MAHATMA GANDHI UNIVERSITY
of
MEDICAL SCIENCES & TECHNOLOGY
JAIPUR

Syllabus

M.Sc. MEDICAL IMAGING TECHNOLOGY

(2 Years Degree Course)

NOTICE

1. Amendments made by the Board of Management of the University in Rules / Regulations of Graduate Medical Courses shall automatically apply to the Rules/ Regulations of the Mahatma Gandhi University of Medical Sciences & Technology.

2. The University reserves the right to make changes in the syllabus/books/ guidelines, fee–structure or any other information at any time without prior notice. The decision of the University shall be binding on all.

3. The Jurisdiction of all court cases shall be Jaipur Bench of Hon'ble Rajasthan High Court only.

RULES & REGULATIONS

M.Sc. Medical Imaging Technology (MIT) (5290)

(2 Years Degree Course)

DURATION OF COURSE:
The course shall be of 2 years duration from the date of commencement of academic session.

ELIGIBILITY FOR ADMISSION:
For admission a candidate should have passed the B.Sc. Radio Imaging Technology /B.Sc. Radiation Technology with at least 50% marks in the aggregate from any recognized University.

SELECTION OF CANDIDATES:
Selection for M. Sc. MIT Course shall be done by an Admission Board strictly on merit judged on the basis of University Entrance Examination conducted in the month of July / August every year.

TRAINING:
1. The period of training for M.Sc. (MIT) course shall be of 2years from the date of admission.
2. M.Sc. (MIT) Part – I and M.Sc. (MIT) Part – II shall be of 1 year each duration.
3. The candidate will undertake the post graduate training as a full time post graduate in the department concerned.
4. The students who have been registered late in the medical college will not be allowed to appear in the regular examination and they will be required to complete the period of study prescribed and fulfill the requirement of attendance.

ATTENDANCE:
1. A candidate is required to have at least 75% attendance in theory and practical separately.
2. A candidate lacking the prescribed attendance shall not be permitted to appear in the Examination.

EXAMINATION AND ASSESSMENT:
1. The examination in M.Sc. (MIT) Part I shall consists of three theory papers and
2. The examination in M.Sc (MIT) Part II shall consist of three theory papers and practical in the opted specialization.
3. A candidate shall be permitted a maximum of Four Attempts or 2 years to complete the part I examination from the year of admission.
5. Only those candidates will be allowed to appear at M.Sc. (MIT) Part II examination, who have passed M.Sc. (MIT) Part –I examination completely.

SCHEME OF EXAMINATION:

The Examination in **M.Sc. MIT Part I** shall consist of:

Paper I (5291)	Basic Physics	100 marks
Paper II (5292)	Radiation Physics	100marks
Paper III (5293)	Modern X-ray & Imaging Equipment	100 marks

	Internal assessment	100 marks
(5294)	Practical & Viva Voce Examination	300 marks
	Total Marks	**700 marks**

Notes:

1. Each theory paper shall be 3 hours duration.
2. Each paper will be set by the External Examiner of the subject concerned and will be assessed by the internal examiner of the subject concerned of the same institution.

   Pattern of questions to be set and answered shall be as follows:

Name of Paper	No. of questions to be set	No. of questions to be answered
Paper I	4	4
Paper II	4	4
Paper III	4	4

3. In order to pass the examination the candidate must secure a minimum of 50% marks in each theory paper.
4. A candidate who has failed in one or more theory paper of M.Sc.(MIT) Part-I Examination must appear in that theory paper in supplementary examination which will be conducted by university within 4 – 6 months.

The Examination in **M.Sc. MIT Part II** shall consist of:

Paper I(5295)	Modern Imaging Techniques	100 marks
Paper II(5296)	Special investigations & Techniques	100 marks
Paper III(5297)	Radiographic photography	100 marks
	Internal assessment	100 marks
(5298)	Practical and viva voce	300 marks
	Dissertation/Project work	100 marks
	Total marks	**800 marks**

Notes:

1. Each theory paper shall be 3 hours duration.
2. All papers shall be set by the External Examiners.
3. Paper I will be assessed by the External Examiner and Paper II will be assessed by the Internal Examiner viz. Head of the Department of subject concerned. Paper III will be assessed by Professor / Associate professor / Assistant professor
4. Practical examination shall be conducted by one Internal, one External Examiner which will be appointed by the university.

Pattern of questions to be set and answered shall be as follows:

Name of Paper	No. of questions to be set	No. of questions to be answered
Paper I	4	4
Paper II	4	4
Paper III	4	4

5. In order to pass the examination the candidate must secure a minimum of 50% marks in Theory papers including Viva and 50% marks in Practical separately.
6. In case a student passes either in Theory or in Practical only, the student shall be considered to fail in the whole examination and he will have to appear in both the Theory and Practical in the subsequent examination.
7. A candidate shall be permitted a Maximum of four attempts or four years from the date of admission in M.Sc. Part I.

ENROLMENT:

Every candidate who is admitted to M.Sc. MIT Courses in Mahatma Gandhi Medical College & Hospital shall be required to get himself/herself enrolled with the Mahatma Gandhi University of Medical Sciences & Technology after paying the prescribed eligibility/enrolment fees.

The candidate shall have to submit the application form duly filled in and forwarded to the University through Principal of the College for the enrolment/eligibility along with the original documents with the prescribed fees (up to November 30 of the year of admission without late fees and up to December 31 of the year of admission with late fees)

PAPER SETTER/EXAMINER

1. All the examiners, paper setters, theory examination answer books evaluators, Internal and External Examiners for Practical examinations shall be appointed by the President of the University.
2. Qualification of the Paper setter / Examiner: Assistant Professor and above.
3. Paper setter can be an examiner

REVALUATION

No Revaluation shall be permitted in M.Sc. Examination. However, the student can apply for scrutiny of the answer books

GRACE MARKS

No grace marks will be provided in M.Sc. Examination.

M.Sc. Medical Imaging Technology

DURATION OF COURSE Two years

COURSE DISTRIBUTION Course is divided into two parts.

Part - I: The candidates are imparted theoretical training in the subjects of:

1) Basic physics
2) Radiation physics
3) Modern x-ray and Imaging equipment (Apparatus construction)

Practical training is given about the radiological equipment and of the radiographic techniques of specialized cases.

Part - II Theoretical training is imparted in the following subjects:

1) Modern 'Imaging techniques'
2) Special investigations and techniques
3) Radiographic photography.

Practical training is imparted in the specialized radiological and imaging procedures.

DISSERTATION:

Objectives:

1. The student should be able to demonstrate his/her capability in research by planning and conducting systematic scientific research and data analysis and deriving conclusion.
2. Communicate scientific information for health planning.

SUBMISSION OF DISSERTATION PROTOCOL

It should be submitted at the end of six months after admission to the course.

Protocol in essence should consist of :

a. Introduction and objectives of the research project
b. Brief review of literature
c. Suggested materials and methods
d. Bibliography

The protocol must be presented in the department of Radio-diagnosis & approved by the departmental research committee which will scrutinize the dissertation protocol in reference to its feasibility, statistical validity, ethical aspects etc.

SUBMISSION OF DISSERTATION

1. Dissertation will be submitted at the end of 1 ½ years.

The candidate shall submit the Dissertation / Project work as a printed copy to the Head of Department at least one month before commencement of University Theory paper examination otherwise permission to appear in the University examination shall not be granted.

2. Dissertationin essence should consist of
    a. Introduction
    b. Review of literature
    c. Aims and objectives
    d. Material and methods
    e. Results
    f. Discussion

The dissertation will be evaluated by the internal and external examiners at the time of viva voce examination of the candidate during the second year and 10% weightage will be given to the candidate for dissertation at the time of clinical/practical viva voce examination of second year. The candidate will be asked to make presentation before the external/internal examiners. The final dissertation duly approved by the External/Internal Examiners will be submitted to the Dean's Office along with the result. The Dean's office will send the dissertation to the library for record.

TEACHING METHODS

Teaching methods include the help of audio-visual aids i.e. transparencies, slides, video cassettes as well as use of multimedia and computers etc.

TEACHING PROGRAMME:

Theory work : Departmental teaching, programme includes:

Regular class Lectures	5 days in a week
Journal clubs/seminars/discussions	Once in a week

Demonstration of equipment/ accessories	Once a week
Demonstration of special radiographic techniques	Once a week

PRACTICAL WORK:

i) Students are posted in various radiographic rooms to work independently and their day to day work is reviewed by senior staff members.

ii) Students are also given practical in physics pertaining to radiology as well as in checking and rectification of common faults in the x-ray equipments/accessories.

iii) Film discussions are also held to teach them the quality control and its importance in radio-diagnosis.

EVALUATION

a) Regular day to day work assessment i.e. checking by senior staff members.

b) Internal departmental examinations.

INTERNAL EXAMINATION

A candidates will be examined by internal departmental examinations and internal assessment will be based on the performance in these examinations as well as their day to day work report.

FINAL EXAMINATION

Appointment of Examiners:	M.Sc. Part I & II:	One external examiner with Ph.D. or MD qualification and one internal examiner which can be Head of the Deptt. / Professor / Associate Professor/ Assistant Professor

MARKS DISTRIBUTION

Part - I (Theory Paper)

Paper I	Basic Physics	100 marks
Paper II	Radiation Physics	100 marks
Paper III	Modern X-ray & Imaging equipment	100 marks
	Internal assessment	100 marks

Practical & Viva Voce examination	300 marks
Total Marks	**700 marks**

(The theory paper will be set by the external examiner and moderated by internal examiners)

Candidates will be given two practical in physics as per list and will be cross examined by the examiners in the morning session. In the afternoon session a grand viva voce in all the three subjects with special emphasis on physics and newer imaging equipment will be taken.

Part - II Examination (Final Year)

Part - II examination will be held at the end of one academic year after the candidate has passed part I examination.

Marks distribution:

Paper I	Modern Imaging Techniques	100 marks
Paper II	Special investigations & Techniques	100 marks
Paper III	Radiographic photography	100 marks
	Internal assessment	100 marks
Practical and viva voce		300 marks
Dissertation		100 marks
	Total marks	**800 marks**

The candidates will be given two special procedures to do one long and one short. This will be followed by grand viva on the special procedures as well as related topics.

RESULT

Final result will be declared after the candidate has passed both part I and part II examinations separately and it will be on the basis of aggregate marks obtained by the candidates in theory, practical, viva voce and internal assessment.

The marks obtained in part I examination will be added in part II examination before declaring the final result.

M.Sc. Medical Imaging Technology

DETAILED SYLLABUS

Part - I

Basic Physics - Paper – I 5291

Fundamental of Physics - Structure of matter, electricity and magnetism

Structure of Matter - Nature of matter, atoms and nuclei, electro magnetic spectrum, quantum theory. Radioactivity, radioactive materials and isotopes.

Electricity and Magnetism : Current electricity, Alternating current, direct current, electrostatic charge, capacitors, electrical energy, magnetic field and electric charge, EMI, induced current, induced EMF, induced currents in motors, mutual and self induction.

Thermionic Vacuum tubes and semiconductor devices:

Thermionic emission, vacuum diodes, triodes, tetrodes and pentodes, gas filled thermionic tube, semiconductor devices, junction diodes, barrier-layer rectifiers, transistors, photoelectric devices, vacuum photo tubes and photomultipliers, semiconductor photo electric devices as well as electronic circuits (amplifier, oscillators with feed positive and negative mechanism).

Logics and gates The binary counting system, logic elements, applications of logic circuits, ADC & DAC philiplop encoder, decoder, register.

Discovery of X-rays production of x-rays and properties of x-rays.

X-ray tube its design, various types, advancements and common tube faults.

Xray circuits including components and control as well as various indicating devices like KV, MA meters including transformers.

Computers - Fundamental and applications, data storage technology and data communication including Internet.

Part – I

Radiation Physics PAPER – II 5292

Absorption of radiation: The exponential attenuation of radiation, linear & mass attenuation co-efficient, half value layer, energy transfer and energy absorption coefficient, total energy absorption co-efficient, relative importance of different types of absorption.

Interaction of radiation : Introduction, photo electric effect, compton scattering, Thomson scattering and pair production. Energy distribution and relative importance of the different attenuation processes.

Measuring Instruments: Dose build up and electronic equilibrium, Bragg-Gray Cavity theory, determination of dose in an extended medium by ionization chamber measurements, Direct measurement of absorbed dose, Relation among exposure, dose and KERMA

Measuring instruments; Ionization chamber, propotional counter, GM counter, Scientillation detectors, semi conductor detectors, film dosimetery system, chemical dosimetery system, TLD calibration, measurement techniques and protocols of radiation dosimetric systems.

Radiation Protection: Units and quantities, dose limits for personnel and public, Recommendations of various advisory groups and regulatory bodies ie. protection of patient, staff and public, various safety measure devices and ALARA Principles including radiological installation planning,

Quality Assurance & Quality Control: Related to Radiography/ fluoroscopy, X-ray units, CT, MRI, US and DSA units.

Part - I

Modern X-ray and Imaging Equipment Paper - III 5293

Recent developments in x ray tube technology

Advancements in H.T. generators

Measure to control scatter radiation including - beam centering devices, collimators, cone diaphragms and grids

Fluoroscopy and IITV systems including cine radiography with various recording devices.

Tomography principle, various types and its applications

Computed tomography :

Principle, data acquisition concepts, image reconstruction, instrumentations,

image manipulation Historical developments - Various generations, spiral/helical, single slice/multislice, CT, Electron beam CT, mobile CT Advances in volume scanning, continuous, subsecond scanning. Real timeCT fluoroscopy, interventional guidance tool, 3D CT, CT angiography. Virtual reality imaging, including image quality and quality control in CT Scanners.

US:

Basic principle of U.S., various types of transducers, mechanism of image formations, various advancements including doppler and image artifacts.

Mammography-:

Principle, application, advantage in soft tissue radiography, physics, QA & QC.

MRI :

Basic principle of MRI, complete imaging equipment and various requirements, Basic principle of MRI, T1 and T2 Relaxation behaviours of tissues, T1,T2 and proton density images, spatial localization of images. Types of imaging sequences (spin echo, fast spin echo, flash, inversion recovery, gradient echo etc.. MR spectroscopy, principle and techniques, Contrast Agents in MRI, Image quality, Image artifacts and its compensaters , NMR hazard and safety. Advances in MRI.

Radionuclide scanning including thyroid up take measurement, rectilinear scanner, gamma camera, PET, SPECT, their principles, working, applications and advancements.

Digital Radiography including DSA, principles, working, applications and advancements.

Care and maintenance of radiological equipme

Part - II

Modern "Imaging Techniques "(Paper - I) 5295

Special Techniques of the following:

Radiographic techniques of whole upper limb & shoulder girdle

Radiographic techniques of whole lower limb and pelvic girdle

Radiographic techniques of whole vertebral column, skull, cranial bones and facial bones.

Dental radiography, intra oral, extra oral as well as occlusal radiography.

Radiographic technique of whole thorax including lungs, mediastinal, heart, Ribs, diaphragms, sternum (Complete respiratory system).

Radiographic technique for liver, pancreas, spleen, biliary system, GI tract and genito-urinary tract.

Radiographic techniques for obstetrics and gynaecology studies.

Radiographic techniques for C.N.S.

Radiographic techniques for cardio-vascular system

Radiographic techniques for lymphatic system.

Part - II.

Special investigations and techniques (paper - II) 5296

1. Soft tissue radiography
2. High KV techniques
3. Macro radiography
4. Mammography
5. Foreign body localization
6. Opeation theatre radiography
7. Trauma and ward radiography
8. Pediatric radiography
9. Special procedures: HSG, myelography, arthrography, DCG etc.
10. Interventional procedures: PTC, ERCP, PCN, FNAC; fluoroscopy/US/CT guided
11. Angiographic procedures:
    Vascular/non-vascular

12. Computed tomography, various imaging protocols and techniques
13. MRI - various imaging protocols and techniques
14. Physical aspects of ultra-sonography including doppler, color doppler, flow imaging, power doppler. Clinical applications of U.S. including use of contrast media in U.S.
15. Digital imaging, applications and advancements

Radiographic photography - Part II (Paper - III) 5297

Photographic Process: Radiographic film, Image processing, manual as well as automatic, Sensitometry, Intensifying screens, film /screen combinations/ Analyzing the image establishing image standards: Professional Imaging standards, The analytical proceess, Accetpance limts

Radiographic Quality; Density: Contrast, recorded detail, distortion

The art of film critique: implementing imaging standards, identifying an image problem, etc.

Quality management: Quality assurance and Quality Control

Comparing exposure systems:

Developing exposure charts

Fixed kilovoltage system

vaariable kilovoltage system

Other exposure systems

Automatic exposure controls

Exposure conversion problems

Planning of a processing room as well as of a radiology department

Day light processing system

Image recording devices, video recorder, multiformat camera, laser camera, dry camera etc. Photo flurography.

Special imaging processes; copying radiography, xero- radiography, subtraction technique etc.

LIST OF PRACTICALS FOR PART - I 5294

Radiological checks like:

- KVP accuracy
- Timer accuracy
- Optical radiation field congruence
- Beam alignment test
- Focal spot size
- Target angle
- Evaluation of total filteration
- Constancy of x-ray out put
- MA linearity
- Timer Linearity

Other checks

- Relative speed of screen
- Test on automatic processor
- Radiological Protection survey

Quality Control of CT

- CT no. calibration
- High contrast, low contrast resolution
- Accuracy of distance measuring device
- Accuracy of localization device
- Light Field accuracy
- Noise characteristics
- Radiation scatter and leakage
- KV_p waveform check etc.

EVALUATION OF DISSERTATION

The dissertation will be evaluated by the External / Internal Examiners at the time of viva voce examination and the marks allotted is 50 marks during the 2nd year examinations. The candidate will be asked to make presentation before the External / Internal Examiners.

The final dissertation duly approved by the External / Internal Examiners will be submitted to the Dean's office along with the result. The Dean's office will send the dissertation to the Library for record.

M.SC Part I

Theory	:	300marks
Clinical / practical, Viva Voce Examination	:	300marks
Internal assessment	:	100marks
Total marks		**700marks**

M.SC Part II

Theory	:	300marks
Clinical / practical, Viva Voce Examination	:	300marks
Internal assessment	:	100marks
Dissertation	:	100marks
Total marks		**800marks**

APPOINTMENT OF EXAMINERS

M. Sc Part I & II : One external examiner with Ph.D or MD Qualification

: Internal Examiner which can be Head of the department or Professor or Associate Professor, Assistant Professor.

COMPARTMENT

Candidates who fails only in one subject will be placed in the compartment provided he or she secures at least 50% marks in theory as well as in practical individually.

Such candidates will be given only two chances to clear the compartment examination which will be held every six months. The candidate placed in compartment will be required to appear both in theory & practical. If a candidates fails to appear in the supplementary examination for any reason it will be considered that he/she has availed a chance. However, the candidates who is placed in the compartment in Part I will be allowed to attend the classes of 2nd Year. The

candidates who is taking compartment examination of part I along with 2nd year examination, his /her result of Part II will be declared only if he/she passes part –I examination. In case he/she fails to clear the compartment examination in two subsequent attempts, he/she would deem to have failed & her name will be struck off from the rolls.

COMPARTMENT IN 2ND YEAR

A candidate of Part II also will be eligible to avail 2 chances to clear the compartment examination held every six months. However if he /she fails to clear the compartment examination, in two attempts, he/ she will be required to reappear in the whole examination of Part II.

FAILURE:

Candidates who fails in Part I or Part II examination will be given only two chances to clear the examinations & in case he/she fails to appear in the subsequent examinations it would be considered that he/she has availed a chance.

MODEL PAPER

M.Sc. MIT Part – I **BasicPhy 5291**

M.Sc. (MIT) Part – I (Main) Examination month year

Paper – I

Basic Physics

Time: Three Hours
Maximum Marks: 100

Attempt all Questions.

All the parts of one question should be answered at one place in sequential order.
Illustrate your answers with suitable diagrams, wherever necessary.

Q.1. Define Radioactivity, radioactive materials and isotopes [25]

Q.2. Describe about Discovery of X-rays production of x-rays and properties of x-rays. [25]

Q.3. (a) ADC & DAC philiplop encoder [$12^1/_2$]

(b) X-ray tube its design [$12^1/_2$]

Q.4. Short notes (Any 5 out of 7) [5x5=25]

a) Computers - Fundamental and applications
b) Transformers
c) X-ray circuits
d) Beam centering devices
e) Common tube faults.
f) X-ray tube its various types
g) Applications of logic circuits

MODEL PAPER

M.Sc. MIT Part – I **RadioPhy 5292**

M.Sc. (MIT) Part – I (Main) Examination month year

Paper – II

Radiation Physics

Time: Three Hours
Maximum Marks: 100

Attempt all Questions.

All the parts of one question should be answered at one place in sequential order.
Illustrate your answers with suitable diagrams, wherever necessary.

Q.1. Define Absorption of radiation and relative importance of different types of absorption. [25]

Q.2. Describe about Radiation Protection, Units and quantities, dose limits for personnel and public. [25]

Q.3. (a) Measurement techniques and protocols of radiation dosimetric systems. [12 1/2]

(b) Measuring instruments; Ionization chamber, proportional counter [12 1/2]

Q.4. Short notes (Any 5 out of 7) [5x5=25]

a) TLD calibration
b) Film dosimetery system
c) GM counter
d) Scientillation detectors
e) Quality Assurance of X-ray units
f) ALARA Principles
g) Energy transfer and energy absorption coefficient

MODEL PAPER

M.Sc. MIT Part – I **ModXrayImg 5293**

M.Sc. (MIT) Part – I (Main) Examination month year

Paper – III

Modern X-ray and Imaging Equipment

Time: Three Hours
Maximum Marks: 100

Attempt all Questions.

All the parts of one question should be answered at one place in sequential order.
Illustrate your answers with suitable diagrams, wherever necessary.

Q.1. Define MR spectroscopy, principle and techniques, Contrast Agents in MRI, Image quality [25]

Q.2. Describe Basic principle of U.S., various types of transducers, mechanism of image formations, various advancements including doppler and image artifacts. [25]

Q.3. (a) Care and maintenance of radiological equipments [$12^1/_2$]

(b) NMR hazard and safety [$12^1/_2$]

Q.4. Short notes (Any 5 out of 7) [5x5=25]

a) Contrast Agents in MRI
b) Tomography principle
c) Advancements in H.T. generators
d) Beam centering devices
e) Fluoroscopy and IITV systems
f) CT angiography Brain
g) Gamma camera

MODEL PAPER

M.Sc. MIT Part – II **ModImgTech 5295**

M.Sc. (MIT) Part – II (Main) Examination month year

Paper – I

Modern Imaging Techniques

Time: Three Hours
Maximum Marks: 100

Attempt all Questions.

All the parts of one question should be answered at one place in sequential order.
Illustrate your answers with suitable diagrams, wherever necessary.

Q.1. Define Radiographic techniques of skull, cranial bones and facial bones.[25]

Q.2. Describe about dental radiography, intra oral, extra oral and occlusal radiography.[25]

Q.3. (a) Radiographic techniques for cardio-vascular system [$12^1/_2$]

(b) Radiographic techniques for lymphatic system. [$12^1/_2$]

Q.4. Short notes (Any 5 out of 7) [5x5=25]

a) Radiographic techniques of shoulder girdle
b) Radiographic techniques of pelvic girdle
c) Radiographic techniques of whole vertebral column
d) Radiographc technique for liver
e) Radiographc technique for genito-urinary tract.
f) Radiographic techniques for C.N.S
g) Radiographc technique for thorax

MODEL PAPER

M.Sc. MIT Part – II **SpecInvTech 5296**

M.Sc. (MIT) Part – II (Main) Examination month year

Paper – II

Special investigations and techniques

Time: Three Hours
Maximum Marks: 100

Attempt all Questions.

All the parts of one question should be answered at one place in sequential order.
Illustrate your answers with suitable diagrams, wherever necessary.

Q.1. Define MRI various imaging protocols and techniques [25]

Q.2. Describe Physical aspects of ultrasonography including doppler, color doppler, flow imaging, power doppler. [25]

Q.3. (a) Special procedures of HSG and myelography [12 1/2]

(b) US & CT guided Interventional procedures [12 1/2]

Q.4. Short notes (Any 5 out of 7) [5x5=25]

a) Mammography
b) Macro radiography
c) Operation theatre radiography
d) Digital imaging, applications
e) CE Computed tomography techniques
f) CT angiography abdomen
g) IVP

MODEL PAPER

M.Sc. MIT Part – II **RadioPhoto 5297**

M.Sc. (MIT) Part – II (Main) Examination month year

Paper – III

Radiographic photography

Time: Three Hours
Maximum Marks: 100

Attempt all Questions.

All the parts of one question should be answered at one place in sequential order.
Illustrate your answers with suitable diagrams, wherever necessary.

Q.1. Describe about Special imaging processes copying radiography, xero- radiography, subtraction technique . [25]

Q.2. Describe Image recording devices, video recorder, multiformat camera, laser camera, dry camera. [25]

Q.3. (a) Planning of a processing room as well as of a radiology department [12 1/2]

(b) Radiographic Quality; Density; Contrast, recorded detail, distortion [12 1/2]

Q.4. Short notes (Any 5 out of 7) [5x5=25]

a) Automatic exposure controls
b) Sensitometry
c) Professional Imaging standards
d) manual and automatic radiography
e) Fluoroscopy and IITV systems
f) Developing exposure charts
g) Professional Imaging standards