



HIMALAYAN UNIVERSITY, ARUNACHAL PRADESH

DIPLOMA IN PARAMEDICAL

(RADIOGRAPHY & IMAGINATION TECHNOLOGY)

1st YEAR

1st Semester

S. NO.	SUB. CODE	SUBJECT NAME	MARKS			
			INTERNAL	THEORY	TOTAL	PASS
1	101	General English	30	70	100	40
2	102	Computer Fundamentals	30	70	100	40
3	103	Human Anatomy	30	70	100	40
4	104	Human Physiology	30	70	100	40
5	105	Practical	30	70	100	40

2nd Semester

S. NO.	SUB. CODE	SUBJECT NAME	MARKS			
			INTERNAL	THEORY	TOTAL	PASS
1	201	General Pathology	30	70	100	40
2	202	General Microbiology	30	70	100	40
3	203	General Biochemistry	30	70	100	40
4	204	General Pharmacology	30	70	100	40
5	205	Practical	30	70	100	40

2nd YEAR

3rd Semester

S. NO.	SUB. CODE	SUBJECT NAME	MARKS			
			INTERNAL	THEORY	TOTAL	PASS
1	301	General Physics and Radiation Physics	30	70	100	40
2	302	Radiographic Techniques	30	70	100	40
3	303	Radiographic Photographic and Dark Room Techniques	30	70	100	40
4	304	X-Ray Equipments	30	70	100	40
5	305	Practical	30	70	100	40

4thSemester

S. NO.	SUB. CODE	SUBJECT NAME	MARKS			
			INTERNAL	THEORY	TOTAL	PASS
1	401	Computed Tomography and Magnetic Resonance Imaging and Ultrasonography	30	70	100	40
2	402	Radiotherapy	30	70	100	40
3	403	Nuclear Medicine	30	70	100	40
4	404	Cath Lab	30	70	100	40
5	405	Special Procedures and the use of Contrast Media	30	70	100	40
6	406	Practical	30	70	100	40

Himalayan University

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DIPLOMA IN PARAMEDICAL

(RADIOGRAPHY & IMAGINATION TECHNOLOGY)

1st YEAR

1st Semester

General English (101)

1) English, Communication Skill and Public Relations:

2) Writing Skills: Basics of English grammar How to write good and correct English .what is a Sentence? Types of Sentences - simple, compound, complex.

3) Listening Skills: What is listening? Types of Listening Purpose of Listening, Obstacles of listening

4) Reading Skills: Purposes of reading Types of reading - skimming, scanning, extensive reading, intensive reading, Loud and silent reading

5) Rapport Building Interpersonal Response, Traits, Managing Difficult Communication Traits in a hospital, communication in terminal illness

6) Effective Communication - The Ten Commandments The process of communication & different type of communication Communication - Definitions, Meaning, nature of communication, Purpose of communication

7) FORMAL LETTERS: Formal Style of Communication, Formal and Informal Letters, Essentials of a Formal Letter, Mechanics of Writing a Formal Letter, Drafting the Letter, Some Basic Equipment, The Format, Letters of Request, Letters of Complaint, Replying to Letters of Complaint, Letters about Jobs, Applications, Accepting an Offer, Declining an Offer, Letters to Government and Other Organisations, Letters of Complaint, Letters Giving Instructions, Letters of Request,

8) WRITING REPORTS: Different Stages in Writing a Report, Types of Report, Reporting Case History: Informal Reports, Reporting Case History: Formal Reports, Referral Letters, Referral Letters, Reply to Referral Letter

CLINICAL CASE STUDY: Significance of case study method some features, How is clinical case study prepared, Analyzing the case, Documentation and presentation, Conclusions

IMPROVING STUDY SKILLS: How do People Learn, Reading with a Purpose, What are Study Skills, Locating Information, Study Strategies for Better Comprehension: SQ3R, Variations of the SQ3R Approach

WRITING SUMMARIES-I : The technique of summarizing, Let us sum up, Key words

FORMAL CONVERSATION: FACE-TO-FACE: Making Enquiries and Giving Information at Public Offices, Making Enquiries at Hotels and Other Places, Making Enquiries : Taking a Medical History, Giving Advice to Patients. and their Relatives, Arguing with and Persuading People, Describing a Process

INFORMAL CONVERSATIONS: FACE-TO-FACE: Greetings: Enquiries about one's Health, Everyday Situations, Social Life, Other Informal Situations

TELEPHONE CONVERSATIONS: Face-to-Face and Telephone Conversation Compared, Formal Conversation, Emergency Calls, Business Calls, Informal Conversation

INTERVIEWS: Preparation for an Interview, Unfolding the Personality: Specimen Interviews

CASE PRESENTATION: How is a Case Presentation Prepared, Data Collection and Compilation of Material, Audiovisual Aids, Choice and Method of Use, How to Make the Case Presentation, Conclusion.

Computer Fundamentals (102)

Introduction to Computer: Meaning or Definition of Computer, Evolution of computer, Features of Computer, Main Operation of the Computer, Main Elements of Computer System, Bits, Bytes and Words, Device in Computer, Various Input & output Device.

Applications of Computer: Advantages and limitations of computers.

Memory: Overview of storage devices. Main memory, storage evaluation criteria, random access memory, read only memory, secondary storage devices.

Generation of Computers and their Classification Generation of Computers, Classification of Computers

Operating System Meaning of Operating System, Function of Operating System, Language Translators

Database Meaning Of Database, Data Processing System, Function of Data Processing, Objectives of Database, Type of Database, Functions of Database Management System (DBMS), Advantages & Disadvantages of DBMS, Various Database Structures or database models

Windows Graphical User Interface, Windows, Features of Windows, Control Button of windows, Various Icons on Desktop

Microsoft Word (INTRODUCTION)

Microsoft Excel (INTRODUCTION)

Microsoft PowerPoint (INTRODUCTION)

Internet – Features, Different type of network, Internet,

Patient Management Medical Establishments using Computer, One or More Computer, Network, Software, Training, Service Operators of System Computerization in Hospitals and Nursing Homes, Features of a Hospital Software Packages, Password Protection ,Various Application of Different Medical ,Software and Support

Human Anatomy (103)

Introduction, Subdivisions of anatomy, anatomical Nomenclature-in terms of position ,location and fundamental planes

Introduction to bones of human body of:

Bone: definition, composition, functions, classification and features of a long bone.

Cartilage: definition, components and classification.

Joints: definition of joints, classification and function

Upper limb: clavicle, scapula, humerus, radius, ulna, carpus, metacarpus & phalanges,

Lower limb: hipbone, femur, tibia, fibula, tarsus. Metatarsus & phalanges, Skull: name the bone of the skull and sutures between them, Thorax: ribs and their articulation,

Vertebral column: cervical, thoracic, lumbar, sacral and coccygeal

Surface markings of the body: Nine regions of the abdomen, Four quadrants of the hip

Introduction to vital organs:

Respiratory organ Nasopharynx, Oropharynx, Larynx, Trachea, Bronchi, Lungs (and their lobular segments), Thoracic, Pleura and pleural cavity

Circulatory organ Anatomical position of the heart, Pericardium of the heart, Chambers of the heart, Great vessels of the heart, Valves of the heart

Digestive organs Tongue, Teeth, Oral cavity, Pharynx, Esophagus, stomach

Reproductive organs Male and female gonads: testes, epididymis, ovary, fallopian tube, uterus, vagina, Introduction to male genital organs, Introduction to female genital organs

Liver and spleen Introduction, Anatomical position, Gall bladder

Excretory organs Cortex and medulla of kidney, Ureter, Urinary bladder, Urethra (male and female), nephrons.

Nervous System :Basic anatomy of nervous system, Central nervous system, Peripheral nervous system, Autonomic nervous system.

Muscles Introduction, origin and insertion, function.

Human Physiology (104)

Cell: Definition ,Structure and functions the cytoplasmic organelles , Reproduction: meiosis, mitosis

The important Physio - Chemical Laws Applied to physiology Diffusion , Osmosis, Bonding, Filtration, Dialysis, Surface tension, Adsorption, Colloid

Fundamentals of different organ system:

Cardiovascular System: Systole, Diastole, Blood circulation, Conduction system of Heart ,ECG. Cardiac Output, Cardiac Stroke.

Respiratory System: Functions of Respiratory Tract, Mechanism of Breathing and Respiration, Muscles of Respiration. Common Respiratory Disorders.

Digestive System: Digestion of food in mouth, stomach & small intestines. Absorption of food, function of liver.

Excretory System: Structure & function of kidney and urinary bladder. Mechanism of urine formation. disorders of kidney.

Reproduction system: Male and Female Reproductive organs. Mensuration cycle.

Endocrine system: Functions of various endocrine glands and hormones secreted by them

Lymphatic system: Lymph vessels, lymph nodes and lymphoid organs, their structure & functions.

Blood Definition, Composition, Function

Formation of different types of blood cells Erythrocytes, Leucocytes, Thrombocytes

Mechanism of Blood clotting

Cerebrospinal fluid Formation, Composition, Function

Special senses Hearing, Taste, Smell, Touch, Sight

Practical (105)

1. Study and care of Microscope.
2. Collection of blood samples.
3. Separation of plasma from blood.
4. Demonstration of Vacutainers and its use.
5. Preparation and Examination of blood smear.
6. Histology of Skeletal Muscle.
7. Histology of smooth muscle.
8. Histology of bone.
9. Histology of hyaline cartilage
10. Histology of elastic cartilage
11. Histology of Epithelial tissues: Columnar Epithelium, Squamous Epithelium, Cuboidal Epithelium.
12. Study of Lab Equipments.
13. Study of lab specimens

English: Job application, Resume writing .Interviews, Group discussions, Essay writing, Formal and informal communication.

Computers: Presentations, using excel sheet, Identification of computer devices,

2nd Semester

General Pathology (201)

Introduction, Cell Injury ,Cell Death and Cellular Adaptation, Inflammation and types of Inflammation, Infections and types of Infections, Wound Healing and Neoplasia.

Pathology of Human Body

Introduction, Atherosclerosis and Other Vascular Diseases.

Morphological Responses of the Cardiovascular System and Ischemic Heart Diseases.

Pathology of Bacterial Pneumonia and Abscess, Tuberculosis.

Kidney and Urinary Tract Diseases.

Chronic Obstructive Pulmonary Diseases,

Pathology of the Esophagus and Stomach,

Pathology of the Small and Large Intestines

General Microbiology (202)

CLASSIFICATION OF MICROORGANISMS.

BACTERIOLOGY Introduction, Structure, Classification & Metabolism of Bacteria
.Bacterial growth curve, Basis of Antimicrobial Action- .Antibiotics.

Infections by staphylococcus and streptococcus, Infections by Mycobacterium.
Tuberculosis, Infections by E.Coli, Infections by Salmonella. typhi.

VIROLOGY Introduction, Structure, Classification and multiplication of viruses, Viral
genetics and pathogenesis of Virus, HIV virus, Hepatitis virus, Influenza virus, Herpes Virus
.Antiviral drugs

MYCOLOGY General concepts of mycology, Classification of Fungus, Structure of Fungi
and disease mechanisms, Diagnosis of Fungal Infections, Treatment of Fungal Infection.

STERILIZATION AND DISINFECTION. STAINING TECHNIQUES.

General Biochemistry (203)

Chemical Bonding Valency, Electrovalent Bonding (Ionic Bonding), Covalent Bonding
Molecular Weight of Compounds

Solutions Definition and Importance of Solutions, Types of Solutions, Diffusion, Osmosis
and Dialysis

Electrolytes Acids, Bases and Salts, Ionization, Physiological Importance of Electrolytes,

Cell: Eukaryotic Cell, its Structure and function, cell organelles structure and functions.
Biological membrane and transport .Passive and Active Transport.

Carbohydrates: classification, glycolysis and its energetic, TCA cycle and its energetics, fate of pyruvate, Regulation of blood glucose by Insulin and Glucagon. Normal Blood Glucose levels.

Lipids: Classification and importance of lipids, Types of Fatty acids, Triacylglycerols, importance of TAG, Phospholipids classification and function, prostaglandins and steroids. Digestion and Transportation of Lipids.

Amino acids, Proteins and Enzymes: Classification of amino acids, Importance of amino acids, Classification of Proteins, structure and functions of proteins. Classification of enzymes, Properties of Enzyme, Factors affecting Enzyme action, Diagnostic Significance of Enzymes.

General Pharmacology (204)

Introduction, Basic concepts of drugs, Factors affecting drug response. Routes of administration of drugs, Effects of Drugs on the body, Prevention of adverse effects to drugs. Drugs and laws, Paramedics Responsibility in Drug Administration, Terminology, drug store, Ethical and Legal Aspects. Antibiotics, Antifungals, Antivirals, Time of Administration, Abbreviations and Symbols used. Antiseptics and Disinfectants,

Practical (205)

1. Blood collection.
2. TLC
3. DLC
4. Microscopic Urine analysis.
5. Microscopic Stool Examination.
6. Staining techniques: Grams staining, Acid Fast Staining, Negative Staining, Simple Staining.
7. Laboratory instruments: Principle and working of Centrifuge, Incubator, colorimeter.
8. Blood grouping.
9. Type of Stains and their Action: Acidic Stains and Basic Stains.
10. Types of media for Bacterial Culture: Nutrient Agar, Nutrient Broth, Macconkey Agar
Bleeding Time and Clotting Time.

3rd Semester

General Physics and Radiation Physics (301)

PHYSICS

Units of measurements, Force, Work, Energy, Heat & Energy.
Various methods of transmission of Heat.

MAGNETISM: Classification of Magnets, Properties of Magnets, Magnetic fields & lines of forces, Magnetic fields & their measurements, Electro Magnetism.

ELECTRICITY : Electrostatic-conductor & insulators, Elementary electron theory, Units of electric charged potential. Condensers & capacity of condensers.

CURRENT ELECTRICITY: Ohm's law, various units of current, Voltage & resistance, heating effects of current units of Power & power consumption calculations, Principles & working of Moving coil & moving iron type of meters.

ELECTRO MAGNETIC INDUCTION : Transformers, their losses, rating Induction motors.

DIRECT & ALTERNATING CURRENTS: Impedance, Capacitance & Inductance. Thermoionic emissions & characteristic curves of diode & triode valves Semi conductors.

RADIATION PHYSICS

Rectifications & various circuits.

Structures of Atom, Radioactivity-natural & artificial.

Production & properties of X-rays.

X-ray tube in detail-stationary Anode, Rotating Anode & Radiotherapy tubes.

Interaction of radiation with Matter.

Quantity & quality of radiation & the factors on which it depends H.V.T.

Various radiation units- Rontgen, Rad, REM, RBE etc.

Dosimetry-various radiation measuring instruments.

I.C.R.P. recommendations.

EQUIPMENT

Mains supply, Basic X-ray circuit control & stabilizing equipment Meters, various exposure timers, Control of scattered radiations Fluoroscopy, Tomography, mobile equipment. Photo-fluoroscopy, Memographic equipment.

Image Intensifiers.

Rapid Serial charger equipment.

Care & maintenance of equipment.

Radiographic Techniques (302)

Upper Limb - Fingers individuals & as a whole, hands, carpal tunnel, wrist, fore arm, elbow, head of radius, humerus, shoulder joint, Acromio - clavicular joint, scapular, clavicle, Sternoclavicular joint.

Lower Limb – Tarsals, foot, calcaneus, ankle joint, leg, knees, patella, fibula, femur, intercondylar notch.

Hip & Pelvis - Hip-Neck of femur-theatre procedure for hip pinning on reduction, pelvis, sacro-iliac joints, public bones, Acetabulum

Vertebral Column – Curves, Postures, Relative levels, atlanto- occipital region, Adonoid, Cervical spine, Cervico – thoracic spine, dorsal spine, thorac-lumbar spine, lumbe sacral spine, sacrum, coccyx, scoliosis, Kyphosis, flexion & extension.

Bones of thorax – Sternum, ribs.

Skull – Land marks, Planes, cranium, facial bones, maxilla, mandible, zygomata, T.M joints, mastoids, petrous – bones, Optics foraman, sella turica.

Chest – Chest in teleradiography, Chest supine & portable.

Abdomen – Preparation indication & contra-indication, acute abdomen, pregnancy abdomen for multipley, maturity & Foetal abnormality, pelvimetry

Radiographic Photographic and Dark Room Techniques (303)

RADIOGRAPHIC PHOTOGRAPHY & DARK ROOM TECHNIQUE

<u>Photographic Process</u>	: Light image-Image produced by radiation- Light sensitive materials-Latent image.
<u>Film material</u>	: The structure of X-ray films- Resolving power- Grainness of film, Sensitivity of film, speed of film, contrast of photographic films
<u>Sensitivity</u>	: Characteristic Curve & its usefulness.
<u>X-ray film storage</u>	: Storage of unexposed films.
<u>Screens</u>	: Construction of intensifying screens, Choice of Fluorescent material, Intensifying factor, Detail, Sharpness, Speed screen contact, Care of intensifying screens.
<u>Cassettes</u>	: Cassette designs- Care of cassette, Mounting of intensifying screen in the cassette.
<u>Film processing</u>	: Constituents of the processing solutions & replenisher. Factors affecting the developer, Types of developer & fixer, Factors affecting the use of the fixer, silver recovery methods.
<u>Film rinsing, washing & drying</u>	: Intermediate rinse, Washing Drying.
<u>Film processing equipment</u>	: Manual & Automatic processing.
<u>Dark room design</u>	: Outlay & material used.
<u>The radiographic image</u>	: The sharpness, contrast, Detail, Definition, Viewing conditions.
<u>Administration</u>	: Trimming, Identification of films, legends, Relevant papers of the patients, records filling, reports distribution.

X-Ray Equipments (304)

Mains supply, Basic X-ray circuit control & stabilizing equipment meters, Various exposure timers, Control of scattered radiations fluoroscopy, tomography, mobile equipment. Photo-fluoroscopy, Memographic equipment.

Image Intensifiers.

Rapid Serial charger equipment.

Care & maintenance of equipment.

Practical (305)

Interpretation of Radiographs:

1. Respiratory system
1. Normal chest Radiograph.
 1. Tuberculosis.
 2. Pneumonia.
 3. Emphysema.
 4. Hydropneumothorax.
 5. Bronchiogenic carcinoma.
2. CVS:
 1. Pericardial effusion.
 2. pericarditis.
 3. Arterial septal defect.
 4. aortic stenosis.
3. GIT:
 1. Abdominal radiograph.
 2. Duodenal ulcer.
 3. Colorectal carcinoma.
 4. Ulcerative colitis.
 5. Sprue.
 6. Bowel obstruction.

Colonic polyp.

4thSemester

Computed Tomography and Magnetic Resonance Imaging and Ultrasonography (401)

Computer Tomography

Basics Principles

- 1) General principles & definitions
- 2) Changes & advance
- 3) Volume & multi-slice scanners
- 4) Principles of image reconstruction
- 5) Computer gray scale & CT numbers
- 6) Slice thickness & table increments
- 7) Pitch with helical scanners
- 8) Attenuation & conversion of voxel to pixels
- 9) Radiographic Anatomy

Magnetic Resonance Imaging

- 1) Definition & Introduction
- 2) Physical principles of MRI
- 3) Comparison with radiography & CT
- 4) MRI- Components
- 5) MRI process & clinical applications
- 6) MRI basic safety

Ultrasonography

- 1) History
- 2) Introduction
- 3) Principles
- 4) Advantages & limitations
- 5) Applications

USG imaging team

Radiotherapy (402)

Surface dose, air dose, given dose, depth dose & charts.

Isodose charts & isodose charting.

Basic principles in radiotherapy with basic knowledge in Tele & brachy therapy treatment & planning.

- Orthovoltage machines.
- Megavoltage machines
- Cyclotron
- Synchotron.
- Klystron.
- Betatron
- Transformer units.
- Betatron

Nuclear Medicine (403)

- 1) Introduction
- 2) Clinical applications
- 3) Linear Accelerators
- 4) Radio Isotopes: Radium, Caesium, Cobalt, Iridium, Iodine, Gold.
- 5) Radiation safety

Cath Lab (404)

Angiography & Interventional Procedures

- 1) Angiography Procedure
- 2) Cerebral, Thoracic, Angiocardiography, Abdominal, peripheral Angiocardiography & Lymphography
- 3) Angiographic Equipment
- 4) Interventional Imaging Procedures
- 5) Purpose, Embolization

Percutaneous transluminal Angiography (PTA) & stents implants & DAS

Special Procedures and the use of Contrast Media (405)

Urinary Tract – K.U.B.I.V.P Retrograde – Cysto- Urethrography

Biliary Tract – Oral Cholecystography, I.V.C, Prans-hepatic percutaneous cholangiography, per-operative,

Cholangiography, T. Tube Cholangiography, ERCP

Gastro- intestinal Tract – Ba-Swallow, Ba-meal, Ba-Meal follow through

Hystero- salphigography – Investigation of uterus & tubes.

Practical (406)

RENAL SYSTEM:

1. Intravenous Urogram
2. Urolithiasis.
3. Pylonephritis.
4. Renal cyst
5. Renal infarct
6. Pelvic kidney
7. Renal cell carcinoma
8. Bladder calculus.

REPRODUCTIVE SYSTEM:

1. Normal Hysterosalpinography(HSG).
2. Ovarian Dermoid Tumour.
3. Hydrosalpinx.
4. Uterine Fibroid.
5. Conjoined twins
6. Benign Prostatic Hypertrophy.

SKULL:

1. Normal Skull X-RAY
2. Normal CT Scan of Brain
3. Cerebral Abscess.
4. Epidural Haematoma.
5. Subdural Haematoma
6. Cerebral Aneurysm
7. Hypertensive Haemorrhage
8. Pituitary Adenoma.

ORTHOPAEDICS:

1. Normal Bone X-RAY.
2. Metabolic Diseases:
 - a) Osteoporosis
 - b) Rickets
 - c) Osteomalacia
 - d) Scurvy
 - e) Bone tumours.
 - f) Fractures

Spina Ventosa

Himalayan University