, Pancreas etc).

**UNIT V**

**(6Hours/5Marks)**

## **Respiratory System**

Trachea, Lungs including other air passages.

## **UNIT VI**

**(6Hours/5Marks)**

### **Urinary System**

Kidney, ureter and urinary bladder etc.

## **UNIT VII**

**(6Hours/5Marks)**

### **Endocrine System**

Thyroid glands, Parathyroid glands, Adrenal glands and Pituitary glands.

### **Reproduction:**

Femal and Male reproductory organs System.

## **UNITVIII**

**(6Hours/5Marks)**

### **Special sense organs:**

Skin and its appendages, Eye, Ear, Nose Taste buds, Subcutaneous sense organs.

### **Nervous System:**

Brain, Spinal cord and peripheral nerves.

## **SCHEME OF EXAMINATION**

<b>Type of Questions</b>	<b>No. of Questions</b>	<b>Marks</b>	<b>Sub Total</b>
SEC-A (Short Answer)	<b>5 questions Each carry 2 marks</b>	$5 \times 2$	10
SEC-B (Short Essay)	<b>4 questions Each carry 5 marks</b>	$4 \times 5$	20
SEC-C (Long Essay)	<b>2 (to attempt 1) Each carry 10 marks</b>	$1 \times 10$	10
<b>Grand Total</b>			<b>40</b>

## **Human Physiology & Nutrition**

**Total Hours: 48 Hrs**  
**Total Marks: 40marks**

### **UNIT I**

**(6Hours/5Marks)**

#### **Blood:**

Blood volume, composition and function of blood, haemopoiesis, blood coagulation, blood groups, body fluids.

#### **Cardiovascular System :**

General plan of circulatory system, function of heart and blood vessels (arteries, arterioles, capillaries and veins) heart sound and E.C.G. nervous control of heart and blood vessels, regulation of blood pressure.

### **UNIT II**

**(6Hours/5Marks)**

#### **Respiratory System**

Functional anatomy of respiratory system, mechanism of breathing and exchange of gases in the lungs. Regulation of respiration, Oxygen and carbon dioxide carriage, anoxia, dyspnoea, cyanosis, artificial respiration and pulmonary function test.

### **UNIT III**

**(6Hours/5Marks)**

#### **Gastrointestinal System :**

Alimentary canal and its various glands, digestion of food in mouth, stomach and small intestines, gastro-intestinal tract movements and absorption. Function of liver and liver function tests and metabolism.

### **UNIT IV**

**(6Hours/5Marks)**

#### **Excretory System**



Structure and function of kidney and Urinary bladder, Structure and function of skin.

#### UNIT V

**(6Hours/5Marks)**

#### **Endocrine Glands**

#### **Reproductive System:**

Endocrine glands and their function. Regulation of endocrine secretion. Physiology of male and female reproductive System.

#### UNIT VI

**(6Hours/5Marks)**

#### **Muscular System:**

Types of muscles, innervation of muscles, neuromuscular transmission, mechanism of muscular contraction.

#### UNIT VII

**(6Hours/5Marks)**

#### **Nervous System :**

Neuron and its function, spinal cord and reflex action, sensory end organs and sensory pathways, cerebral cortex and motor path ways. Maintenance of posture and locomotion, automatic nervous system, Physiology of vision, hearing test and olfaction.

#### **Unit VIII**

**(6Hours/5Marks)**

Minerals and their role in nutrition

- Common mineral salts – Source,function and importance
- Trace mineral salts - Source,function and importance

Nutrition in health and disease

- Balanced diet – Regulations of food intake and energy storage
- Disorder of nutrition – Malnutrition, Malabsorption, Obesity, Starvation, deficiency disease

Detoxification

- Pathways of Metabolism
- Drug Biotransformation

Antibiotics

- Introduction, nomenclature & General characteristics
- Classification & Mechanism of action

- Antibacterial antibiotics- Penicillin, tetracycline, cephalosporin & sulphonamides
- Antifungal antibiotics – griseofulvin & nystatin
- Antiviral antibiotics & Interferons

### SCHEME OF EXAMINATION

<b>Type of Questions</b>	<b>No. of Questions</b>	<b>Marks</b>	<b>Sub Total</b>
SEC-A (Short Answer)	<b>5 questions Each carry 2 marks</b>	$5 \times 2$	10
SEC-B (Short Essay)	<b>4 questions Each carry 5 marks</b>	$4 \times 5$	20
SEC-C (Long Essay)	<b>2 (to attempt 1) Each carry 10 marks</b>	$1 \times 10$	10
<b>Grand Total</b>			<b>40</b>

### Microbiology

**Total Hours: 120 Hrs**  
**Total Marks: 80marks**

UNIT I  
marks)

(12 Hours/8

**Historical introduction & Bacterial Taxonomy**

Historical introduction & Scope of Microbiology

Contribution of the following:

- Antony Von Leeuwenhoek
- Alexander Fleming
- Louis Pasteur
- Joseph Lister
- Robert Koch
- Elie Metchnikoff
- John Needham
- John Tyndall
- Lazzaro Spallanzani
- Paul Ehrlich

Bacterial morphology:

- Cell wall (both of Gram +ve and –ve bacteria)
- Components external to cell wall: Capsule, Slime layer, S-Layer)
- Pili & Fimbriae
- Flagella & Motility( Ultrastructure, Synthesis, Mechanism of Flagellar movement)
- Bacterial Endospore

UNIT II  
marks)

(12 Hours/8

**Bacterial Taxonomy & Bacterial Genetics**

General View of:

- Five Kingdom Classification (Whittaker)
- Bergey's Manual of Systemic Bacteriology

Bacterial Genetics

- DNA as a genetic Material
- Bacterial Plasmids
- Bacterial Conjugation:
- DNA Transformation
- Transduction

- DNA probes
- PCR
- GMO
- Gene Therapy

### UNIT III

(12 Hours/8

marks)

#### **Growth, Nutrition & Metabolism of Bacteria**

Bacterial growth: Bacterial Cell Division, Bacterial Growth Curve, Generation Time, Bacterial Count, Bacterial Kinetics: Batch & Continuous Culture

Measurement of Growth and environmental factors affecting Growth.

Bacterial nutrition: Nutritional groups, Common Nutritional requirements

Growth of Bacteria under extreme conditions: Psychrophiles, Thermophile, Halophiles, Acidophiles.

Bacterial metabolism:

- Oxidation
- Fermentation
- Oxidation –Reduction Potential
- 

### UNIT IV

(12 Hours/8

marks)

#### **Microscopy & Staining Techniques**

Microscopy

- Light Microscope
- Phase Contrast Microscope
- Dark field Microscope
- Interference Microscope
- Fluorescent Microscope
- Electron Microscope

Staining Techniques:

- Unstained (wet) preparations
- Stained preparations (Simple, Differential: Albert, Acid Fast Staining, Gram staining, Capsule, Spore)

**UNIT V**  
**marks)**

**(12 Hours/8**

**Culture Media, Culture Method & Identification of Bacteria**

Culture Media: Introduction & Types of Media

Culture methods:

- Streak
- Lawn
- Stroke
- Stab
- Pour Plate
- Liquid Culture

Anaerobic Culture methods

Methods of isolating pure culture

Identification of bacteria:

- Morphology of Bacterial colony
- Growth in Liquid Media
- Staining
- Hanging Drop Preparation
- Biochemical test
- Typing methods
- Pathogenicity test

**UNIT VI**  
**marks)**

**(12 Hours/8**

**Specimen Collection & Processing** Basic principles of Specimen collection

Preservation & Storage & Transport of specimen

Specimen receipt & Processing

Culture Workup

Non routine specimens

Communications of laboratory Findings

UNIT VII (12 Hours/8 marks)

**Quality Control** Quality issue in Clinical Microbiology  
General guidelines for establishing quality control

UNIT VIII (12 Hours/8 marks)

Sterilization & Disinfection

UNIT IX (12 Hours/8 marks)

**Antimicrobial Susceptibility Test & Drug Resistance Activity**

- Dilution susceptibility Testing Methods
- Disk Diffusion Testing (KB Method)

UNIT X (12 Hours/8 marks)

**Pathogenicity** Normal Flora of Human Body  
Microbial Pathogenicity

**SCHEME OF EXAMINATION**

Type of Questions	No. of Questions	Marks	Sub Total
SEC-A (Short Answer)	<b>10 questions</b> Each carry 2 marks	10 × 2	20
SEC-B (Short Essay)	<b>5 questions</b> Each carry 6 marks	5 × 6	30
SEC-C (Long Essay)	<b>4 (to attempt 3)</b> Each carry 10 marks	3 × 10	30
<b>Grand Total</b>			<b>80</b>

**LIST OF PRACTICALS OF MICROBIOLOGY:**

1. DIRECT MICROSCOPIC EXAMINATION
  - a. WET MOUNT TECHNIQUE
  - b. HANGING DROP TECHNIQUE
  - c. DRY MOUNT TECHNIQUE
2. STAINING
  - a. SAMPLE
  - b. GRAM
  - c. ZN STAIN
  - d. ALBERT'S STAIN
  - e. SPORE
  - f. CAPSULE
3. PREPERATION OF CULTURE & VARIOUS BIOCHEMICAL TESTS
  - a. AGAR SLANT
  - b. CULTURE PLATES
4. VARIOUS CULTURE TECHNIQUES
  - a. STREAKING
  - b. SPREADING/LAWN
  - c. POURING
  - d. STAB
5. CULTURE ENVIRONMENT OF MICROBES
  - a. AEROBIC CULTURE
    - i. CANDLE JAR TECHNIQUE
  - b. ANAEROBIC CULTURE
    - i. THIOGLYCOLLATE BROTH
    - ii. ALKALINE PYROGALLOL METHOD
    - iii. BREWER ANEROBIC JAR
    - iv. GAS – PAK SYSTEM
6. ANTIMICROBIAL SUSCEPTIBILITY TEST
7. HOW TO PROCESS A CULTURE
8. SAMPLE COLLECTION & PROCESSING

## **BIOCHEMISTRY**

**Total Hours: 80 Hrs**

**Total Marks: 80marks**

**Unit – I (16**

**Hours/16Marks)**

Carbohydrates: Carbohydrates intermediate metabolism, glycogenesis, glycogenolysis, gluconeogenesis & glycolysis. TCA, HMP, and its regulations

Disorders of carbohydrates metabolism related to each cycle (inborn error of metabolism)

**Unit – II (16**

**Hours/16Marks)**

Proteins: Different metabolic pathway of amino acid the flow sheet of amino acids oxidation. Transamination, oxidative deamination and pathways leading to acetyl co-A.

Decarboxylation of Amino acids, formation of nitrogenous excretion products. Urea cycle and ammonia excretion.

**Unit – III (16**

**Hours/16Marks)**

Lipid: Biosynthesis and oxidation of fatty acids (odd & even number )

Ketone bodies formation and their oxidation

Regulation and inborn error of lipid metabolism

**Unit – IV (16**

**Hours/16Marks)**

Biochemical aspects of Hormone: Hormone receptors and intracellular messengers, Adenylate cyclase, protein kinase and phosphodiesterase.

Role of Insulin, glucagons, epinephrine and their mechanism

Various endocrine and regulatory systems mediated by cyclic AMP.

**Unit – V (16**

**Hours/16Marks)**

Vitamin: Fat and Water soluble and their deficiency

Mineral metabolism : Minor and Major (Cu, Fe, Ca, Mg & P)

Inborn error of Nucleic acids metabolism

**Practicals:**

Estimation of Protein

Estimation of Glucose



Estimation of bilirubin  
 Estimation of Urea  
 Total protein test – A:G ratio  
 Urine Analysis Chemical, Physical, Microscopically  
 GTT (Glucose Tolerance Test)  
 Demonstration of electrophoresis  
 Estimation of Sodium & Potassium

**SCHEME OF EXAMINATION**

<b>Type of Questions</b>	<b>No. of Questions</b>	<b>Marks</b>	<b>Sub Total</b>
SEC-A (Short Answer)	<b>10 questions Each carry 2 marks</b>	10 × 2	20
SEC-B (Short Essay)	<b>5 questions Each carry 6 marks</b>	5 × 6	30
SEC-C (Long Essay)	<b>4 (to attempt 3) Each carry 10 marks</b>	3 × 10	30
<b>Grand Total</b>			<b>80</b>