



# **State Medical Faculty of West Bengal**

## **INFORMATION BROCHURE**

**FOR**

## **DIPLOMA IN RADIOGRAPHY 2015**

**State Medical Faculty of West Bengal**

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## **INTRODUCTION:**

State Medical Faculty of West Bengal was established as a statutory body by the Government of West Bengal in the Year 1914. The Faculty was entrusted with conduction of Licentiate Courses in Medical Sciences (L.M.F.). Subsequently the Faculty started conducting examination of Diploma in Pharmacy.

With the rapid growth of medical sciences it was felt necessary to train the paramedical personnel of the State. With this object in view, the State Medical Faculty started conduction of different diploma and certificate courses with the approval of the Government of West Bengal. It is essential to have a uniform standard while conducting the courses not only in Government Institutions but also in the Private Organizations and as such, the Faculty has already stipulated minimum requirement for starting conduction of different Para Medical Courses.

As per provision of Clinical Establishment Act of West Bengal any Diagnostic Laboratory possessing Valid Licence under the said Act can start the Training Course with the permission of appropriate authority provided the diagnostic laboratory fulfills the minimum requirements as stipulated by the State Medical Faculty of West Bengal.

Any Institution desirous of starting Para Medical Courses with the affiliation of State Medical Faculty of West Bengal has to fulfill the stipulated requirements and to follow the syllabus as prescribed by the Faculty. The State Medical Faculty also acts as an Examining Authority for such courses.

Conduction of a Para Medical Course in Affiliated Institutions is being monitored by the Faculty so that uniformity is maintained while conducting the same course in different institutions.

Presently, the State Medical Faculty of West Bengal is considering grant of recognition to Institutions for conducting the following courses:

<u>Sl.</u>	<u>Name of the Courses</u>
1.	Diploma in Medical Laboratory Technology
2.	Diploma in Radiography
3.	Diploma in Radiotherapeutic Technique
4.	Diploma in Optometry with Ophthalmic Technique
5.	Diploma in Perfusion Technology
6.	Diploma in Neuro Electro Physiology
7.	Diploma in Cath-Lab-Technician
8.	Diploma in Dialysis Technician
9.	Diploma in Critical Care Technology
10.	Diploma in Operation Theatre Technology

## **COMMON PROCEDURE FOR OBTAINING AFFILIATION FOR ANY DIPLOMA COURSE RUN BY THE FACULTY**

### **PART – I**

The intending institute which wants to start a particular course is required to collect the booklet "**Information Brochure**" for that particular Course by paying the requisite fee of **Rs.500/-**.

The Institute should create the facilities required for starting the course as per norms of the course.

The Institute after fulfilling the norms for the course is required to apply in the prescribed form annexed in **Part-II** alongwith the requisite Inspection Fee of **Rs. 5000/- for each course**. Inspection fee is not refundable.

The Faculty will send Inspection Team for physical verification of the facilities to start the course.

On the basis of report received from the Inspection Team, the Faculty may ask the Institute for compliance or modification, as the case may be, or accord permission to start the course.

#### **Caution Money Deposit:**

- i) Private Institutions to be recognized are required to deposit with State Medical Faculty of West Bengal Caution Money of Rs.50,000/- per course.
- ii) Caution Money will be treated as one-time payment till students of private institutions continue their studies.
- iii) Caution Money deposited by Private Institutions will not accrue any interest payable to the concerned depositors.
- iv) Caution Money will be refunded without any interest at the time when the institute closes their course of studies with prior intimation to the Faculty.
- v) In the event of de-recognition of the institution by the Faculty, Caution Money deposited would be forfeited.
- vi) Caution Money deposit is applicable in case of new Institute / existing Institute to conduct new course(s).

#### **Conduction of Paramedical Courses:**

Paramedical Courses should exclusively be conducted at the institute premises under the control of the Affiliated Institute, save and except Blood Bank Training for DMLT [Tech] Course, which could be done in any Government Hospital or any Private Hospital with their consent. Consent letter to be attached in Application Form for recognition.

In case of rented building of the institute, three years' rental agreement with the owner of the premises be submitted with the Application Form for grant of recognition/extension of recognition.

#### **Fire Safety Measures:**

Fire Safety Measures should be ensured. Provision for alternative exit be arranged.

In case of non-availability of Fire Safety Measures, the same may be informed and also their plan of actions for introduction/improvement of Fire Safety Measures.

#### **Duration of Course:**

Duration of Para Medical Courses is 2 years followed by 6 months compulsory Post Examination Practical Training of minimum **600 hours in 6 months** after passing of Final Examination of Para Medical Courses.

#### **Eligibility:**

Any person seeking admission into the course of study in Para Medical Courses must fulfill the following conditions:

- a) That he/she has passed the Higher Secondary or an equivalent Examination of any Indian University or duly constituted Board, with pass mark in Physics, Chemistry and Biology.
- b) That he/she has attained the age of 17 years on 1<sup>st</sup> September of the respective year of his/her admission into the course in an approved institution.
- c) That he/she has furnished a certificate of physical fitness from a registered medical practitioner and two references from persons other than relatives testifying to satisfactory general character.

#### **Selection:**

Selection will be made on the basis of pass marks obtained in Physics, Chemistry and Biology in the Qualifying Examination [i.e. Higher Secondary and/or equivalent Examination]. The Faculty will, however, reserve the right to amend/alter/modify the selection procedure at its sole discretion.

#### **Fees:**

The admission and tuition fees will be charged by the individual institution with the approval of the Faculty. The Tuition Fees will be Rs.15,000/- per course per annum in respect of all Affiliated Institutions.

The Registration Fees of Rs.500/- per student per course and Examination Fees of Rs.400/- per student per examination will be charged by the State Medical Faculty of West Bengal separately in respect of students admitted in Para Medical Courses in Affiliated Institutions. Students of **ESI Hospitals, Kolkata Port Trust Centenary Hospital, Chittaranjan National Cancer Institute are required to pay Registration Fees and Examination Fees.**

**Academic Session:**

The Session will commence ordinarily in September of every year. The exact date is to be announced at the time of admission.

**Inspection, Counseling, etc.:**

**Inspection is to be carried out to all Institutions including existing Institutions.**

**All affiliated Institutions have to join Counseling of the Faculty on scheduled date, time and venue. Seed money for joining the Counseling is Rs. 4000 /- for each course. However, if they do not get students in Joint Counseling then they will be allowed for second counseling at their end.**

**Prospectus and Application Forms, etc. are to be issued by the Affiliated Institutions by their own arrangements for the second counseling, if any. Subject to the approval of the Faculty.**

Students of the Non-Government Institutions, selected in the Joint Counseling, have to deposit Rs.15,000/- preferably by Demand Draft in favour of State Medical Faculty of West Bengal at the time of admission in the Counseling Hall. Faculty will remit this amount to the concerned Institution in due course.

Affiliated Institution has to pay Rs.500/- per student per month for six months as stipend to the students during Internship (Clinical) and/or Post-Examination Practical Training.

Affiliated Institution has to pay **Recognition Fee of Rs. 10,000 /-** per course per annum.

Affiliated Institutions have also to pay **Rs.4000/-** as Examination Fee per examination per course.

Institutions should have been attached with Multi Specialty Hospital of its own; in case of DMLT [Tech] Course, Diagnostic Centre with large laboratory and in case of DRD [Tech] Course, well equipped Radio Diagnostic Centre, should have been attached.

New Institution (other than existing one) has to submit "No Objection Certificate" for conduction of course from the State Government.

Internship for all the passed out students of Diploma Courses is compulsory and that same should be completed just after passing the Final Examinations.

**No Objection Certificate**

**I. In case of new Institute proposed for affiliation to conduct different Para Medical course(s) is required to submit Noc from State Govt**

**II. Similarly existing Institutes intend to conduct new Para Medical course(s) is also required to submit Noc from State Govt.**

**PART II**

**Application for obtaining fresh affiliation or extension of affiliation of  
State Medical Faculty of West Bengal for conducting \_\_\_\_\_  
(Name of the Course(s))**

1. Name and address of the applicant:

Name \_\_\_\_\_

Address with Pin Code \_\_\_\_\_

\_\_\_\_\_

Phone No. \_\_\_\_\_ Fax No. \_\_\_\_\_ E-mail \_\_\_\_\_

2. Whether any other training course(s) are running by the Institute: Yes/No

If yes, please indicate the name of other course(s): \_\_\_\_\_

3. Status of the Institution: \_\_\_\_\_

4. Details of the Institution: \_\_\_\_\_

A. If it is Society/Trust \_\_\_\_\_

The Society Registration Act No. or the Trust No. under which the Society/Trust was formed:

(i) Registration No. -----

(ii) Date of Registration -----

(iii) Place of Registration -----

(Attached copy of Registration of Society/Trust alongwith detail of constitution/Memorandum of Association of the Society/Trust)

(iv) Details of member/Trustees and their experience in running Para Medical Courses alongwith present occupation and academic background:

Name of the Member/Trustees	Designation in Society	Present Occupation	Academic Background	Experience

B. If other, specify:

- i) Name and complete postal address of the proposed Institution.
- ii) Name and address and Telephone No. of the authorized person for communication.
- iii) Furnish the details of Resource and funding agencies.
- iv) Number of students proposed to be admitted.
- v) Year of starting/proposed date of starting the course.
- vi) Specify the nature of attached hospital/laboratories with full description thereto and status of the same.
- vii) Registration No. of the establishment for Practical Training.

5. Details of Fire Safety Measures are as under :  
(Attach separate sheet)
6. Alternative exit arranged or not.
7. Rented Building, Yes/No.
8. Name of the authorized person to sign Registration forms, Admit Cards and other documents.

**Note:-**

- a) Copy of current license under Clinical Establishment Act of West Bengal be attached.
- b) In case of new Institution, copy of permission letter from the Government of West Bengal for conducting Para Medical Course be attached.
- c) In case of rented building of the institute, three years' rental agreement with the owner of the premises be submitted with the Application Form for grant of recognition/extension of recognition.
- d) Copies of **Blood Bank Facility (For DMLT [Tech] Course only)** provided by Govt. Hospital / Private Blood Bank if any.
- e) Copies of updated **Registration Certificate** of WBMC for Medical Faculty are attached.
- f) Copy of License under clinical Establishment Act is attached

Name :

Signature of the Head of Institute :

Date with stamp :

**Availability of Existing Infrastructural Facilities:**

1. Whether the Institution is/will be established in own building or in a rented building –  
(Documentary evidence is required in case of owned building and in case of rented building the rent receipt and Agreement with the owner is required.)

**Accommodation:-**

Administrative Area:

Sl. No.	Particulars	Size of the room	Remarks of Inspectors
	Head of Department Room		
	Staff Room:		
	a) Room for Teaching Staff		
	b) Room for Technicians		
	c) Office Room		
	d) Store Room		

2. Academic Area:

Sl. No.	Particulars	Size of the room	Remarks of Inspectors
	Class Room		
	Library		
	Students' Common Room		

3. Staff:

**(a) Regular :**

Sl.No.	Designation	Name & Address	Qualification & experience	Date of Appointment	Inspector's Remarks
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					

Non-Teaching staff –

**(b) Part Time :**

Sl.No.	Designation	Name & Address	Qualification & experience	Date of Appointment	Inspector's Remarks
1					
2					
3					
4					
5					
6					
7					

Whether potable water is supplied :  
 Whether Gas is provided :  
 Whether electricity is provided :  
 Whether waste disposal management system is followed :  
 Whether the following records are maintained :

1. Attendance for staff
2. Salary Payment Sheets
3. Cash Book
4. Store material receive and supply (Stock Ledgers)
5. Students Attendance
6. Student Register (Admission)
7. Dead Stock Register
8. Patients' Attendance Register/Daily Treatment Register in Clinic.

4. The Training Area should be provided with the following:

Sl. No.	Particulars	Size of the room	Remarks of Inspectors
1	X-Ray Room		
2	Mobile X-Ray Room		
3	U.S.G. Room		
4	Dark Room		

5. Teaching Staff:  
 (A) Regular Faculty :

Sl.No.	Designation	Name & Address	Qualification & experience	Date of Appointment	Regn No*	Inspector's Remarks
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						

\* In case of Doctor

(B) Guest Faculty :

Sl.No.	Designation	Name & Address	Qualification & experience	Date of Appointment	Regn No*	Inspector's Remarks
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						

\* **In case of Doctor**

## 6. List of equipment:

Sl.No.	Name of Equipment	No. Required	Inspector's Remarks
1	High Power X-Ray Machine 300Mato 700MA/100MA/200MA	4 (Four)	
2	Mobile X-Ray Machine	1 (One)	
3	Portable X-Ray Machine	2 (Two)	
4	U.S.G. Scanar	1 (One)	

Name :

Signature of the Head of Institute :

Date with stamp :

**PART III****Standard requirements of infrastructural facilities  
to start Para Medical Course : DRD [Tech]****Accommodation:**

The Institution must provide potable water supply as well as Distilled/Deionised water supply.

The gas and electricity must be provided wherever applicable.

The Institution must have arrangement for handling the patient in case of emergency.

## 1. Administrative Area:

Sl. No.	Particulars	Size of the room	Remarks of Inspectors
	Head of Department Room	150 Sq. ft.	
	Staff Room:		
	a) Room for Teaching Staff	200 Sq. ft.	
	b) Room for Technicians	200 Sq. ft.	
	c) Office Room	150 Sq. ft.	
	d) Store Room	150 Sq. ft.	

## 2. Academic Area:

Sl. No.	Particulars	Size of the room	Remarks of Inspectors
	Class Room	300 Sq. ft.	
	Library	500 Sq. ft.	
	Students' Common Room	300 Sq. ft.	

## 3. The Training Area should be provided with the following:

Sl. No.	Particulars	Size of the room	Remarks of Inspectors
1	X-Ray Room	20'x20'x12'	
2	Mobile X-Ray Room		
3	U.S.G. Room	15'x15'	
4	Dark Room	2 x (10'x10')	

## 4. Staff -

## Non-Teaching Staff:

Sl.No.	Designation	Qualification	No. Required
1	Office Superintendent	Graduate in any discipline with experience	One
2	Office Assistant	Qualification same as that of 1 with experience in Computer operation	One
3	Store Keeper	Qualification same as that of 1 with experience in Store Keeping	One
4	Library Assistant	Graduate in Science	One
5	Laboratory Attendant	Nurse (Female)	Two
6	Office Attendant	10 <sup>th</sup> Standard	One
7	Cleaner/Safaiwala		One

## 5. Teaching Staff:

The following Teaching Staff are required:

Sl.No.	Designation	Qualification	No. Required
1	Lecturer in Radiology	DMRD/MD (Radiology)	Two
2	Lecturer in Anatomy	MBBS/MS (Anatomy)	One
3	Lecturer in Physics	DMRD/MD (Radiology)	One
4	Technologist	DRD/Ten years experience in the Radiography	Five

## 6. List of Equipment:

Sl.No.	Name of the Equipment	No. Required
1	300 MA	One
2	800/500 MA with I.I.T.V	One
3	Mobile X-Ray Machine	Two
4	Portable X-Ray Machine	One
5	U.S.G. Scanar	One

**Conduction of Para Medical Course:**

Para Medical Courses should exclusively be conducted at the institute premises under the control of the Affiliated Institute, save and except Blood Bank Training for DMLT [Tech] Course, which could be done in any Government Hospital or any Private Hospital with their consent. Consent letter to be attached in Application Form for recognition.

In case of rented Building of the institute, three years' rental agreement with the owner of the premises be submitted with the Application Form for grant of recognition/extension of recognition.

**Fire Safety Measures:**

Fire Safety Measures should be ensured. Provision for alternative exit be arranged.

In case of non-availability of Fire Safety Measures, the same may be informed and also their plan of actions for introduction/improvement of Fire Safety Measures.

## RULES, REGULATIONS AND SYLLABUS

### PART – IV

#### **Duration of the DRD [Tech] Course:-**

(a) The first one year of the course shall be devoted to the training in the subjects of the Preliminary Courses.

(b) On completion of the Preliminary Course, the Preliminary Examination will be held.

(c) On passing the Preliminary Examination, the students shall follow for one year the curriculum of the Final Course. On completion of the course, the Final Examination will be held.

(d) After successfully passing the Final Examination, the students shall undergo Compulsory Practical Training of not less than 600 hours in not less than 6 months in a recognized hospital.

1. The Preliminary and Final Course shall include the respective subjects as given in the Tables as well as the minimum number of hours devoted to each subject, lectures, practical and demonstration, subject to addition and alteration at the discretion of the Governing Body of the State Medical Faculty.

The detailed syllabus of each subject is given in **Appendix I**.

#### **Preliminary Course**

<u>Subject to be taught</u>	<u>No. of lecturers including demonstration</u>
1. Basic Anatomy	25
2. Radiological Physics	30
3. Radiation Protection	06

#### **Final Course**

Radiographic Anatomy	30 hours
Radiographic Technique	30 hours
Radiographic Equipment Radiographic Photography and Darkroom Technique	10 hours
Care and maintenance of equipment	05 hours
First-aid, Basic Nursing, handling of patients, Medical Ethics and Administration, Drugs in Radiography	10 hours

### Examination for the Diploma Course:

1. No person other than a student borne on the roll of an approved training institution and studying therein at the time, shall be eligible for appearing at the examination held by the Governing Body of the Faculty.
2. Every student after admission into the course of study in an approved Institution shall apply in the prescribed form **Appendix II** through the Principal/Director of the Institution with a fee of Rs.500/- to have his/her name registered in the Students' Register maintained by the Governing Body. A registration certificate bearing serial number allotted to the student will be sent to him/her through the Head of the Institution.
3. (a) There will be two examinations – (a) Preliminary and (b) Final. The examinations shall be held twice a year at such time and place as may be determined by the Governing Body.

(b) **Internal Assessment** marks for all Para Medical Courses have been introduced from the academic session 2013, **20% of allotted marks in Theory and 10% of allotted marks in Oral and Practical in each paper of Diploma courses** would be assigned for internal assessment marks. **Pass marks in Internal assessment is 50% in each paper rounded off to the nearest five.** A candidate should not be allowed to sit for examination without pass marks in Internal Assessment.

4. **Preliminary Examination** : Only such students, who produce certificate from the Head of the approved Institutions in proof of their having regularly undergone the Preliminary Course of study by attending not less than 75% of classes, both in theoretical and practical in each subject, shall be eligible for appearing at the Preliminary Examination.

The Examination will be conducted according to the following table:

<u>Subject of Examination</u>	<u>Total marks Theory+IA</u>	<u>Total marks Oral+IA</u>
1. Basic Anatomy	80+20	90+10
2. Radiological Physics, Radiation Protection	80+20	90+10

5. All written examinations shall be of three hours' duration and the number of papers in each subject shall be as mentioned above.
6. Every candidate for the Preliminary Examination shall apply to the Secretary, State Medical Faculty of West Bengal through the Head of the Institution where he/she is undergoing his/her study, in the prescribed form together with the necessary certificates **Appendix III**.
7. No application will be entertained unless it reaches the Secretary atleast 21 days before the date notified for commencement of the examination. An application received later but not later than 14 days before the commencement of examination, may on sufficient grounds being shown and accepted, be entertained provided that a late fee of Rs.20/- is paid for the delay.

8. **Final Examination:** Only such students, who produce certificate from the Head of the Institution concerned in proof of their having regularly undergone after successfully passing the Preliminary Examination by attending not less than 75% of classes – lectures, practical and clinical of each subject separately and has worked for atleast 350 days in the Radiology Department of a recognized Hospital shall be eligible for appearing at the examination as given in the following table:

Subject of Examination	Total marks <u>Theory+IA</u>	Total marks <u>Oral+IA</u>	Total marks <u>Practical+IA</u>
Radiographic Anatomy, Radiographic Technique, Radiographic Photography, Darkroom technique, Care & Maintenance of equipment First-aid, Basic Nursing, Handling of patients, Medical Ethics and Administration, Drugs in Radiography	80+20	90+10	90+10

9. Every candidate for the Final Examination shall apply to the Secretary, State Medical Faculty of West Bengal through the Head of the Institution where he/she had been undergoing his/her course of studies, together with the necessary certificates from the Head of the Institution **Appendix IV**.
10. The fee payable with the application shall be such as may be prescribed by the Governing Body from time to time. The fee is not refundable on any account.
11. No such application will be entertained unless it reaches the Secretary atleast 21 days before the date notified for commencement of the examination. An application received later but not later than 14 days before the commencement of examination, may on sufficient grounds being shown and accepted, be entertained provided that a late fee of Rs.20/- is paid for the delay.
12. A candidate declared to have passed the above examinations – both Preliminary and Final – if he/she secures 50% of the total marks in each subject – Theoretical + Oral – 50% and Practical – 50%. A candidate securing 75% marks or above in any subject or subjects, shall be declared to have obtained "Distinction" in that subject or subjects, provided he/she passes in all the subjects of the examination at the same time and at his/her first appearance at the examination.
13. A candidate, who appears at the Preliminary or Final Examination for the course but fails to pass in all the subjects or in one or more subjects, may be admitted to one or more subsequent examinations in subject or subjects in which he/she failed provided, however, that he/she passes in all the subjects in three subsequent examinations within a period of two years computed from the date of the examination in which he/she appeared for the first time. If he/she does not pass the entire examination within a period of two years, as mentioned above, he/she shall have to take the whole examination in all the subjects at the time when he/she appears next.

14. A failed candidate shall have to undergo a further course of training and produce a certificate from the Head of the Institution stating that he/she has, since the date of the last examination and within the period of six months proceeding his/her re-examination, attended to the satisfaction of the Head of the Institution further course of study in the subject or subjects in which he/she failed **Appendix V**.
15. The general rules and regulations regarding conduct of examinations of the State Medical Faculty of West Bengal shall apply with necessary modifications for the conduct of Diploma in Radiography examinations. Detailed rules and regulations may be framed by the Governing Body from time to time.

#### **Award of Diploma in Radiography (Diagnostic) : DRD [Tech]**

1. A candidate who passes successfully the Final Examination will be granted a Diploma in Radiography (Diagnostic) – DRD [Tech].
2. Every such application shall be accompanied by a certificate from the Head of the recognized Hospital, in the form given in **Appendix VI**, with all the particular mentioned therein and the Head of the Institution shall forward the same to the Secretary, in the form given in **Appendix VII**, stating whether he/she considers him/her eligible to receive the Diploma in Radiography (Diagnostic) – DRD [Tech].
3. The Governing Body may then, if satisfied that all requirements of these regulations have been fulfilled, issue the Diploma, which shall be in the form given in **Appendix VIII**.

**PART IV****Appendix I****MODIFIED SYLLABUS - 2011****Preliminary Course**

Anatomy: General Anatomical terms, Regions of the body. Bones and Joints. General structures and forms; Important ligaments and muscular attachments; skull, spine, pelvis, bones of upper and lower extremities. Bones of hand and foot to be learnt with articulated only without detail, except Os calcis, Talus and scaphoid. Structure of a typical joint and general descriptions of main joints, Synovial fluid; movements in joints and their limitation, chief relation, group movements of joints.

Thorax and abdomen: Structure of thoracic cage; abdominal cavity; Diaphragm and Mediastinum

Heart and vessels : Structure and function of heart. Names of main arteries and veins.

Respiratory System: Accessory nasal sinuses; Larynx; trachea; bronchi; lungs; pleura.

Alimentary system: Mouth, tongue, salivary glands, pharynx, tonsils, oesophagus, stomach, small and large intestine, liver and biliary tract, spleen, pancreas, mesentery, omentum. Urinary tract: Kidney, ureters, bladder and urethra.

Reproductive system: Male genital tract, fallopian tubes, ovaries, uterus, mammary gland.

Nervous system: Bones of the skull – general features. Names and position of bones of vault and base [articulated only], Vertebral column – structure of a typical vertebra, Atlas Axis, Sacrum and coccyx. Brain – main sub-divisions and lobes ventricles, spinal cord. Surface anatomy in relation to Radiography. Ductless glands.

Physics: Basic ideas of measurement and units. Graphical representation of data. Elementary explanation of exponential law. Radiation spectrum. Photo-electric effect. Compton effect. Fluorescence, photo-rescense. Atomic structure. Solenoids. Electromagnets. Electromagnetic induction – Generation and transmission of alternating current. RMS and peak values of current and coltage. Principles of construction of transformer – step up, step down, auto, Rectilinear propagation of light. Umbra and penumbra. Inverse square law.

Electronics: Theremionic emission. Construction and function of diode and triode valves and their uses. Rectifier (Solid State).

**Production of X-Rays, X-Rays tubes : Design**

Diagnostic H.T. circuits, high tension generators, Half-wave, Full-wave, three phase, Condenser discharge, constant voltage, H.T. switches, control table, measuring instruments, voltmeters, ammeters, milliammeter.

Focal spot, inherent filtration, tube holders. mAs meter, mains compensator, exposure timer, Inter-lock and safety devices. Grid:Ratio in relation to KV. Reciprocating and oscillating, Potter bucky diaphragms, stationary grids.

Scattered radiation: Control of Scattered radiation, cones, Diaphragms and filters.

Special equipments: Tomography, Magnification technique, Mobile units, portable units, image intensifier, Tele-radiography. Spot film devices. Stereoscopy

Interaction of X-ray with matters, Energy absorption from X-rays. Measurement of X-rays. Rontgen and Rad, Simple principle of dosimeters, fluorescent effect, photographic effect.

Protection: Code of practice for the protection of persons against ionizing radiation, protective materials, Lead, lead equivalent. Building material, personnel monitoring, International recommendations against hazards of ionizing radiation.

## **SYLLABUS**

### **Final Course**

#### **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.

**Genito-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.

**Biliary system:** Cholecystography, Oral and I V Cholangiography – Direct and Indirect.

**Liver and spleen:** Spleno-portal venography.

**Silvary glands :** Sialography.

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

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

### **Radiographic photography and Dark-room technique**

**X-Ray materials:** Types of emulsion – characteristic and control, screen and non-screen films, dental films, X-ray paper under and over exposure, speed contrast.

**Intensifying screens:** Fluorescence, application of fluorescence in Radiography, type of intensifying screens, intensifying factors, cleaning and general care of screens – after glow.

**X-ray cassettes:** Testing and proving good screen contract, general care.

**X-Ray developers:** Characteristics, Detail and contrast freedom from chemical fog and staining, function and constituent of developer, standardization by time and temperature, exhaustion of developer, Replenishers.

Types – Powder and liquid solution, medium and high contrast developer, ultra-rapid development methods. Automatic processing.

**X-ray fixers and fixing:** Fixing agents, acid and preservative in fixer, inclusion of hardner, time of fixation, silver recovery.

**Rinsing, washing and drying:** Object, methods employed, method of drying films.

**Processing:** Preparation of solution, suitable water supply, nature of mixing vessels, order mixing solutions, filtrations, making of stock solutions, storage of dry chemicals, storage of solution.

**Processing apparatus:** Processing units, hangers, care of hangers, refrigeration and use of ice.

**Operation theatre processing :** Dish units.

**Technical and processing faults:** Chemical reduction.

Chemistry and characteristics of Farmer's reducer, local and general application.

**X-ray dark room:** Size, light proof entrancer, hatches, construction of walls for protection against chemicals and radiation, ceiling, colour schemes, water proofing of floors, loading bench design, disposition of processing and accessory equipment for efficient working, arrangement of drying cabinets in dark-room or in adjacent rooms, dark-room illumination and testing for safety, ventilation.

**The Radiographic image:** Radiographic factors affecting image contrast and sharpness, variation in exposure time in accordance with quality of radiation filters, distance, intensifying screens, grids, film speed, developer and development.

**Presentation of radiograph:** Identification of film, aspect for direct and stereo [univeraprismatic] viewing, mounting dental films.

**Accessories:** Viewing boxes, spot-light, illuminators, projectors and viewing screens for miniature and cine-radiography, magnifiers, film identification, lead letters and numbers, actinic makers, embossing machine, film trimmers, corner-cutters, dental mounts and cutter, filling units.

### **Care and maintenance of equipment**

General principles and routine use of charts supplied by manufacturer, Radiographic calibration procedure, Tube rating chart.

### **First Aid**

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 etiquettes 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. Appoints. 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.

**Computed Tomography** – More classes should be allotted for CT & MRI

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

Rectifier

Scan parameters; Scan time, Number of views per second, Reconstruction time, scan cycle time, Acquisition matrix, Display matrix, Slice thickness.

Image reconstruction; Pixel & Voxel; C.T. Number & Hounsfield Number.

Image display; matrix, pixel, voxel, Window level, Window width, Double Window, Partial Volume phenomenon.

Image quality: Patient exposure; Resolution

Ultrafast C.T., Dynamic C.T. & C.T. angiography, C.T. guided FNAC.

3D C.T./Artefacts

Radiation dose aspects.

Clinical application – Scan planes specially in Cranial C.T. [Gross anatomy of conventional planes] Indication and contra-indication; Patient preparation and positioning

Contrast enhanced C.T.

**Magnetic Resonance Imaging**

BASIC PHYSICS WITH PRACTICAL APPLICATIONS:

Magnets – types, powers, magnetism Radio Frequency (RF) pulse  $T_1$  (longitudinal relaxation time)  $T_2$  (transverse relaxation time)

Basic sequences, basic parameters and basic tissue (like fat and water)

Different types of coils.

Contrast agents, MR angiography and dynamic MR.

Spectroscopy.

Hazards, safety and limitations.

**Ultrasonography** –

Basic Physics : Characteristic of sound; Propagation of sound; Interaction between ultrasound and matter attenuation and reflection; Transducers; Ultrasound display, A, TM, B-mode Gray scale imaging; Scanning methods; Doppler techniques; Artefacts Safety Application.

**STATE MEDICAL FACULTY OF WEST BENGAL**

**APPENDIX II**

Form of application for registration of the name of a student admitted to an approved Training institution for Diploma in Radiography [Diagnostic] : DRD [Tech]

[ Vide Regulation 2 of Part III ]

1. Name of the student in full :
2. Address –  
(a) Permanent :
  
- (b) Present :
3. Father's Name :  
{In case of married women, her  
Husband's name}
4. Age [as on the date of admission] :
5. Race – Caste or religion :
6. Name of the approved training Institution :
7. Date of admission :
8. Preliminary educational qualification :

\_\_\_\_\_  
Signature of the applicant

I hereby certify that the above particulars are true to my knowledge.

Dated, the .....20  
Place :

\_\_\_\_\_  
Signature of the Head of the Institute

**STATE MEDICAL FACULTY OF WEST BENGAL**

**APPENDIX III**

Application for admission to the Preliminary Examination for Diploma in Radiography [Diagnostic]  
: DRD [Tech]

[ Vide Regulation 6 of Part III ]

To  
The Secretary, State Medical Faculty of West Bengal.

Sir,

I beg to apply for admission to the ensuing Preliminary Examination for Diploma in Radiography [Diagnostic] : DRD [Tech] to be held by the Governing Body of the State Medical Faculty of West Bengal from .....

The required certificate from the Head of the Institution is given herewith and I have paid the prescribed fee of Rs. .... in his office.

- |    |                              |   |
|----|------------------------------|---|
| 1. | Name in full (Block letters) | : |
| 2. | Father's Name                | : |
| 3. | Present Age                  | : |
| 4. | Student Registration No.     | : |
| 5. | Permanent Address            | : |
| 6. | Present                      | : |

Dated, the .....20

Signature of the applicant in full

**Certificate of the Head of the Institution**

I certify as below –

[1] that the above named ..... was admitted in this Institution for the course of Diploma in Radiography [Diagnostic] : DRD [Tech] on .....

[2] that previous to his/her admission, he/she has attended regularly the course of studies as laid down in the Regulations. His/her attendance in the several subjects being as below:

<u>Subject</u>	<u>No. of Theoretical lectures and demonstrations</u>	<u>No. of Attendance</u>
Basic Anatomy	25	
Radiological Physics	30	
Radiation Protection	05	

That he/she has paid in my office the prescribed fee of Rs.400/- which is being separately remitted to the Faculty.

That his/her conduct in the Institution was satisfactory.

Signature of the Head of the Institute

Dated, the .....20

Place :

## STATE MEDICAL FACULTY OF WEST BENGAL

### APPENDIX IV

Application for admission to the Final Examination for Diploma in Radiography [Diagnostic]  
: DRD [Tech]

[ Vide Regulation 9 of Part III ]

To  
The Secretary, State Medical Faculty of West Bengal.

Sir,

I beg to apply for admission to the ensuing Final Examination for Diploma in Radiography [Diagnostic] : DRD [Tech] to be held by the Governing Body of the State Medical Faculty of West Bengal from .....\*

The required certificate from the Head of the Institution is given herewith and I have paid the prescribed fee of Rs. .... in his office.

I passed the Preliminary Examination in ..... and my present age is .....

- |    |                              |   |  |
|----|------------------------------|---|--|
| 1. | Name in full (Block letters) | : |  |
| 2. | Father's Name                | : |  |
| 3. | Present Age                  | : |  |
| 4. | Student Registration No.     | : |  |
| 5. | Permanent Address            | : |  |
| 6. | Present                      | : |  |

Dated, the .....20 Signature of the applicant in full  
\* State name of the training institution.

#### Certificate of the Head of the Institution

I certify as below –

[1] that the above named ..... passed the Preliminary Examination for Diploma in Radiography [Diagnostic] : DRD [Tech] in .....

[2] that he/she has attended regularly in this Institution. The 2<sup>nd</sup> Year's course of studies laid down in the Regulations and fulfilled the other requirements.. His/her attendance in the several subjects being as below:

<u>Subject</u>	<u>No. of Theoretical lectures and demonstrations</u>	<u>No. of Attendance</u>
Radiographic Anatomy	25	
Radiographic Technique	30	
Radiographic Equipment Radiographic Photography and Darkroom Technique	10	
Care & Maintenance of equipment	05	
First Aid, Basic Nursing, Handling of Patients, Medical Ethics and Administration		
Drugs in Radiography	10	

[3] That he/she has paid in my office the prescribed fee of Rs.400/- which is being separately remitted to the Faculty.

[4] That his/her conduct in the Institution was satisfactory.

Dated, the .....20

Signature of the Head of the Institute

**STATE MEDICAL FACULTY OF WEST BENGAL**

**APPENDIX V**

(Certificate by the Head of the Institution regarding further course of training in the subject or subjects in case of a failed candidate)

[ Vide Regulation 14 of Part III ]

This is to certify that Sri/Sm. .... who appeared at the Preliminary/Final Examination for the Diploma in Radiography [Diagnostic] : DRD [Tech] in .....20 and failed in ..... has undergone a further course of training in the following subject/subjects since the date of the last examination to my entire satisfaction.

Sl. No.	Subject(s)	Number of Theoretical Lecturers/ Demonstrations attended
-----	-----	-----

Signature of the Head of the Institute

Dated, the .....20

Place :

**STATE MEDICAL FACULTY OF WEST BENGAL**

**APPENDIX VI**

(Certificates to be produced by students of Diploma in Radiography [Diagnostic] : DRD [Tech]  
after completion of Practical Training)

[ Vide Regulation 2 of Part II ]

No. : .....

Date : .....

I....., hereby certify that.....  
[ name of the student ] after passing the Final Examination for Diploma in Radiography  
[Diagnostic] : DRD [Tech] underwent practical training for .....hours during the period  
from .....to ..... under my supervision and guidance.

Signature .....

Name .....

Designation .....

Address .....

(Countersigned by the Head of the Hospital)

**STATE MEDICAL FACULTY OF WEST BENGAL**

**APPENDIX VII**

[ Vide Regulation 2 of Part II ]

To  
The Secretary  
State Medical Faculty of West Bengal  
Dated, the .....20

Sir,

I am to say that the under-mentioned students have passed the Final Examination for the  
Diploma in Radiography [Diagnostic] : DRD [Tech] held by the Faculty in .....20  
and have thereafter undergone the practical training as required under the Regulations of which  
the necessary certificates are enclosed. I certify that I consider the students to be eligible to  
receive the Diploma in Radiography [Diagnostic] : DRD [Tech] .

Yours faithfully,

Head of the Institution

**STATE MEDICAL FACULTY OF WEST BENGAL**

**APPENDIX VIII**

[ Vide Regulation 3 of Part II ]

***Diploma in Radiography [Diagnostic] : DRD [Tech]***

*We, the President and Members of the Governing Body of the State Medical Faculty of West Bengal, acting under the authority vested in us by Article 17 of the Statutes of the said Faculty and in accordance with the Regulations made there under with the approval of the Government of West Bengal, do hereby declare that .....*after undergoing the prescribed course of training for the Diploma in Radiography [Diagnostic] : DRD [Tech], duly passed the Final Examination for the Diploma in Radiography (Diagnostic) : DRD [Tech] held by this Faculty in the month of .....20 with distinction.

*And we, accordingly, grant him/her this Diploma in Radiography (Diagnostic) : DRD [Tech] of this Faculty.*

*Dated at Kolkata, the .....day of .....in the year .....*

*Signed on behalf of the Governing Body of the State Medical Faculty of West Bengal.*

*Secretary*

*President*

*Signature of the holder .....*

## REPORT OF THE INSPECTORS

### Part V

Summary of findings by the Inspectors in respect of \_\_\_\_\_

For \_\_\_\_\_ Course. Name of the Institution

1. Accommodation (including toilet, ventilation, light) :
2. Fire Safety Measures available or not? :
3. Water, Electricity, Gas & Waste Disposal :
4. If the Institute is in rented building, then 3 years Agreement is shown or not? :
5. Furniture :
6. Office Records :
7. Laboratory equipment :
8. Qualification of Teachers :
9. Teacher-student ratio :
10. Workload of teachers :
11. Library books and Journals :
12. No. of working days in the session :
13. Daily working hours :
14. Laboratory facilities provided to the students :
15. Standard of teaching :
16. Standard of students :
17. Performance of students in
  - i) Theoretical :
  - ii) Practical :
  - iii) Oral :
18. Facilities provided for conducting the examination (Examination hall rented may be allowed) :

19. Date of Last Inspection :
  20. In case of DMLT [Tech] Course Blood Bank facilities have been shown in Government Hospital/Private Hospital and attendance of DMLT students in Blood Bank has been seen. :
  21. Compliance of past deficiencies (if any) :
  22. NOC from State Govt. for conduction of new course has been seen. :
  23. Updated License for clinical Establishment Act. has been seen. :
  24. Updated Registration Certificates of the Doctor Tutors from WBMC. :
  25. Recommendation of Inspectors: The Institution may be granted affiliation/following conditions are to be fulfilled before consideration of extending/according affiliation.
- 1.
  - 2.

Name and Signature of the Inspectors with date