2: RADIOLOGY TECHICIAN (S7, S8, S9)

Scheme of Examination

Std. XI

Paper	Title of the Paper	Theory		Practicals		Term work	Project work	I.V.	Total Marks
		Marks	Time (Hrs)	Marks	Time (Hrs)				
1	Anatomy & Physiology	80	3	80	3	20	10	10	200
2	Radiology Equipments	80	3	80	3	20	10	10	200
3	Basic Imageology	80	3	80	3	20	10	10	200

* IV = Industrial Visit.

Scheme of Examination

Std. XII

Paper	Title of the Paper	Theory		Practicals		Term work	Project work	I.V. *	OJT **	Total Marks
		Marks	Time (Hrs)	Marks	Time (Hrs)					
1	Radiography	80	3	80	3	10	10	10	10	200
2	Special Equipments and Procedures	80	3	80	3	10	10	10	10	200
3	Imageology	80	3	80	3	10	10	10	10	200

* IV = Industrial Visit.

** OJT = On Job Training

Introduction

The Govt. of Maharashtra has specially designed Vocational courses (HSCV) to diversify a sizeable segment of students at the senior secondary stage to world of work, so that the students after XII can start earning. Various trades come under this stream. One of the trade is "Radiology Technician" which comes under paramedical Group.

As per the Latest modern medical sciences X-ray, CT scan, MRI Scan, USG, Cath lab, Digital radiography, Computerised radiography is being used daily for the diagnosis of diseases. To work on above said equipments technical personnel are required with theoretic trained knowledge and operating knowledge. The thoroughly trained personnel will help in providing better radiological services leading to complete utilization of available resources. These trained personnel will be the member of multidisciplinary team of a hospital.

The course of Radiology Technician fulfills this need of present day. These trained candidates have necessary skills of Radiological technology required in Radiological Services of a hospital.

When learning deals with performance type activities it is necessary to have an analysis of each job to be performed. Hence the subject expert committees has discussed this aspect while revising the Curriculum & prepared for STD XI & XII.

Hope that the present Curriculum of this course of Radiology Technician will prove useful to students, teachers & employees & will help the programme of vocationalization very useful & meaningful & will reduces the large gap between supply & demand of paramedical staff in Radiology Technology.

OBJECTIVES

1. The Main objectives of HSCV Radiology technician course is to teach and train the students about the techniques, in radiology, dark room technique special radio-diagnostic procedures recent modalities in Imaging & to give basic knowledge of radio therapy and related pathology.
2. To train students to acquire the techniques of latest sophisticated modern imaging modalities such as CT scan, MRI Scan, USG, Digital and Computerized Radiography & Nuclear Imaging.
3. To train the students to take good and clear radiographic images of any part of human body, so that they will offer the help to patient's quick & better care.
4. To provide basic knowledge of radiotherapy so that after one year special training in Radiotherapy dept. they can work as Radiotherapy Technician
5. To train the students about radiological emergencies & radiation hazards, radiation protection and first aid. So that these trained personnel will help in providing better radiological services leading to optimum utilization of available resources.

SKILLS TO BE PROVIDED

1. To follow the instructions of Doctors.
2. Maintenance of equipments used in Radiography.
3. Darkroom procedure-loading & unloading of X-ray films, film processing, care of unexposed & exposed X-ray films.
4. Maintenance of registers like registration register, dispatch register, chemical's register, film register, X-ray equipments register and accessories register.
5. The comparative use of-various imaging techniques.
6. Proper knowledge of careful choice of beam parameters, methods to reduce scattered radiation, reaction of part of the body to be radiographed.
7. To prepare the patient for special radio diagnostic procedures.
8. Technique of modern diagnostic modalities e.g. - CT scan, MRI, USG, Cath-Lab., Digital Radiography, computerised radiography.
9. Radiation protection.
10. Use of equipments and drugs to be used in emergencies in X-ray dept.
11. Basic knowledge of Radiotherapy.
12. Preparation of film processing chemicals.

JOB OPPORTUNITIES

Students who have passed the H.S.C. Vocational Radiology Technician course can get employment in Govt. Hospital, Central Govt. Hospitals, Municipal Hospitals, Railway Hospitals, Military Hospitals, P.H.C., Rural Hospitals and Private Hospitals as a member of multi disciplinary team.

1. Radiographer (X-ray Technician)
2. Dark room Technician
3. Radiotherapy Technician
4. CT scan Technician
5. MRI Technician
6. Cath-Lab Technician

Self Employment

1. Radiography Clinic (In Collaboration with Radiologist)
2. Provider of X-ray films.
3. Provider of X-ray film processing chemicals.
4. Silver Recovery from user fixer.

Std XI
Paper I: Anatomy & Physiology (S7)
Theory

Sr. No.	Unit	Sub-Unit	Periods
1.	Introduction	1.1 Definition of Anatomy, Physiology, Pathology. 1.2 Cell, Tissue 1.3 Radiological Services	8
2.	Musculoskeletal System	2.1 Skull 2.2 Vertebral Column 2.3 Pectoral Girdle 2.4 Bones of Upper Extremity 2.5 Bones of Lower Extremity. 2.6 Thoracic Cage 2.7 Pelvic Girdle 2.8 Joints & its types	32
3.	Cardio-Vascular System	3.1 Heart 3.2 Arterial System & venous System 3.3 Cardiac Cycle 3.4 Blood-Content & Function 3.5 Circulation of Blood 3.6 Blood Groups	8
4.	Lymphatic System	4.1 Lymphatic glands and vessels 4.2 Circulation of Lymphatic, Thoracic duct.	6
5.	Digestive System	5.1 Anatomy & Physiology of digestive system 5.2 Necessary Organs 5.3 Dental formula & Structure of tooth.	12
6.	Respiratory System	6.1 Anatomy of Upper Respiratory Tract 6.2 Lower Respiration Tract 6.3 Physiology of Respiration	8
7.	Nervous System	7.1 Anatomy of Brain Ventricles - Spinal cord.	10
8.	Urinary System	8.1 Anatomy of Urinary Tract 8.2 Functions of Urinary Organs – Kidney, Ureters 8.3 Formation of Urine	8
9.	Reproductive System	9.1 Anatomy of Female Reproductive System 9.2 Physiology Female Reproductive system 9.3 Physiology of menstruation. 9.4 Anatomy of Male Reproductive system 9.5 Physiology of Male Reproductive system 9.6 Spermatogenesis	16
10.	Endocrine System	10.1 Anatomy of Enodcrine glands and	8

		functions of Hormones 10.2 Pituitary gland 10.3 Thyroid glands 10.4 Parathyroid gland 10.5 Adrenal gland 10.6 Testies 10.7 Ovaries 10.8 Pancreas	
11.	Sense Organs	Structure and Function of 11.1 Eye 11.2 Ear 11.3 Skin	4
		Total	**120**

Practicals

Periods

1. Radiological Anatomy of all parts of the body. 26
   a) Introduction
   b) Bones of body

2. Digestive System 28
   a) To show charts & models of Alimentary Canal
   b) Function of Digestive System.

3. Respiratory 26
   a) To show charts and models of respiratory system
   b) Function of respiratory system.

4. Cardiovascular System 24
   a) To show charts and models of cardiovascular system
   b) Functions of Heart
   c) Physiology of conducting system of Heart

5. Urinary System 26
   a) Anatomy and functions of urinary system.

6. Reproductive System 28
   a) To show male and female reproductive system by chart and models.
   b) Function of both system.

7. Endocrine System 28
   a) To Show chart and model of endocrine glands
   b) Function of endocrine glands

8. Nervous system 26
   a) To show charts and model of brain

9. Sense organs 28
   a) Show anatomy of eye, ear skin & its functions

Total **240**

Paper II: Radiography Equipment (S8)
Theory

Sr. No.	Unit	Sub-Unit	Periods
1.	Fundamentals of Electricity	1.1 Basic Concept of Electricity 1.2 Transformer	8
2.	Electrical Safety Measures	2.1 Electrical Hazards 2.2 Safety Precautions	8
3.	Diode Tube	3.1 Vaccum Diode Tube 3.2 Rectification	8
4.	X-ray Tube	4.1 Structure & characteristics of various X-ray tubes 4.2 Care of X-ray Tubes 4.3 Faults in X-ray Tubes	12
5.	X-ray Circuits & Control Panel	5.1 X-ray Circuit 5.2 Control Panel	8
6.	X-ray Machines	6.1 Conventional X-ray machine 6.2 Portable X-ray machine 6.3 Digital X-ray machine 6.4 Computerised Radiography machine 6.5 Mammography Unit 6.6 X-ray Genesis, focal Spot, Central rays	36
7.	Fluoroscopic Unit	7.1 Fluoroscopic Equipments 7.2 Standard Fluoroscopic Table 7.3 Table for Myelography	8
8.	Image Intensifier	8.1 Image Intensifier Tube 8.2 C-Arm Image Intensifier	6
9.	Ionization	9.1 Measuring Radiation Dose	8

	Chamber GM & Scintillation Counter Dosimeter	9.2 MPD 9.3 Pocket Ionization Chamber 9.4 GM & Scintillation Counter 9.5 Film Badge, TLD 9.6 Simple Principles of Dosimeter	8
10.	Dental Radiographic Equipments & X-ray Beam Restrictors	10.1 Conventional Dental X-ray Unit 10.2 OPG Unit 10.3 Grid 10.4 Collimators 10.5 Cones 10.6 Filters	10
		Total	**120**

Practicals

1. X-ray Machines 24
   a) Identification and Operation of parts of X-ray machines
   b) Demonstration of all parts of X-ray machines

2. Fluoroscopic equipment 26
   a) Explanation of the fluoroscopic equipment and its uses.
   b) Operation of fluoroscopic equipment

3. Image Intensifier 24
   a) Explanation and its use of Image intensifier
   b) Operation of image intensifier

4. Explain 24
Dental Radiographic Equipment & its Operation

5. Operation of Portable X-ray Machine 24

6. Digital X-ray machine 30
   a) Basic knowledge of computer
   b) Explain the difference between Conventional and Digital and Computerised radiography
   c) Operation of Digital X-ray machine.

7. Computerised X-ray Machine 24
   a) Basic Knowledge.
   b) Operation of computerised radiography.

8. X-ray Tube 24
   a) Care, maintenance of X-ray tubes.

b) Common failure in X-ray tube.

9. Radiation measuring device 26
   a) Explain and its use of radiation measuring devices.

10. X-ray beam restrictor. 24
    a) Explain and uses of
       i. Grid
       ii. Cones
       iii. Filters
       iv. Collimators

Total 240

Paper III: Basic Imageology (S9)
Theory

Sr. No.	Unit	Sub-Unit	Periods
1.	Radiation and Radiation Measuring Units	1.1 Definition of Radiation & its Types 1.2 Electromagnetic Radiation 1.3 Sources of Radiation 1.4 Roentgen, Rad, Rem, Sievert 1.5 Cathode rays & X-rays	12
2.	Radioactivity	2.1 Atomic & Nuclear Structure 2.2 Atomic Number, mass Number 2.3 Isotopes & Radioisotopes 2.4 Radioactive Decay 2.5 Radioactive Substances & their properties 2.6 Uses of Radioactive substances in medical field 2.7 Artificial and Natural Radioactivity, it's Units	18
3.	Interaction of X-rays with matter	3.1 Interaction of X-rays with matter 3.2 Ionization & Attenuation 3.3 Absorption coefficient 3.4 Modes of Interaction 3.5 Energy Absorption from X-ray 3.6 Half Value Layer 3.7 Fluorescent and photographic effect	12
4.	Radiation Protection	4.1 Radiation hazards: Local, Systemic & Genotic 4.2 Acute Radiation Syndrome 4.3 Code of Practice for the Radiation 4.4 Protection Guide lines from AERB 4.5 Lead shielding	16

		4.6 Personal Radiation Protection	
5.	Ultra Sonography	5.1 Ultra Sonography, it's Principles 5.2 Ultrasound System 5.3 Colour Doppler, Basics of Doppler	8
6.	C. T. Scan	6.1 Conventional C. T. 6.2 Spiral C. T. 6.3 Basic Principles & Equipments 6.4 C. T. Artifacts 6.5 Contrast Medium Used	14
7.	M R I	7.1 Basic Principles & Equipments 7.2 MRI Artifacts 7.3 Magnets, Powers, Nuclear Spin Proton Density, Larner equation 7.4 Radio Frequency 7.5 Contrast medium Used	14
8.	P E T Scan and Nuclear Medicine	8.1 Definition 8.2 Radionuclide's 8.3 Basic Principles & Equipment description	12
9.	Inter Ventional Radiology	9.1 Definition 9.2 Names of different type of procedures 9.3 Equipments required for various procedures 9.4 Orientation of Cath-Lab	14
		Total	**120**

Practicals

Periods

1. Study of X-Ray Machine — 26
   a) Mechanism of X-ray machine
   b) Study the interlock mechanism of X-ray machine

2. Radioactivity — 20
   a) Explain the effect of
      i. Exposure Factors.
      ii. KV
      iii. mAs

3. Interaction of X-rays with matter — 28
   a) Explain the use of aprons.
   b) Checking the lead apron for any cracks.

4. Radiation Protection — 28
   a) Explaining Various Radiation Protection measures (Guidelines)

b) Explaining various personal radiation protection

5. Ultra Sonography 28
   a) Explaining Operation of Ultrasound machine

6. CT Scan 28
   a) Explaining Basic Principles and equipment of CT scan machine.
   b) Explain difference both conventional and spiral CT.
   c) Operation of CT scan machine.

7. MRI 18
   a) Explain basic principle and function of MRI
   b) Operation of MRI

8. Pre Scan and nuclear medicine 18
   a) Explain basic principle and function of PET and nuclear medicine

9. Primary beam radiation 16
   a) Centering
   b) Effect of improper centering

10. Verification of Optical Radiation 20

11. X-ray Machine Circuits 10
   a) Control Panel
   b) Centre of difficult parameter

Total **240**

Std. XII
Paper I: Radiography (S7)
Theory

Sr. No.	Unit	Sub-Unit	Periods
1.	Photographic materials X-ray films	1.1 Image Produced by X radiation 1.2 Latent Image 1.3 Structure of X-ray Films 1.4 Sensitivity and Contrast of Films 1.5 Types of X-ray Film 1.6 Storage of Unexposed X-ray Film	4

		1.7 Care of Radiographs	
2.	Screens and Cassettes	2.1 Construction of Intensifying Screen 2.2 Choice of Fluorescent material 2.3 Care of Screen 2.4 Types of Screen 2.5 Structure, Types and care of cassette 2.6 Testing & Providing good film screen contact 2.7 Intensification factor, speed of Screen.	6
3.	Dark room Design, Health hazards & Safety in the dark room	3.1 Location & building 3.2 Entrance, Ventilation & pass box 3.3 Wiring and Lights (Illuminations) 3.4 Equipments 3.5 Health hazard & safety	6
4.	Film Processing	4.1 Definition, Types 4.2 Manual - Stages & diagram 4.3 Automatic - Stages, working and diagram 4.4 Processing Chemicals, affecting factors, Replenishments 4.5 Silver recovery methods	10
5.	Services by Radiology Technician	5.1 Duties of Radiology Technician 5.2 Medicolegal Importance of X-ray Film 5.3 Trimming, Enveloping Record and Distribution 5.4 Identification of X-ray Films	4
6.	Digital Radiography	6.1 Principle & Basics 6.2 Technique, Films used 6.3 Advantages of digital radiography	6
7.	Computerised Radiography	7.1 Principle & Basics 7.2 Technique, Films used 7.3 Advantages of Computerised Radiography (C R)	6
8.	Radiography of a. Upper limb	8.1 Fingers 8.2 Hand 8.3 Carpal 8.4 Wrist 8.5 Forearm 8.6 Elbow 8.7 Humerus 8.8 Shoulder 8.9 Scapula 8.10 ACJ 8.11 SCJ 8.12 Clavicle	20
	b. Lower limb	8.1.1 Toes 8.1.2 Foot 8.1.3 Calcaneum	14

		8.1.4 Ankle 8.1.5 Tibia Fibula 8.1.6 Patella 8.1.7 Knee 8.1.8 Femur	
	c. Hip and Pelvis	8.2.1 Pelvis 8.2.2 SIJ 8.2.3 Hip bone, Acetabulum	8
	d. Vertebral Column	8.3.1 Atlanto axial Joint 8.3.2 Odentoid process 8.3.3 Cervical spine 8.3.4 Thoracic spine 8.3.5 Lumbar spine 8.3.6 Lumbo sacral spine 8.3.7 Sacrum Coccyx 8.3.8 Spinal deformities - Scoliosis, Kyphosis, Lardosis	8 4
	e. Bones of Thorax	8.4.1 Thoracic Cage 8.4.2 Sternum 8.4.3 Ribs	4
	f. Skull	8.5.1 Basic guidelines for radiography of skull 8.5.2 Bony land marks, planes 8.5.3 Oesteology and all radiographic basic views of cranial bones, facial bones, paranasal sinus (PNS) TM joint, mastoid bones, sella turcica, optic foramen	4
9.	Chest	9.1 Chest P A view 9.2 AP view 9.3 Lat. view 9.4 Apical view 9.5 Lordotic view	4
10.	Abdomen	10.1 Anatomical regions 10.2 Radiographic views of Abdomen in supine and erect position 10.3 X-ray KUB 10.4 Indications, Contra indications for radiography of Abdomen	6
11.	Ward and Theater Radiography	11.1 Ward Radiography 11.2 Theater Radiography Technique Care in case of sterile O.T.	4
12.	Dental Radiography	12.1 Dental Formula, 12.2 Dental Xray 12.3 OPG	2
		Total	**120**

Practicals

1.	Photographic material a) Study of various x-ray films b) Study of Dental x-ray film	30
2.	Screen and Cassettes. a) Care and Maintenance of Screen and Cassettes.	30
3.	Processing chemicals a) How to prepare developer? b) How to prepare fixer?	30
4.	Loading and unloading of x-ray films. a) Loading of unexposed films b) Unloading of exposed films	30
5.	Dark Room Design. a) Designing an 'Ideal Darkroom' b) Testing of darkroom light for safety	30
6.	Silver Recovery Procedures of silver recovery from the fixer solution	30
7.	Record keeping a) Keeping record of x-ray films b) Keeping record of processing chemicals	30
8.	Skeletal Radiography a) Radiography of various human bones in various position b) Setting exposure factors for such radiography.	30
	Total	**240**

Paper II: Special Radiological Procedures (S8)
Theory

Sr. No.	Unit	Sub-Unit	Periods
1.	General Pathology	1.1 Definition of Pathology, Cell 1.2 Cell Growth, Cell Damage 1.3 Cell repair, Cell deformities 1.4 Health and Disease	6

		1.5 Inflammation 1.6 Immunity, Immunization Schedule 1.7 Causes of Diseases	
2.	Tumors	2.1 Definition, Classification 2.2 Causes 2.3 Metastasis 2.4 General effects 2.5 Methods of diagnosis	5
3.	Blood Diseases	3.1 Leukemia 3.2 Anaemia 3.3 Complete Blood Count	6
4.	Radio therapy	4.1 Definition 4.2 Methods of Radiotherapy Teletherapy, Brachytherapy 4.3 Radiotherapy machines, Telecobalt, Linear Accelerator 4.4 Radiotherapy in Cancer of Various organs	6
5.	First aid	5.1 First aid in shock 5.2 First aid in Convulsion 5.3 First aid in Asphyxia 5.4 First aid in Wound 5.5 First aid in Electric shock and Burns 5.6 First and in Injuries to Bones and Joints 5.7 First aid in Poisoning	8
6.	Contrast Medium	6.1 Definition and Types 6.2 Criteria for selection of contrast medium 6.3 Routes of administration of contrast medium	6
7.	Emergencies in X-ray department	7.1 Signs and Symptoms of Various emergencies in X-ray dept. 7.2 Equipments & drugs needed to treat them. 7.3 Emergency drug box	6
8.	Special Radiological Procedures 1. IVP 2. RUG 3. MCU 4. T – Tube Chalangiography 5. Barium Swallow 6. Barium meal 7. Barium meal follow through 8. Barium Enema	Each procedure should be explained in detail with the help of following points • Definition • Indication • Contraindication • Contrast medium & it's dose • Preliminary films • Preparation • Premedication • Equipment • Film Services	8 4 4 4 4 4 4 4 7 7

	9. HSG 10. Coronary Angiography 11. Bronchography 12. Dacrocystography 13. Sialography 14. Myelography 15. Mammography & Soft tissue Radiography	• Complications • After Care of the Patient	8 4 3 4 6 6
		Total	**120**

Practicals

1. SUB-SPECIAL RADIOLOGICAL PROCEDURES 50
   a) Radiography in various positions for all the special radio diagnostic procedures using different contrast media.

2. Medical Emergencies 52
   a) Preparation of Medical tray in medical emergencies.
   b) Handling of emergencies

3. Medical Equipments. 38
   a) Practicals applicability of medical equipments used in emergencies

4. Basic Body Parameter (Vitals) 50
   a) Measurement of Basic Body Parameters (Vitals)
      i) Pulse ii) Temperature iii) Orientation iv) Blood Pressure

5. First Aid 50
   a) How to give first aid in shock
   b) How to assist medical and paramedical staff in
      i. Shock
      ii. Convulsions
      iii. Asphyxia
      iv. Electric shock
      v. Injuries to bones & Joints

Total 240

Paper III: Imageology (S9)
Theory

Sr. No.	Unit	Sub-Unit	Periods
1.	Ultra Sound	1.1 Conventional Doppler and Colour Doppler 1.2 Preparation of patient 1.3 Indications 1.4 Clinical application 1.5 Main differences in Ultra Sound and X-rays	16
2.	C. T. Scan	2.1 Conventional C. T. 2.2 Spiral C. T. 2.3 Preparation of Patient 2.4 Contrast Media 2.5 Indication & Contraindication 2.6 Technical aspects of various Procedures in CT Scan	18
3.	M R I	3.1 Preparation of Patient 3.2 Contrast media 3.3 Indication & Contra indication 3.4 Clinical Applications 3.5 Procedures 3.6 M.R.I Angiography 3.7 Image Characteristics 3.8 Functional MRI 3.9 Precaution to be taken	20
4.	Nuclear Medicine	4.1 Preparation of Patient 4.2 Indications & contra indication 4.3 Clinical application and Procedures 4.4 Brain Scan 4.5 Bone Scan 4.6 M N G A 4.7 R N U Study 4.8 Thyroid Perfusion Scan 4.9 D T P A 4.10 Renogram 4.11 Bullido Scan	30
5.	Interventional Radiology	5.1 Preparation of Patient 5.2 Indication & Contra Indications. 5.3 Techniques of various Procedures and Various System in the body 5.4 Cath Lab Techniques	20
6.	PET Scan	6.1 Preparation of patient	16

		6.2 Indication & Contra indication. 6.3 Technique of chemical application	
		Total	**120**

Practicals

1. Visit and observation of various Radiographic Technology in hospital setups 140
   a) Interventional Radiography
   b) CT scan
   c) MRI
   d) USG
   e) Cath – Lab
   f) PET
   g) Nuclear Medicine

2. Power point presentation of visit and observation of Radiographic Technology seen (above a to g) 40

3. Computer 60
   a) Basics of computer
   b) Applied knowledge of computer related to Medical Imaging Technologies.

Total 240

RADIOLOGY TECHNICIAN
REFERENCE BOOKS

1. Anatomy & Physiology - by Gray, Kumber, Stacpoles
2. Surface and Radiological Anatomy by Halim, Das
3. Fundamentals of X-Ray and Radium Physics by Joseph Selman
4. Basic Physics in Radiology by Kemp & Oliver
5. X-Ray Equipments for Students, Radioprapher - by Chesneys
6. Radiographic Positioning - by R.C. Clerk
7. Advanced Imageology
8. Anatomy & Physiology For Nurses - by Pearce
9. Human physiology - by chattarjee
10. A text Radiology - by S. Bhargava A text of Radiology by S. Bhargava

11. Text book of Human Osteology - Singh
12. Radiology of Positioning and - G.S. Garkal applied anotomy
13. Guide to Radiological Procedures - Chapman
14. Hand book of Ultrasound - Garkal
15. Radiophysics and Darkroom cetabulum
16. Synopsis of Radiology and Imaging - Sidhwa
17. Aids to Radiological differential - Chapman
18. X-ray Diagnosis and Imaging – Gupta

LIST OF TOOLS AND EQUIPMENTS
Std. XII
Paper – I: Radiography (S7)

Sr. No.	Instrument/Equipment	No. of Quantity
1.	X-ray machine with bucky table (Desirable)	01
2.	Portable x-ray machine	01
3.	Dark room accessories	
	SS Tank (Processing Tanks)	03
	Safe Light	02
4.	Processing chemicals	02
5.	Cassettes - 4 type size 8''x10'', 10''x12''	04
6.	Hangers - 4 types size 12''x15'', 14''x17''	08
7.	X-ray film - 4 types size	
8.	Lead Apron	1
9.	Lead divider	1
10.	Lead Markers	2 Set
11.	Fluoroscopy Unit (Desirable)	
12.	Computer with Printer	01
13.	Lead Goggle	01
14.	Lead Gloves	01 (Pair)
15.	Dental Films	

Std. XII
Paper – II: Special Radiological Procedures (S8)

Sr. No.	Instrument/Equipment	No. of Quantity
1.	Equipments required for special radiological procedures such as in HSG, IVP etc.	01 Each
2.	Different Contrast media	As per requirement
3.	Emergency drug box.	01
4.	First Aid Box	01
5.	B. P. Apparatus	01
6.	Stethoscope	01
7.	Syringes with needles	As per requirement

Std. XII
Paper – III: Imageology (S9)

Sr. No.	Instrument/Equipment	No. of Quantity
1.	CT Scan machine (Desirable)	01
2.	USG, Colour Doppler (Desirable)	01
3.	MRI Machine (Desirable)	01
4.	Computer with printer	01
5.	PET Scan Machine (Desirable)	01

LIST OF EQUIPMENTS, TOOLS MACHINES AND MATERIALS
Std. XI
Paper – I: Anatomy and Physiology

Sr. No.	Instrument/Equipment	No. of Quantity
1.	Human Skelton	01
2.	Various coloured charts depicting various system	10
3.	Various anatomical models of the organs of the body	16
4.	Human bones set	01

Std. XI
Paper – II: Radiography Equipments

Sr. No.	Instrument/Equipment	No. of Quantity
1.	X-ray machine with Bucky Table	01
2.	Portable x-ray Machine (Desirable)	01
3.	Cassettes with intensifying screen of various sizes	01 Each
4.	Hangers of various sizes	01 Each
5	Digital x-ray Machine (Desirable)	01
6	Lead divider	01
7	Lead Marker (Letters & Number)	01 Set Each
8	Dental radiography Unit (Desirable)	01
9	Fluroscopic Unit (Desirable)	01
10	Image Intensifier (Desirable)	01
11	Computer with Printer	01

Std. XI
Paper – III: Basic Imegeology

Sr. No.	Instrument/Equipment	No. of Quantity
1.	C. T. Scan Machine (Desirable)	01
2.	U.S.G. (Desirable)	01
3.	M.R.I. Machine (Desirable)	01
4.	P.E.T. Scan Machine (Desirable)	01
5	Film badge	01
6	T.L.D.	01
7	Lead Apron	02
8	Lead gloves	01 Pair
9	Computer with Printer	01

INFRASTUCTURE

1. Class Rooms 20 ² 20 = 400 Sq.-ft. with Charts, Display Board, Black - Board, LCD PROJECTOR
2. Laboratory - 50 ² 20 = 1000 sq...ft. (including X-ray Room) with required appliances
3. Electrical Power Supply - At - least 8 KVA with 3 - phase Connection
4. Pure Drinking Water Facility
5. Library may be Common

Sr. No.	Designation	No.	Qualification
1	Full Time Teacher	01	1. D.M.R.D or M.D. (Radiology) Or 2. M. B. B. B. Or 3. B. A. M. S. with five years Teaching experience in HSCV Concern Subject
2	Full Time Instructor	01	1. B. A. M. S. Or 2. B. Sc. (MIT) with five years experience Or 3. HSC Vocational, X-ray or Radiology Technician with five years experience

3: OPHTHAIMIC TECHNICIAN (P7, P8, P9)

Scheme of Examination
Std. XI

Paper	Title of the Paper	Theory		Practicals		Term work	Project work	I.V.	Total Marks
		Marks	Time (Hrs)	Marks	Time (Hrs)				
1	Ocular Anatomy Physiology and Pharmacology	80	3	80	3	20	10	10	200
2	Optics, Lenses and Ophthalmic Equipments	80	3	80	3	20	10	10	200
3	Sterilization, Medical Records and Community Ophthalmology	80	3	80	3	20	10	10	200

* IV = Industrial Visit.

Std. XII

Paper	Title of the Paper	Theory		Practicals		Term work	Project work	I.V. *	OJT **	Total Marks
		Marks	Time (Hrs)	Marks	Time (Hrs)					
1	Common ocular Disease, special Investigation and OT Procedures.	80	3	80	3	10	10	10	10	200
2	Refractive Errors, Squint and Contact Lenses	80	3	80	3	10	10	10	10	200
3	Special Lenses grinding and Dispensing of spectacles	80	3	80	3	10	10	10	10	200

* IV = Industrial Visit.

** OJT = On Job Training