



RVP RISHIKA VARUN PAWAR FOUNDATION
DR S PAWAR INSTITUTE OF
PARAMEDICAL SCIENCES COLLEGE



AFFILIATED TO TELANGANA PARAMEDICAL BOARD
Recognition Certificate. No. 139/01/10/TSPMB/2023



CURRICULUM

ADDRESS :2-151/1,MAVALA ADILABAD, TELANGANA STATE - PIN CODE - 504002

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DRGA DOA DMLT DMPHA(Male)



**RVP RISHIKA VARUN PAWAR FOUNDATION
DR S PAWAR DIAGNOSTIC AND RESEARCH CENTRE**



DR S PAWAR INSTITUTE OF PARAMEDICAL SCIENCES COLLEGE



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Estd .2023



RVP Rishika Varun Pawar Foundation

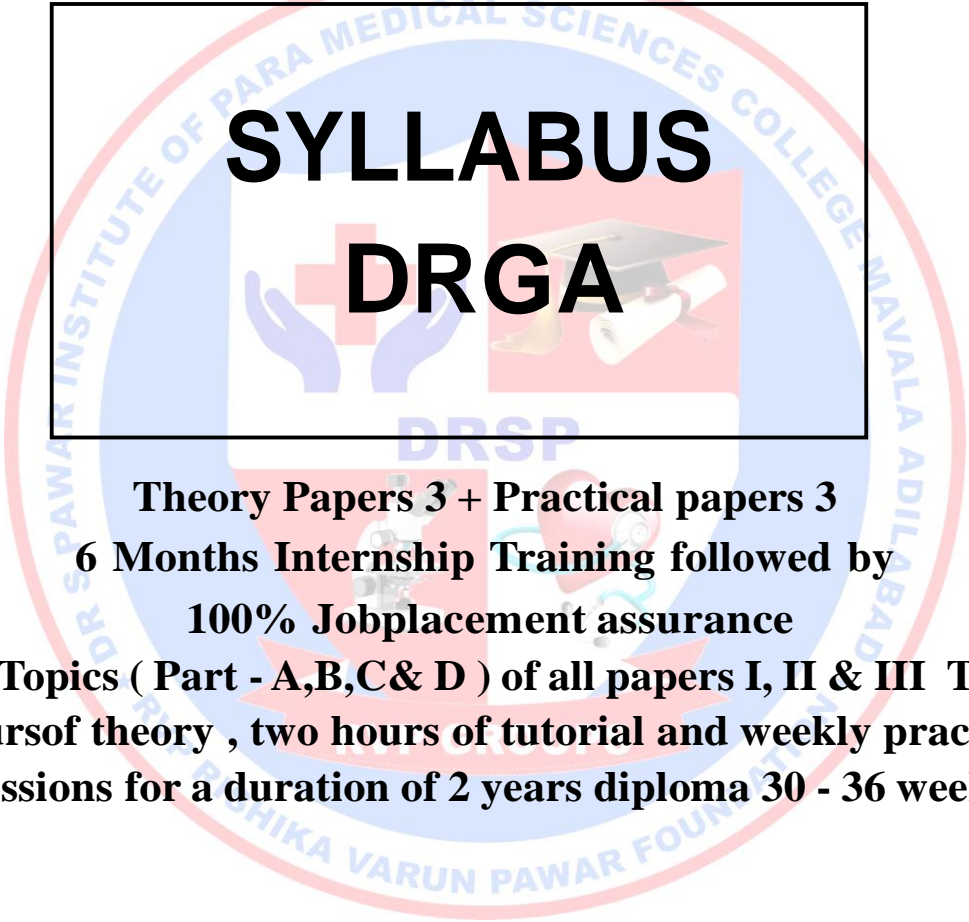
**DR.S PAWAR INSTITUTE OF
PARAMEDICAL SCIENCES COLLEGE**

Affiliated to TS Paramedical Board

**College Address: HNo. 2-151/1, MAVALA
ADILABAD, TELANGANA-504002**



Provided by
TELANGANA STATE PARA MEDICAL BOARD
HYDERABAD, TELANGANA



SYLLABUS
DRGA

Theory Papers 3 + Practical papers 3
6 Months Internship Training followed by
100% Jobplacement assurance

Sub Topics (Part - A,B,C& D) of all papers I, II & III Three
Hoursof theory , two hours of tutorial and weekly practical
sessions for a duration of 2 years diploma 30 - 36 weeks

INTRODUCTION

DRGA

“The Science is devolving different branches of specialization and Medical Sciences are closely linked with each other scientific Medicine has been nurtured and grown to the present form in the laboratory. It is the knowledge gained in the technology that makes diagnosis of disease feasible, their treatment and subsequent follow us success.

Sometime it can harm the patient seriously; mainly the diagnosis depends upon the report of investigation done in the Laboratory by the Medical laboratory technology. Thus the Laboratory Technician plays a vital role in the Medicine field . It is difficult for the doctor alone.

In Fact it is necessary that every department in General Hospital Hospital Primary health centre at Taluk level, every Hospital belonging to state / Centre Govt. and all clinics & Nursing Homes & Practitioners should have the assistance of trained technician. So A gap has been developed between the requirement and the availability of trained lab Technician due to the fast grow in Laboratory & X- Ray field. To fulfil the gap and to make the Para medical Board of India has realized the problems and start training course in Medical laboratory technology & X-ray E.CG Technician.

The need of the Radiology field is to have wel trained technicians who are able to deliver qualify care to patients. The technician is not only expected to produce quality images but also strictly stick to health and safety protocols while carrying out the X-ray examinations and procedures. The Diploma in radiology technician is developed keeping in mind the above mentioned aspects.

Thus the student of this course will be undergoing extensive training various techniques including Patient preparation, Exposure Techniques, Development of image including dark room techniques or alternative methods of acquiring good image for X-ray exposures during X-ray examinations or special investigation procedures ,which will help in carry out variety of tasks efficiently. The qualified technician will be trained to handle all the X-Ray equipments, manage preliminary maintenance authorities / maintenance agencies about the observed faults in X-Ray equipment effectively.

After completing a Diploma in radiology and imaging technology, candidates may work in important fields such as private care facilities, occupational health facilities, radiotherapy research organisations, radiotherapy equipment manufacturers, etc

DRGA- I YEAR & II YEAR

Paper	SUBJECTS	(MAX. MARKS)		TOTAL	PASS MARKS	PRACTICAL MARKS	PASS MARKS
		INTERNAL	EXTERNAL				
I	A & B :ANATOMY & PHYSIOLOGY C: BASICS OF BIOCHEMISTRY D: BASICS OF BIOSTATISTICS A: Radiation Hazard and Protection	20	80	100	40	60	24
II	A: BASICS OF PATHOLOGY B: BASICS OF BLOOD BANKING C: BAICS OF MICROBIOLOGY A: Positioning Radiography and Contrast Procedures	20	80	100	40	60	24
III	A:HOSPITAL AWARENESS B: COMMUNICATION SKILLS C:PATIENT RELATED SERVICES D: BASICS OF CENTRAL STERILIZATION A: Basic and Advanced Ultrasound imaging	20	80	100	40	60	24

PAPER -1
ANATOMY & PHYSIOLOGY(21 Periods)

A: Anatomy (Theory)

1. Introduction:-

- (a). Common Anatomical terms & Anatomical Positions .Different parts of the human body
(b) Tissue with Function & Classification (c) Cell & Animal Cell

(2.) Skeletal system:

- (a) Bones, joint, & Movement (b) Muscles

(3) Genito- Urinary System:(a) Male & Female

Reproductive Organic System (b) Urinary bladder, Kidney and Ureter

(C). Uterus & Urethra

(4)Respiratory System(a) Lungs & Thoracic Cavity(b) Pleura (c) Surface marking of lungs

(5)Gastro- Intestinal System :-(a) Mouth (b)Pharynx & Salivary gland and Tonsils
(c)Oesophagus &stomach(d) Spleen & Pancreas (e) Gall Bladder & Liver (f) Surface making
of Abdomen (g) Structure of Digestive Tract

**(6) Movement of the body(a) Upper Limb –Bones, Important Vessels (b) Lower Limb –
Bones Important Vessels**

**(7) Nerves System(a) C.S.F & Spinal Card (b) Nerves & Brain(c)SympatheticAnd
Sympathetic (d) Cranial and Spinal Nerves**

**(8) Cardio –Vascular System(a) Arterial System (b) Lymphatic and Venous System (c) Heart
(d) Surface Making, Important Blood Vessels & Muscles(e) Pericardium**

B: Physiology (Theory)(21 Periods)

1. Introduction to Human Physiology

2. Digestive System(a) Mastication deglutition(b)Function and Composition Saliva
(c) Function of Stomach (d) Function and Composition of gastric juice (e)
Function of Pancreatic Juice (f) Function of Bile

3. Respiratory System(a) Define-Respiratory Rate(b) Vital Capacity, Cyanosis
(c)External & Internal Respiration (d) Transport of O₂ and CO₂ in the Blood (e)
Function of Respiration its structure

4. Blood(a) Function of Blood (b) Composition of Blood (c) Anti-
Coagulants(c)Description of Blood Cells(e) Blood Group of A B C O and Rh
Factor(f) Function of Lymph (g)anaemia and its Type

5. Cardio- Vascular System(a) Define of Cardio output(b) Define the blood pressure,
Electrocardiogram (e) Circulation (Systematic and Pulmonary) (f) Function of Heart
(g) Function of Blood vessels (h) Cardio Cycle

6. Excretory System(a) Kidney (Function)(b) Formation of Urine (Normal and
abnormal)(c) Composition of Urine

7. ENDOCRINE GLAND(a) Define- Name and hormones Secreted by than (b) Action
of Hormones in our body

8. Reproductive System(a)Male female Genital System(b) Function of Ovary(c)
Formation of Ova and Their action of ovarian Hormones(d) Function of Testis- Their

action Testosterone (e) Mensuration Cycle and Fertilization (f) Progesterone and Oestrogen Hormones

9. **Skin**(a) Define the Skin (b) Function of Skin

10. **Formation**, Function & Composition of C.S.F

11. **Special Senses**-Smell, Taste, Touch, Hearing

REFERENCE BOOKS:

1. Anatomy & Physiology for Paramedical students – Pinky Rajendra Wadiya
2. Anatomy & Physiology -Teena kumari
3. Anatomy & Physiology- Indu Khurana Arushi Khurana
4. Anatomy & Physiology- Gyton
5. Ross & Wilson Anatomy & Physiology in Health & Illness
6. BD Chaurasias Human Anatomy Vol-I

C: BASICS OF BIO-CHEMISTRY (21 Periods)

Introduction to basics of Biochemistry including code of ethics for Medical Lab Technicians and Medical lab organization

Reception, Registration and Bio-Chemical parameters investigated.

Glassware and Plastic ware used in Bio-Chemical Laboratory.

Glassware:

Types of glass and composition

Types of glassware used, their identification, application & uses.

Cleaning ,Drying, Maintenance and storage of glassware

Plastic ware : Brief outline

Instrumental methods of Bio-chemical analysis.

Colorimetry: Visual and Photoelectric methods, Instrumentation, Principle & laws involved construction , operation , care and maintainance, applications.

Spectrophotometry: Principle and theory, types , construction & applications

Basic lab operations like

Separation of solids from liquids

Centrifugation: Principle, Different types of centrifuges, care maintainance, applicions

Filtration using funnel

Weighing: Different types of balances used, care and maintainance.

Evaporation

Distillation

Refluxing

Drying different salts and dessication

Water Chemicals and related substances

Purity of chemicals

Corrosives

Hygroscopic substances

Prevention , safety and FIRST AID in lab accidents.

Collection of Specimens.

Blood: Type of Specimens, collection, Precautions during collection, processing and preservation.

Urine: Types of Specimens, collection, precautions during collection, processing and preservation.

Urine Biochemical Parameters

Units Of Measurements

Solutions: Types ,based on solute & solvent, Types based on method of expressing concentration , calculations.

Carbohydrates: Definition, Biological Importance, Acid Value, Iodine Value, Saponification Value.

Amino acids & Proteins: Definition, Biological Importance, Classification, Qualitative Tests.

Diagnostic Tests: Blood Sugar, Glucose Tolerance Test, Blood Urea, Serum uric acid, Serum creatinine.

Vitamins & Minerals

Vitamins: Water Soluble Vitamins, Fat Soluble Vitamins, Sources, Daily Requirements, Deficiency Diseases.

Minerals: Sources, Daily Requirements, Deficiency Diseases.

REFERENCE BOOKS:

1. Text Book on Bio-Chemistry for DMLT & Paramedical courses – Dr . I Clement
2. Biochemistry - U satyanarayana
3. Concise Text Book of Biochemistry -DM Vasudevan
4. Basics of Clinical Biochemistry & Instrumentation For Para medical Students – Poonam Baccheti
5. A Text Book on Biochemistry for Paramedical Students -Dr. Kiran Dahiya
6. A Text Book of Medical Biochemistry – Dr. Rajagopal Ganapathy
7. Biochemistry & Clinical pathology 4th edition – VN Raje
8. Text Book of Biochemistry for Paramedical Students 2nd edition- P Ramamoorthy
9. Biochemistry for Medical Laboratory Technology Students – Harbansandashuma Sachdeva
10. Text Book of Applied Biochemistry and Nutrition & Dietetics – Harbans lal

Part D : Basics Of Bio-Statistics(15 Periods)

1. Introduction & Branches of Biostatistics
2. Types of variables, Measurements and measurement scales
3. Fundamentals of Biostatistics (Sample, Population, Variable)
4. Importance of Biostatistics in paramedical sciences
5. Methods of statistical analysis
6. Basics statistical concepts and data interpretation are discussed in the subject (Mean, Mode & Median)
7. The characteristics of Biostatistics & its importance
8. Measurement of Distribution (Range, Variance & Standard Distribution)
9. Graphical methods to depict Data (histograms, bar-plots, pie charts, line graphs)

Reference Books:

1. Biostatistics for medical & nursing students – C.S. Agrawal
2. A text Book of biostatistics – Vinod Kumar
3. Research methodology 7 Biostatistics – Vinod kumar
4. Biomedical Statistics – a beginners Guide – shakti kumar Yadav
5. Fundamentals of biostatistics – khan & Khanum

Paper-II

Basics of Pathology(12 Periods)

Introduction to Pathology in brief

1. Urine – Analysis – a. Physical Examination – specific gravity PH, reaction, Colour.
b. Chemical Examination – Sugar Albumin, Bile salts, Bile Pigments etc.
c. Microscopic, d. Sediment for RBC, WBC, Epithelial cells, Casts, Crystals, Parasites. Preparation of Reagents, procedure and principle of tests.
2. Sputum Analysis – Physical Examination, Preparation and staining smear for Microscopic Examination.
3. Semen Analysis – Physical Examination Microscopy – counting, Motility, Staining. Morphology. Abnormal and normal forms.
4. Body Fluids – Differential count of Peritoneal, pericardial, pleural fluids & CSF, charging chamber, Identifying and counting the cells.

Reference Books:

1. Text Book on Pathology – Dr . I Clement
2. Pathology for paramedical students & health sciences -Ramnik sood
3. Text Book of Pathology & genetics – Rimpi Bansal
4. Histopathology – Aruna Singh
5. Text Book of pathology for allied health sciences – Ramadas Nayak

Part B : Basic Of Blood Banking (18 Periods)

1. History of blood banking , To study evolution of different blood groups.
2. Blood grouping, typing and complement system , To study basics of different blood groups& complement system
3. Identification of antibodies and antibody screening , To identify various antibodies in blood group systems & methods of screening antibodies
4. Various blood components and their functions , To have knowledge of blood components and their functions and uses
5. Coagulation and hemostasis , To know basics of coagulation pathways and hemostasis
6. Immune hemolytic anaemias and Hemolytic disease of newborn , To know types of hemolytic anaemias along with details of hemolytic disease of newborn
7. Cross matching & compatibility testing , To know major & minor cross matching and compatibility testing
8. Donor selection , To know criteria of selection of donor
9. Pre-transfusion serologic testing , To know different tests used for pre transfusion serologic testing
10. Donor recruitment, phlebotomy and Donor reactions , To know how to perform phlebotomy and different donor reactions
11. Adverse blood transfusion reactions , To have complete knowledge of adverse blood transfusion reactions
12. Investigations of transfusion reactions , To know how to investigate a blood transfusion reaction
13. Apheresis , To know what is apheresis & its importance
14. Preparation and storage of blood components and their uses , To know procedure of preparation of blood components & their uses
15. Record keeping, quality control and blood bank Inspections , To know importance of record keeping & preparation for inspection of blood banks according to the protocol
16. Guidelines for safe blood transfusion , To know the guidelines for safe blood transfusions
17. Safety procedures in blood banking , To know the safety procedures in blood banking to avoid serious hazards
18. Safe storage and transportation of blood and its components , To know how to store components, procedure for transportation of blood components
19. Safe disposal of lab waste in blood bank , To know in detail how to dispose lab waste in blood bank and its importance
20. Medicolegal aspects of blood banking , To know the importance of blood banking from medico-legal point of view
21. Administration of blood bank , To know different ways of administration in a blood bank ,
22. Management of donor reactions in Blood donation camp , To enumerate steps in

- management of reactions in donor at camp site
23. Component preparation , To observe various steps in procedure for component preparation & enumerate them
 24. Investigating a transfusion reaction , To enumerate various steps in investigating a transfusion ,reaction
 25. Conduction of blood donation camp , Toper form MOCK conduction of blood donation camp & later attend a blood donation camp
 26. Documentation in blood bank , To write down all the steps point wise on various documents required in blood bank and updation of these.

Reference Books:

1. Essentials of blood banking – SR Mehdi
2. Standard operating procedures and regulatory guidelines blood banking- Singal
3. Blood banking and transfusion practices – Paula R. Howard
4. Blood banking and transfusion medicine basic principles & Practice – Hillyer
5. Essentials of blood banking and transfusion medicine – Ganga S Pilli

Part C : Basics Of Microbiology (15 Periods)

Basics of Microbiology

1. Introduction to Microbiology in brief : Definition, History
2. Microscopy
 - a) Principle working and maintenance of compound Microscope.
 - b) Principle of Fluorescent microscope, Electron Microscope, Dark Ground Microscope.

History : Types of Microscope: (a) Light Microscope, (b) DGI, (c) Flurosent, (d) Phase contrast. (e) Electron Microscope: a). Transmission, b) Scanning, Principles of operational mechanisms of various types of Microscopes.

3. Sterilization and disinfection - classification and Methods of sterilization.

Sterilization: Definition, types and principles of sterilization methods: (a) Heat (dry heat, moist heat with special reference to autoclave, (b) Radiation, (c) Filtration, efficiency testing to various sterilizers.

Antiseptics and Disinfectants: Definition, types and properties, mode of action, uses of various disinfectants, precautions while using the disinfectants, qualities of a good disinfectants, testing efficiency of various disinfectants.1) Principle and Methods of sterilization by heat

- a) By Dry Heat, flaming, Red Heat, Hot air oven, incineration.
- b) By Merit Heat-pasteurization, Inspissation, tyndalisation, autoclave.
- 2) Filtration Methods
- 3) Ionising Radiation - Disinfection, Mode of action and uses of important chemical disinfections - Phenol and Phenolic compounds, alcohols, halogens, dyes and acids and alkalies.
- 4) Gaseous Methods of sterilization.

IV. Cleaning, drying & Sterilization of Glassware disposal of contaminated material i.e. clinical infective material inoculated culture media. Handling and Disposal of Biomedical waste.

V. Biomedical waste management in a Microbiology Laboratory: types of the waste generated, segregation, treatment, disposal.

VI. Morphology and classification of Bacteria Sp. of cell, capsule, flagella, spore, Anaerobic

Methods of cultivation of Bacteria.

Reference Books :

1. Text Book Of Microbiology for paramedical students – Aju Dhir
2. Text Book of Microbiology for DMLT Students & Paramedical students – Dr. I Clement
3. Text Book of Microbiology – Dr. Arora



Paper-III
A. Hospital Awareness(12 Periods)

A brief idea of hospital as an organization management different units of a hospital
effective communication skills, communication channel Maintenance of records
Effective leadership
General patient care
Medical terminologies
Vital signs
Unit preparation
Transporting & Transferring patients
Sterilization Techniques
Control of infection
Medication-Oral & parenteral
Admission-Discharge procedure
Bandages

Practicals: Posted in ward & taught clinically

A. Surgical Department

Familiarization of different tubes

1. Drainage tube
2. Post Operative Exercises
3. Post OP Management of Patient
4. Shock of Management
5. Changing Surgical Dressing.

1. Preoperative preparation of patient
2. Preanesthetic preparation
3. Assisting in operation
4. Anaesthesia
5. CSSD

1. Recovery room
2. Movement of papers
3. Scheduling of theatres
4. Supplying of articles
- 5 Specific area practices

As scrub nurse, As circulating nurse

Communication and Computer Skills, Audio & Visual Aids

COMMUNICATION

Process, Types of communication, Strategies for effective Communication

Barriers of communication

SOFT SKILLS

Presentation with the use of visual aids such as power point Conversation

Extempore speech, usage of effective language for communication of health work. Case studies and situational analysis, Survey and Reporting

COMPUTER

INTERNET CONCEPTS: Computer : basic MS-Office MS-Word, MS-Excel, MS-Power Paint, Browsing, Down-Loading, Use Projector of Slide Projector

Reference Books:

1. Hospital administration and management – joyfeep Das Gupta
2. Hospital administration – DC Joshi
3. A handbook for understanding hospital services – mishra&kaushik
4. Hospital and patient care management – Dr. Vidhta srinivasan
5. Principles of hospital administration & planning

Part-C: Patient Related Services(15 periods)

1. Patient Care System
2. Information Management in Patient Care.
3. Concept of Patient Care.
4. Information to Support Patient Care.
5. Historical Evolution
6. Society and Influences
7. Professional practice model
8. Techniques of Patient Care.
9. Development & Innovative implimentation of patient Care.
10. Types, functions, Uses pr Patients & Hospitals

Reference Books:

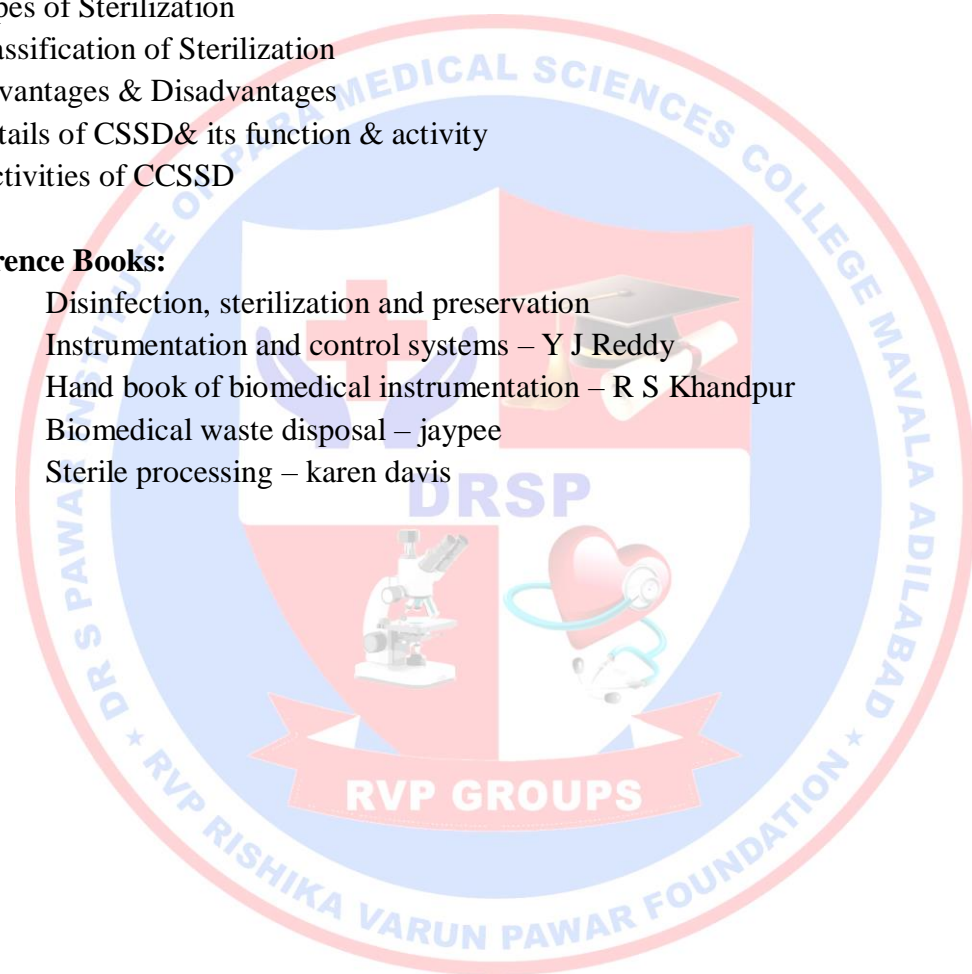
1. Principles of hospital practice and patient care – P Srinivasulu Reddy
2. Patient care technician – kimberlytownsend little
3. Hospital supporting services and systems- Dr. M. A. George

Part D: Basics of central sterilization (7 Periods)

1. Introduction of sterilization
2. Functions of Sterilization
3. Types of Sterilization
4. Classification of Sterilization
5. Advantages & Disadvantages
6. Details of CSSD& its function & activity
7. Activities of CCSSD

Reference Books:

1. Disinfection, sterilization and preservation
2. Instrumentation and control systems – Y J Reddy
3. Hand book of biomedical instrumentation – R S Khandpur
4. Biomedical waste disposal – jaypee
5. Sterile processing – karen davis



DRGA II Year

Syllabus

PAPER - I

Radiation Hazards and Protections (24 Periods)

1. During radiography
2. During fluoroscopy
3. Effects of radiation on human tissues
4. Permissible doses
5. Measurement of radiation doses
6. Dosages in diagnostic radiology
7. Protective gadgets in RD Department
8. Radiation safety duties of radiologist, radiographer & patient.

Radiation Preventive Maintenance

1. General care
2. Maintenance of log book
3. Practical precautions
4. Brakes & locks
5. HT cables care
6. Care of meters & controls
7. Care of tube stands & tracks
8. Care of accessory equipment
9. Functional tests for any faults
10. Failure of x ray tubes
11. Failure of HT cables
12. Common trouble – shooting & remedies

Regional Radiography

General

Head & neck, Spine, Chest, Abdomen, Pelvis, Upper limbs, Lower limbs

Special

Macro – radiography, Xero – radiography, Mammography, Dental radiography

Orthopantomogram, High K V technique, Subtraction techniques

Special Diagnostic Procedures

GUT-IVP, RAP, RAU, MEUG, Cystography, AGP, HSG.

GIT – Sialography, Barium swallow, BM Study, BMFT, SB enema, Ba enema, SPVG.

Billiary system – PTC, T tube cholangiogram, OCG.

Respiration – Bronchography

Vascular – Angiography of limbs, aorta, carotid vessels.

Contrast media – Type, reaction, treatment.

Reference Books:

1. Basics of Radiation Hazards and Prevention in Diagnostic Radiology –Prashant kumarjhaa
2. Radiation Oncology – Krishna
3. Concise Text Book of Radiology – Lalit Agarwal
4. C Ramamohan's Hand Book of Medical Radiography
5. Radiological Safety – Thalayam

PAPER - II

Positioning Radiography and Contrast Procedures (25 – 30 Periods)

General:

Age subject types and sex, anatomical landmarks-postural variations-erect and horizontal technique-respiratory movement and diaphragm level-regional densities preparations -and immobilization of patient-pathological conditions-injuries, fractures and dislocations congenital, localized views-periodic examination-use of dry bones positioning terminology identification systems.

Positioning Radiography – I

Skeletal System

Upper Limb:

Techniques for hand-fingers-thumb-wrist joint-forearm-elbow joint-humerus-shoulder joint and sterno- clavicular joint.

Lower Limb:

Techniques for foot-calcaneum-ankle joint-leg-knee joint-patella-and femur (lower two thirds)

Pelvic Girdle:

Techniques for pelvic-iliac fossa-ischium-and sacro iliac joint.*

Vertebral Colum:

Techniques for Atlanto-occipital articulation, cervical vertebrae, cervico-thoracic junction, thoracic vertebrae, lumbar vertebrae, lumbosacral articulation, sacrum,

Bones of Thorax:

Techniques for sternum, ribs (upper and lower).

Skull:

Techniques for cranium, facial bones, sella turcica, temporal Bone and optic foraminae, sinuses, mandible and temporo mandible joint.

Positioning Radiography – II

Abdomen:

Routine and radiographs on acute condition Bedside radiography – techniques for acute chest conditions-intestinal obstruction, abdominal perforations-vertebral injuries-skull injuries-fractures immobilized. Theatre radiography-introduction to C-arm image intensifier-exposure & training.

Contrast Procedures –I

Barium swallow-Barium meal series-Barium enema-double contrast barium enema, small bowel enema, double and single contrast, ERCP,PTBD, sonograms, fistulograms, mammograms.

Contrast Procedures – II

IVU, retrograde pyelogram, MCU,AUG, Opposing Urethrogram, Dacrography, Sialogram, HSG,T-Tube cholangiogram, operative cholangiogram (on table in theatre).

Radiographic Technique and Radiographic Anatomy

Contrast media: Barium preparation, Iodine preparation, Air-Oxygen.

Skeletal system: Upper limb, lower limb, shoulder, girdle and thorax, vertebral column, pelvic girdle and hip region. Teeth jaw.

Accessory nasal sinuses: Lachrymal system

Cardiovascular system: Upper respiratory passage, lungs, pleura, diaphragmatic excursion, Mediastinum, bronchography, artificial pneumothorax.

Genioto-urinary system: Straight X-ray of abdomen, pyelography, cystography, urethrography, gas insufflation, pneumo-peritonium.

Obstetrics and Gynaecology: Radiation protection, pregnancy, pelvimetry, hystero salpingography, placentography.

Central nervous system: Routine and special projections of skull, ventriculography and encephalography, cerebral angiography, myelograph.

Alimentary system: Barium suspension, Barium-meal and follow through Barium emena.

Liver and spleen: Spleno-portal venography.

Silvery glands: Sialography.

Arthrography, singraphy, Lymhpangiography, Operation theatre technique and ward radiography.

Stereoscopy, Magnification, High and Low K.V. technique and Mammography.

First Aid, Basic Nursing, Handling of Patients

Shock, convulsion, asphyxia, artificial respiration, Administration of Oxygen, Burns and scalds. Electric shock and burns. Wound, haemorrhage, pressure points, Tourniquet, Injuries to Bones, Joints and muscles, Dressing of Bandages, Plaster of Paris technique, Splints, Drug reaction, Poisons, Basic Nursing.

Drug in Department: Storage labeling. Checking, Regulation regarding dangerous drugs, Units of measurement.

Medical Ethics: Ethical law and professional etiquette s applied to members of profession associated with medicine.

Nursing and Handling of patients: Hospital and Departmental procedure, Hospital staffing and organization. Records and departmental statistics. Medico-legal aspects.

Appointments. Stock taking and stock keeping.

Care of patients: Reception, Elementary hygiene.

Nursing Care: Temperature, pulses and respiration. Application of sterile dressings. **Preparation of patients for General X-ray examination:**

Departmental instructions to out-patients or ward-staff. Instructions for various special investigations. Nursing care before and after special X-ray. Drug allergy.

Principles of asepsis: Methods of sterilization. Care and identification of instruments. Setting of trays and trolleys. Elementary operating theatre procedure.

Tomography History:

Basic principle and data acquisition/C.T. generations, Gantry and patient table - Travel Speed, Load capacity, X-ray tubes.

Rotating anode; cooling system; Collimator; Pencil beam; Fan beam Anode heat storage capacity; Detector system: Type, number, Efficiency Generator, UPS & Voltage Stabilizer. Rectifier.

Magnetic Resonance Imaging

History:

Basic Physics

Magnets - Types, Powers, Magnetism; Nuclear Spin, Proton density;

Larmor equation; Radio Frequency (RF) Pulse;

T1 (Longitudinal relaxation time)

T2 [Transverse relaxation time]

Free induction decay

TR [time to repeat] and TE [time to echo] Flip Angle

Imaging process

Fourier transformation, Pixel, Matrix, Gantry and different types of coils,

Magnets and field gradients RF pulse and pulse sequences

Partial saturation & saturation recovery sequences

Inversion recovery sequence, Spin-echo sequence

Fast imaging sequence

Selection of slices; Slice thickness; Image storage; Contrast agents,

MR angiography & Dynamic MR Spectroscopy; Hazards and safety.

Reference Books:

1. Clark's Positioning in Radiography – Craig Anderson
2. Basic radiographic Physics Darkroom Procedures , Radiographic Positioning Radiographic Positioning & Techniques—Lalit Agrawal
3. Manual of Practical Radiology – Joseph Varghese
4. Radiological Procedures --- Arya
5. A Guide on Special radiographic Investigations & Techniques – Dr . Kushal Gehlot

PAPER – III

BASIC AND ADVANCED ULTRASOUND IMAGING (20 Periods)

Ultrasound – Generation, Properties and Interaction:

Basic Acoustics, Ultrasound terminologies: acoustic pressure, power, intensity, impedance, speed, frequency, dB notation: relative acoustic pressure and relative acoustic intensity.

Interaction of US with matter: reflection, transmission, scattering, refraction and absorption, attenuation and attenuation coefficients.

Production of ultrasound: Piezoelectricity, Medical ultrasound transducer: Principle, Construction and Working, Characteristics of US beam.

Image Formation, Display and Quality:

Ultrasound display modes: A,B,M, T-M mode, B-scan, Scan-converters: Analog and Digital, Image Quality: Axial, Lateral and Elevational resolutions, US Machine Controls, US Focusing.

Real-time ultrasound: Line density and frame rate, Real-time ultrasound transducer : mechanical and electronic arrays, Ultrasound Artifacts.

Techniques:

Techniques for imaging different anatomic areas, Patient preparation for Doppler, Vascular sonography, Quantitative ultrasound densitometry.

Doppler Ultrasonography:

Doppler Effect, Doppler ultrasound techniques: Continuous Wave Doppler, pulsed Doppler, Duplex scanning, Doppler spectrum, Color Doppler, Power Doppler.

Harmonic imaging , Extended FOV imaging

3D US imaging: acquisition methods , reconstruction 4D & 5D US imaging.

INTERVENTIONAL PROCEDURES AND ANGIOGRAPHY

Principle & Instrumentation:

Digital Subtraction Angiography: Instrumentation, Principle of Digital Subtraction Angiography, Various Digital Subtraction Techniques.

Basics of Invasive Radiology:

Procedure of image guided biopsies and drainage procedure.

Invasive Angiography & Venography:

4 Vessel DSA, Aortogram, Selective Angiogram Venogram

Invasive Monitoring:

NIBP, Pulse oximetry, Cardiac resuscitation measures, IBP, ECG, Management of Shock.

Interventional Procedures:

PTBD, Stenting, PTA + stenting, stent graft, Embolisation TIPS, drainage procedure.

Neuro Interventional Procedures:

Embolisation, GDC, Glue embolization, Vertebroplasty, Direct puncture

Adult & Paediatric Invasive Cardiology:

Basics of cardiac catheterization, Invasive monitoring, Coronary angiogram

BASIC AND ADVANCED CT IMAGING**CT Imaging – Principle:**

Basic principle of Computed Tomography, Comparison of CT with Conventional Radiography and Tomography, Generations of CT.

Instrumentation:

Gantry, Patient couch, X-ray tube, Filters, Collimators, Detectors, Data Acquisition System (DAS).

Image Formation:

Image Formation in CT, CT Image Reconstruction, Hounsfield Unit, Windowing, CT image display, CT Image Quality, CT artifacts.

Advances in Ct Imaging:

Helical CT scan : Slip ring technology, Advantages, Multi Detector CT, Cone-Beam geometry, Reconstruction of helical CT images, CT Fluoroscopy, HRCT, Post Processing Techniques : MPR, MIP, Min IP, 3^D rendering : SSD and VR, Ct Dose.

Patient Preparation & Protocols:

Patient preparation, Imaging techniques and protocols for various parts of body, CT contrast enhanced protocols – CT angiography: Aortogram, Selective angiogram head, neck and peripheral, Image documentation: Filling, Maintenance.

BASIC AND ADVANCED MRI (MAGNETIC RESONANCE IMAGING)**MRI Imaging- Principle:**

Basic Principle and concepts of MRI, the need for MRI, Role of hydrogen in MR Imaging, Advantages and disadvantages of MRI, **Instrumentation:**

MR architecture, magnet system and gradient system, patient screening before scanning, Safety aspects, types of magnets and RF coils, **Protocols:**

Different types of pulse sequence, Protocols in MRI for whole Body.

Image Formation:

Fourier transformation, K space imaging, Image formation in MRI, Gating mechanism in MRI,

Advanced MRI Techniques:

MR Angiography, (TOF, phase contrast and dynamic contrast MR angiography), Functional MRI, MR Spectroscopy, Recent advancement in MRI and open MRI.

Reference Books:

1. Text Book of Radiology Imaging – David Sutton
2. Diagnostic Ultrasound – Deborah Levine
3. The Physics of Radiology and Imaging – K Thayalan
4. Practical Guide to Point-of-Care Ultrasound -Puneet Khana
5. AICOG Manual of Ultrasound and Fetal Medicine -Anshu Baser

Practicals:

- a) Basic ultrasound techniques.
- b) Practical based on theory.
- c) Invasive monitoring
- d) Interventional procedures technique
- e) Positioning Radiography
- f) Contrast Procedures.

Lab equipment:

Auto Film Processor
Mobile X-ray Machine
X-ray Machine-200 mAs
X-ray Machine with II TV
C-arm X-ray Machine
Ultrasound machine
Mammography machine, OPG Machine
Multislice CT Scan Machine
MRI Machine-1 Telsa

DRGA 2ND YEAR PRACTICALS

Paper – I

- ⇒ General care and maintenance of radiation.
- ⇒ Maintenance of log books
- ⇒ General radiography of head & neck spine, chest, abdomen, pelvis, upper limbs, lower limbs.
- ⇒ Macro radiography, xero radiography, mammoradiography, dental radiography, orthopantogram, high k v technique, subtraction techniques.
- ⇒ Respiration bronchography.
- ⇒ GUT- IVP,RAP, RAV, MEUG, AGP, HSG, diagnostic procedures.
- ⇒ Crystography, siacography.

Paper - II

- ⇒ Barium preparation & Iodine preparation
- ⇒ Anthrography, Singraphy, lymphangiography, operation theatre technique & ward radiography.
- ⇒ High & Low K V technique
- ⇒ Dressing of bandages, plaster of paris technique.
- ⇒ splints drug reaction poisons & basic nursing handling of patients.
- ⇒ Nursing care before and after special X-ray.
- ⇒ Method of Sterilization.
- ⇒ Tomography history maintenance

Paper-III

- ⇒ Techniques for imaging different anatomic areas
- ⇒ Patient preparation for Doppler
- ⇒ Doppler ultra sonography.
- ⇒ MRI imaging & CT angiography
- ⇒ MBP pulseoximetry
- ⇒ IBP, ECG
- ⇒ Embolisation , GDC, Glue embolization neri
- ⇒ cardia catheterization , coronary angiogram
- ⇒ Computed tomography & data acquisition system (DAS)



Dr S Pawar Institute of Paramedical Sciences College

**Chairman/Director
Correspondent & Secretary**

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W/o Dr. Subhash Pawar**

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3. Route Map :-

