SINGHANIA UNIVERSITY
(RAJASTHAN)

DETAILED SYLLABUS

Degree Program
(BRIT)

BACHELOR IN RADIO IMAGING TECHNOLOGY
**BRIT** : (BACHELOR IN RADIO IMAGING TECHNOLOGY)

**DURATION** : 3 YEAR  
**TOTAL CERTIFICATE MARKS** : 1800

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<th><strong>FIRST YEAR</strong></th>
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TOTAL 1800

**Note:**
Theory Paper: 30% Continuous Internal Assessment and 70 % University examinations.  
Practical Paper: 30% Continuous Internal Assessment and 70 % University examinations.
### SECOND YEAR

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**TOTAL** 1600

**Note:**
Theory Paper: 30% Continuous Internal Assessment and 70 % University examinations.
Practical Paper: 30% Continuous Internal Assessment and 70 % University examinations.
## THIRD YEAR

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**Note:**

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Practical Paper: 30% Continuous Internal Assessment and 70 % University examinations.
ANATOMY

Maximum Time : 3 hrs  
University Assessment -70%  
Total marks :200  
Internal Assessment – 30%

Minimum Pass Mark – 40%

COURSE CONTENTS – THEORY

1) Introduction of Bones of the Human Body of :
   - Upper Limb : clavicle, scapula, humerus, radius, ulna, carpus, metacarpus & phalanges
   - Lower Limb : hipbone, femur, tibia, fibula, tarsus, metatarsus & phalanges
   - Skull : name the bone of skull and sutures between them
   - Thorax : ribs and their articulations
   - Vertebral Column : Cervical, thoracic, lumber, sacral and coccyx vertebrae

2) Surface Markings of the Body :
   - Nine regions of the abdomen
   - Four quadrants of the Hip

3) Introduction of different Vital Organs :

   A) Respiratory Organs :
      - Nasopharynx
      - Oropharynx
      - Larynx
      - Trachea
      - Bronchi
      - Lungs (and their lobular segments)
      - Thoracic cavity
      - Pleura and Pleural cavity

   B) Circulatory Organs :
      - Anatomical position of the heart
      - Pericardium of the heart
      - Chambers of the heart
      - Great vessels of the heart
      - Valves of the heart
C) Digestive Organs:

- Tongue
- Teeth
- Oral cavity
- Pharynx
- Oesophagus
- Stomach
- Small intestine
- Large intestine

D) Joint and functions

PRACTICAL:

Labeled Diagrams of different organs and bones Viva
COURSE CONTENTS:

1. Cell:
   - Definition
   - Structure and functions the cytoplasmic Organelles
   - Reproduction: Miosis, Mitosis

2. The important physical-chemical laws applied to physiology
   - Diffusion
   - Osmosis
   - Bonding
   - Filtration
   - Dialysis
   - Surface Tension
   - Adsorption
   - Colloid

3. Fundamentals of different Organ Systems
   - Cardiovascular System
   - Respiratory System
   - Digestive System
   - Excretory System
   - Reproduction System
   - Endocrine System
   - Lymphatic System
   - Practical
   - Viva and diagrams of different Vital Organs

Practical:
Viva and diagrams of different Vital Organs
Viva
1) Pathology—

- Introduction
- State of Cell
- Inflammation
- Metabolism of cell and disorders
- Cause of disease
- Diseased state
- Degeneration

2) Immunity & Hypersensitivity

- Definition
- Immunity : Definition and Classification
- Antigen
- Antibodies – Immunoglobulin
- Antigen and antibody reaction
- Structure and function of immune system
- Immune response
- Hypersensitivity

3.) Principal & Procedure of Serological Tests.

- CRP, Brucella, Agglutination, ASO, WIDAL
- Cold agglutination, VDRL, TPHA

1. Human blood group antigens and antibodies

2. ABO Blood group systems
   - Sub. – group
   - Source of antigens and types of antibodies

3. Rh Blood group System
• Types of Antigen
• Mode of Inheritance
• Types of Antibodies

4. Erythroblastosis faetalis

5. Growth disorders and Heoplasia

• Neoplasia
• Tumouts
• Histopathology of diseases
BRIT – 140 GENERATION AND PROPERTIES OF X-RAY

Maximum Time : 3 hrs University Assessment -70%
Total marks :200 Internal Assessment – 30%

Minimum Pass Mark – 40%

COURSE CONTENTS :

INTRODUCTION :

- Properties and Production of X-Ray
- Electric system, components and Control in X-Ray.
- Basic X-Ray circuits transformers laws and types used in X-Ray machine. The rectification of high tension, control of kilo voltage, filament circuits ad tube current
- Exposure switches and relays timers and its radiographic application
- X-RAY tubes fixed and rotating anodes and faults in X-Ray tubes
- Image intensifier/Fluoroscopic equipment, dental radiographic equipments.
- High tension cable and circuits.
- Serial Radiography
- Tomography
- Iteration of X-ray and Scatter Radiation
- Care and maintenance of X-ray equipment and image intensifier and quality assurance.

Clinical Lab :

- X-ray tubes general features and mobile equipments
- To study effects of KV and MAS
BRIT—150  Radiation Hazards & Protection

Maximum Time : 3 hrs.  University Assessment – 70%
Total Marks : 200  Internal Assessment –30%
Minimum Pass Marks – 40%

COURSE CONTENTS :

1. Introduction of various Hazards
   - Ionization chamber, GM and Scintillation Counter
   - Measuring radiation dose
   - Absorption co-efficient, grid, cones and filter
   - Inverse square low scattered radiation radio activity, curie, half life, decay factor

2. Doses, film Badge, Pocket dosimeter and TLD.

3. Maximum permissible Dose

4. Principle and Method of Protection

5. Ten days rule, personal protection and shielding, Leakage Limits.

6. Radiation Risk Biological effects of Radiation

7. Protective Barrier Design.

8. Transport of Radiation materials


PRACTICAL

- Dark Room Procedure
- Equipments
- Developing technique
- Fixing technique
BRIT – 160  General Radiography

Maximum Time : 3 hrs  University Assessment -70%
Total marks :200  Internal Assessment – 30%

Minimum Pass Mark – 40%

COURSE CONTENTS :

1. Patents and role of General Radiographer
2. Regional Radiography :
   a) Upper Limb – (30 Hours)
      i. Fingers
      ii. Hand, Carpal Tunnel
      iii. Wrist Joint
      iv. Fore arm
      v. Elbow Joint
      vi. Head of Radius and Ulna
      vii. Humerus
      viii. Shoulder Joint
      ix. Acromio-calvicular joint
      x. Scapula
      xi. Sterno-clavicular joint

   b. Lower Limb – (20 Hours)
      i. Toes
      ii. Foot
      iii. Calcaneum
      iv. Intercondylar Notch
      v. Ankle Joint
      vi. Tibia and Fibula
      vii. Patella
      viii. Knee joint
      ix. Femur

   (c) Hip & Pelvis (20 Hrs)
      i. Theater Procedure for Hip Pinning & Reduction
      ii. Pelvis
      iii. Sacro Iliac Joint
iv. Pelvis Bone
v. Acetabulum
(d) Skull, Cranium, facial bones. temporal Boral bones, temporo- mandibular joins, mandible,

Para nasal Sinuses.

(e) Viertebral Column

- Cervical Spine
- Thoracic spine
- Lumber spine
- Sacrum
- Coccyx

(f) Chest
1. Lung fields and heart,
2. diaphragm,
3. Sternum

(g) Adomen
1. Gastro-intestinal tract, urinary tract

(h) Skeletal Survey,
   Photography

1. Developer, fixer, Rinser components.
4. Films and Screens.
5. Safe light test.
BRIT – 170

BASIC COMPUTER SKILLS

Maximum Time : 3 hrs
Total marks : 200
University Assessment -70%
Internal Assessment – 30%

Minimum Pass Mark – 40%

COURSE CONTENTS:

Fundamentals of Computers

Introduction:
Classification of computer & generation, Basic architecture of computer and its building blocks, input devices, Computer memories.

Number System:
Binary, Octal, Decimal, Hexadecimal representation of characters: ASCII and EBDIC codes, Binary arithmetic and logic circuit.

Classification of Computer language:
Machine, Assembly and High level language, Brief idea of operating system, Assembler, Compiler and interpreter.

Fundamentals of Computer Programming:
Problem solving through computer algorithms and flow chart level of programming.

Operating System:
Introduction to O.S., Types of operating system, Multiprogramming, Timesharing, Batch, Real time and UNIX

Internet:
Introduction to Internet, Components, Services and working on internet, introduction to protocols, tools.
COMMUNICATION SKILL

Maximum Time: 3 hrs
Total marks: 200

University Assessment - 70%
Internal Assessment - 30%

Minimum Pass Mark - 40%

COURSE CONTENTS:

**Unit 1:**
Introducing communication, importance & nature of business communication

**Unit 2:**
Process of business communication, objectives, media of business communication

**Unit 3:**
Types of communication, barriers in communications, principles of communication, essentials of goods communication

**Unit 4:**
Business report writing, written & oral presentation of reports, preparation of office orders, memo, circulars.
COURSE CONTENTS :

1. Reproductive Organs :
   • Male and Female gonads : Testes, Prostate, Epidiymis, Ovary, Fallopian Tubes, uterus, Vagina etc.
   • Introduction of male Genital organs
   • Introduction of female Genital organs
2. Liver and Spleen Pancrease: Gall Bladder
   • Introduction
   • Anatomical Position
3. Excretory Organs
   • Introduction of Kidney
   • Cortex and medulla of the Kidney
   • Ureter
   • Urinary Ladder
   • Urethra (male and female)
4. Muscles
   • Introduction
   • Origin and Insertion of muscles
   • Function

PRACTICAL :

Labeled diagrams of different organs and bones

Viva.
COURSE CONTENTS:

1. Blood
   - Introduction
   - Composition
   - Function
2. Formation of different type of Blood Cells
   - Erythrocytes
   - Leucocytes
   - Thrombocytes
3. Mechanism of Blood Clotting
4. Cerebrospinal Fluid:
   - Composition
   - Formation
   - Function
5. Special Senses
   - Hearing
   - Taste
   - Smell
   - Touch
   - Sight

PRACTICAL:

Diagram of Corpuscles

Viva
COURSE CONTENTS:

1. Special procedure and related contrast Media
   - Contrast media
   - Emergency in Radiology Department
   - Excretory System
   a) IVP
   b) RGU
   c) MCU
     - Oral Cholecystography
     - Percutaneous Transeptic Cholangiography
     - G.I. Tract
     a) Barium Swallow
     b) Barium Meal Series
     c) Barium meal Follow Through
     d) Barium Enema
       - Hystero Salpingography
       - Angiography

2. Guideline for design and location of X-Ray Room.

3. Dark Room designing
   - Outline structure of Dark Room
   - Material used
   - Miscellaneous

4. High K.V. Technique

5. Soft tissue Radiography

6. Air gap technique

7. Forensic Radiography

8. Foreign bodies Radiography

PRACTICAL:

1. Radiography in various position for all the special radiological procedures, using contrast media as per syllabus
2. Positioning and treatment of various cancer patients by using
   a) Prescribed filters and wedges
   b) Protecting various organs
BRIT -240  MAMMOGRAPHY AND ULTRASOUND IMAGING

Maximum Time : 3 hrs.  University Assessment – 70%
Total Marks : 200  Internal Assessment –30%

Minimum Pass Marks – 40%

COURSE CONTENTS :

- Mammography: Dedicated mammographic unit and its special features,
  Mammographic positioning and technical considerations, film screen
  mammography, digital mammography.
- Ultrasound
- Principle of Ultra Sound
- Types of Ultra Sound
- Equipments description
- Indication and Clinical Application The physics of ultrasound imaging
- The physics of transducers
- The physics of Doppler
- Ultrasound tissue characterization
- The potential for three dimensional ultrasound
- Artifacts in ultrasound
- Comparison of ultrasound equipment
- Computerization of data
- Image recording
- Safety of ultrasound
- Medical sonography : reproductive effects and risks
- Transvaginal ultrasonography
- Transvaginal Doppler duplex system
- Transvaginal color Doppler imaging
- The obstetric ultrasound examination
- Method of gynecologic ultrasound examination
- Assessment of normal fetal growth
- Fetal behavior states
- Fetal breathing movements
- Fetal activity
- Twins and twinning
- Fetal tumors
- Placenta and umbilical cord
• Role of ultrasound in the delivery suite
• Vaginal ultrasonography of the pregnant cervix
• Screening for ovarian cancer

PRACTICAL:

Applications of various procedures in well equipped Hospitals and Diagnostics Centers
BRIT —250

CT SCAN

Maximum Time : 3 hrs. University Assessment – 70%
Total Marks : 200 Internal Assessment – 30%
Minimum Pass Marks – 40%

COURSE CONTENTS :

C.T. Scan

Basic principle of CT scan
Equipment’s description
Conventional CT
Indications and Contra Indications

Computed Tomography

Scanning principle
Image reconstruction
Image display and documentation
Scanning parameters

Spiral CT

Scanning principle
Image reconstruction
Scanning parameters
Image review, display and documentation

PRACTICAL :

Applications of various procedures in well equipped Hospitals and Diagnostics Centers
BRIT —260  

MRI

Maximum Time : 3 hrs.  University Assessment – 70%
Total Marks : 200  Internal Assessment –30%
Minimum Pass Marks – 40%

COURSE CONTENTS :

MRI

- Basic Principle
- Equipment’s description
- Principles of magnetic resonance imaging
- Instrumentation
- Physical and physiological basis of magnetic relaxation
- Image contrast and noise
- Use of the inversion recovery pulse sequence
- Rapid scan techniques
- Fast spin-echo and echo-planar imaging
- Fast and water signal separation methods
- Spectroscopy
- Artifacts
- Flow phenomena
- Contrast agents
- Interventional magnetic resonance imaging
- Bioeffects and safety

PRACTICAL :

Applications of various procedures in well equipped Hospitals and Diagnostics Centers
ORGANIZATIONAL BEHAVIOUR

Maximum Time : 3 hrs.     University Assessment – 70%
Total Marks : 200               Internal Assessment –30%
Minimum Pass Marks – 40%

COURSE CONTENTS

UNIT 1 :
Meaning, Concepts, Challenges & O.B. Model individual difference & Learning Theories.
Job Satisfaction and Commitment, Personality and Behavior emotional intelligence.
UNIT 2 :
Perception and Attribution, Behavioral decision making, participating decision making,
Theories of Motivation
UNIT 3 :
Goal Setting, Benefits, Group Structure, Group decision making, Effective Team, Managing
Team, Processes and Issues, Theories and issues.
UNIT 4 :
Basis of Power, Conflict Process, Organizational Design, Nature & Dynamics, Managing
Change, Work Stress

Reference :
1. Udai Pareek, Understanding Organisational /Behaviour, Oxford
2. Mishra : Organizational Behaviour Bikas
3. Luthans, Fred : Organizational Behaviour
4. Mirza Saiyadain : Organizational Behaviour, TH
5. Chandan : Organizational Behaviour, Vikas
6. Helga Drummond : Organizational Behaviour, Oxford
7. Senge, Peter : The Learning Organization
8. Harriss & Martman : Organizational Behaviour, Jaico.
PERSONALITY DEVELOPMENT

Maximum Time : 3 hrs. University Assessment – 70%
Total Marks : 200 Internal Assessment – 30%

Minimum Pass Marks – 40%

COURSE CONTENTS :

Unit-I

Practical grammar basic fundamental of grammar and usage, how to improve command over spoken and written English with stress on Noun, Verb Tense and Adjective. Sentence errors, Punctuation, Vocabulary building to encourage the individual to communicate effective and diplomatically, common errors in business writing.

Unit-II

Introduction to Business Communication: Basic forms of communication, Process of communication, Principles of effective Business Communication, 7 Cs.

Media of Communication: Types of communication: Barriers of communication (Practical exercise in communication)

Unit-III


Unit-IV

Aids to correct Business writing, Practical Grammar (basic Fundamentals), Sentence errors—Punctuation, Vocabulary building.

Business Etiquettes

Business manners. Body language gestures, Etiquette of the written word, Etiquette of the telephone, Handling business meetings.

Role play on selected topics with case analysis and real life experiences
Text Books:
4. Rogets Thesaurus.

Reference Books:
COURSE CONTENTS:

History of Doppler & Echo Cardiography

1. Equipments and description
2. Color Doppler Flow Imaging
3. Indication
4. Preparation and Technique
5. Clinical Application
6. Artifacts of Doppler
7. Coupling agents and components.

PRACTICAL

Application of various procedures in well equipped Hospital and Diagnostic Centers
COURSE CONTENTS:

1. Advancement in CT
2. Spiral CT
3. Preparation of Patient
4. Contrast Media
5. Indication and Contraindication
6. Technical Aspects of various procedures in CT

2. Computed Tomography
   Scanning principle
   Image reconstruction
   Image display and documentation
   Scanning parameters

3. Spiral CT
   Scanning principle
   Image reconstruction
   Scanning parameters
   Image review, display and documentation
Multislice CT
Scanning principle
Detector types
System performance
Image reconstruction
Scanning parameters
Workflow, image review, display and documentation

Cardiac multislice CT
Prospective ECG Triggering
Retrospective ECG Gating

CT Fluoroscopy
Principle and Image Reconstruction
Technique
Radiation Safety

PRACTICAL

Application of various procedures in well equipped Hospital and Diagnostic Centers
COURSE CONTENTS:

Preparation of Patients

Contrast Media

Indication and Contraindication

Clinical Application

Procedure

MR Angiography

- Principles of magnetic resonance imaging
- Instrumentation
- Physical and physiological basis of magnetic relaxation
- Image contrast and noise
- Use of the inversion recovery pulse sequence
- Rapid scan techniques
- Fast spin-echo and echo-planar imaging
- Fast and water signal separation methods
- Spectroscopy
- Artifacts
- Flow phenomena
- Contrast agents
- Interventional magnetic resonance imaging
- Bioeffects and safety

PRACTICAL

Application of various procedures in well equipped Hospital and Diagnostic Centers
COURSE CONTENTS:

1. Nuclear Medicines, PET scan and Mammography
   
   A. Definition
   B. Characteristic of Radio Nuclide
   C. Commonly used Radio Nuclides
   D. Description of Equipments
   E. Indications
   F. Preparation and technique

2. Digital Radiography
3. Computer Radiography
4. PACS
COURSE CONTENTS:

1. Interventional Radiology

A. Definition
B. Indication
C. Clinical Application
D. Name of different type of Procedures and description
   1. MRI Angiography
   2. C.T. Angiography
   6. Radiofrequency Ablation
   7. Stereotactic Brain Biopsy.
COURSE CONTENTS:

1. Facilities regarding general Anesthesia in the X-ray Deptt.

2. Anaesthetic Problems associated with specific technique
   
   A. Vascular Studies
   
   B. Carotid Angiography
   
   C. Venography
   
   D. CT and NMR

3. Basic Patient care and safety in Radiographic imaging
   
   i. Care of Pts Belongings
   
   ii. Body mechanics
   
   iii. Moving and transferring Technique
   
   iv. Skin Care
   
   v. Departmental Safety

4. Infection control and institutional Safety

5. Professional issues in Radiologic technology
   
   i. Legal issue
   
   ii. Medical Records and Documentation
   
   iii. Professional ethics

6. Patient care during special Procedures.
   
   i. Angiography
   
   ii. Myelography
   
   iii. Computed Tomography
   
   iv. MRI
v. Urological Procedure
vi. Ultrasound
vii. PET-CT Scan
viii. Mammography or X-ray.
BRIT—370 PROJECT REPORT

Maximum Time : 3 hrs.  University Assessment – 70%
Total Marks : 200   Internal Assessment – 30%
Minimum Pass Marks – 40%

COURSE CONTENTS :
HUMAN RESOURCE

Maximum Time : 3 hrs.  University Assessment – 70%
Total Marks : 200  Internal Assessment – 30%
Minimum Pass Marks – 40%

COURSE CONTENTS :

Unit 1 :

Unit 2 :

Unit 3 :
Employee Welfare and Benefits, Industrial Relations and Trade Unions, Dispute Resolution and Grievances Management.

Suggested Reading :
1. C. B. Mamoria : Personal Management
SINGHANIA UNIVERSITY
(RAJASTHAN)

DETAILED SYLLABUS

Certificate Program
(CRIT)

CERTIFICATE IN RADIO IMAGING TECHNOLOGY

(YEARLY PROGRAMME)
COURSE TITLE : CRIT (CERTIFICATE IN RADIO IMAGING TECHNOLOGY)

DURATION : 1 YEAR
TOTAL CERTIFICATE MARKS : 1800

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TOTAL 1800

Note:
Theory Paper: 30% Continuous Internal Assessment and 70 % University examinations.
Practical Paper: 30% Continuous Internal Assessment and 70 % University examinations.
CRIT – 110

ANATOMY

Maximum Time : 3 hrs  
University Assessment -70%
Total marks :200  
Internal Assessment – 30%

Minimum Pass Mark – 40%

COURSE CONTENTS – THEORY

1) Introduction of Bones of the Human Body of :
   - Upper Limb : clavicle, scapula, humerus, radius, ulna, carpus, metacarpus & phalanges
   - Lower Limb : hipbone, femur, tibia, fibula, tarsus, metatarsus & phalanges
   - Skull : name the bone of skull and sutures between them
   - Thorax : ribs and their articulations
   - Vertebral Column : Cervical, thoracic, lumber, sacral and coccyx vertebrae

2) Surface Markings of the Body :
   - Nine regions of the abdomen
   - Four quadrants of the Hip

3) Introduction of different Vital Organs :

   A) Respiratory Organs :
      - Nasopharynx
      - Oropharynx
      - Larynx
      - Trachea
      - Bronchi
      - Lungs (and their lobular segments)
      - Thoracic cavity
      - Pleura and Pleural cavity

   B) Circulatory Organs :
      - Anatomical position of the heart
      - Pericardium of the heart
      - Chambers of the heart
      - Great vessels of the heart
      - Valves of the heart
C) Digestive Organs:

- Tongue
- Teeth
- Oral cavity
- Pharynx
- Oesophagus
- Stomach
- Small intestine
- Large intestine

D) Joints and functions

PRACTICAL:

Labeled Diagrams of different organs and bones Viva
COURSE CONTENTS:

1. Cell:
   - Definition
   - Structure and functions the cytoplasmic Organelles
   - Reproduction: Miosis, Mitosis

2. The important physical-chemical laws applied to physiology
   - Diffusion
   - Osmosis
   - Bonding
   - Filtration
   - Dialysis
   - Surface Tension
   - Adsorption
   - Colloid

3. Fundamentals of different Organ Systems
   - Cardiovascular System
   - Respiratory System
   - Digestive System
   - Excretory System
   - Reproduction System
   - Endocrine System
   - Lymphatic System
   - Practical
   - Viva and diagrams of different Vital Organs

Practical:
Viva and diagrams of different Vital Organs
Viva
BRIT – 130

PATHOLOGY

Maximum Time : 3 hrs            University Assessment -70%
Total marks :200         Internal Assessment – 30%

Minimum Pass Mark – 40%

COURSE CONTENTS –

1) Pathology—
   • Introduction
   • State of Cell
   • Inflammation
   • Metabolism of cell and disorders
   • Cause of disease
   • Diseased state
   • Degeneration

2) Immunity & Hypersensitivity
   • Definition
   • Immunity : Definition and Classification
   • Antigen
   • Antibodies – Immunoglobulin
   • Antigen and antibody reaction
   • Structure and function of immune system
   • Immune response
   • Hypersensitivity

3.) Principal & Procedure of Serological Tests.
   • CRP, Brucella, Agglutination, ASO, WIDAL
   • Cold agglutination, VDRL, TPHA

1. Human blood group antigens and antibodies

2. ABO Blood group systems
   • Sub. – group
   • Source of antigens and types of antibodies

3. Rh Blood group System
• Types of Antigen
• Mode of Inheritance
• Types of Antibodies

4. Erythroblastosis faetalis

5. Growth disorders and Heoplasia

• Neoplasia
• Tumouts
• Histopathology of diseases
CRIT – 140  GENERATION AND PROPERTIES OF X-RAY

Maximum Time : 3 hrs  University Assessment -70%
Total marks :200  Internal Assessment – 30%

Minimum Pass Mark – 40%

COURSE CONTENTS :

INTRODUCTION :

- Properties and Production of X-Ray
- Electric system, components and Control in X-Ray Circuit
- Basic X-Ray circuits transformers laws and types used in X-Ray machine. The rectification of high tension, control of kilo voltage, filament circuit ad tube current
- Exposure switches relays and timers and its radiographic application
- X-RAY tubes fixed and rotating anodes and faults in X-Ray tubes
- Image intensifier /Fluoroscopic equipment, dental radiographic equipments.
- Care and maintenance of X-ray equipment and image intensifier

Clinical Lab :

- X-ray tubes general features and mobile equipments
- To study effects of KV and MAS
CRIT – 150 Radiation Hazards & Protection

Maximum Time : 3 hrs University Assessment - 70%
Total marks : 200 Internal Assessment – 30%

Minimum Pass Mark – 40%

COURSE CONTENTS:

1. Introduction of various Hazards
   - Ionization chamber, GM and Scintillation Counter
   - Measuring radiation dose
   - Absorption co-efficient, grid, cones and filter
   - Inverse square low scattered radiation radio activity, curie, half life, decay factor

2. Doses, film Badge, Pocket dosimeter and TLD.

3. Maximum permissible Dose

4. Principle and Method of Protection

5. Ten days rule, personal protection and shielding, Leakage Limits.

6. Radiation Risk Biological effects of Radiation

7. Protective Barrier Design.

8. Transport of Radiation materials


PRACTICAL:

- Dark Room Procedure
- Equipments
• Developing Technique
• Fixing Technique

CRIT – 160  General Radiography

Maximum Time : 3 hrs  University Assessment -70%
Total marks :200  Internal Assessment – 30%

Minimum Pass Mark – 40%

COURSE CONTENTS :

1. Patents and role of General Radiographer
2. Regional Radiography :
   a) Upper Limb – (30 Hours)
      i.  Fingers
      ii. Hand, Carpal Tunnel
      iii. Wrist Joint
      iv. Fore arm
      v. Elbow Joint
      vi. Head of Radius and Ulna
      vii. Humerus
      viii. Soulder Joint
      ix. Acromio-calvicular joint
      x. Scapula
      xi. Sterno-clavicular joint
   b. Lower Limb – (20 Hours)
      i. Toes
      ii. Foot
      iii. Calcaneum
      iv. Intercondylar Notch
      v. Ankle Joint
vi. Tibia and Fibula
vii. Patella
viii. Knee joint
ix. Femur

(c) Hip& Pelvis (20 Hrs)

i. Theater Procedure for Hip Pinning & Reduction
ii. Pelvis
iii. Sacro Lilac Joint
iv. Pelvis Bone
v. Acetabulum
CRIT – 170  BASIC COMPUTER SKILLS

Maximum Time : 3 hrs  University Assessment -70%
Total marks :200  Internal Assessment – 30%

Minimum Pass Mark – 40%

COURSE CONTENTS:

**Fundamentals of Computers**

**Introduction :**
Classification of computer & generation, Basic architecture of computer and its building blocks, input devices, Computer memories.

**Number System :**
Binary, Octal, Decimal, Hexadecimal representation of characters : ASCII and EBDIC codes, Binary arithmetic and logic circuit.

**Classification of Computer language :**
Machine, Assembly and High level language, Brief idea of operating system, Assembler, Compiler and interpreter.

**Fundamentals of Computer Programming :**
Problem solving through computer algorithms and flow chart level of programming.

**Operating System :**
Introduction to O.S., Types of operating system, Multiprogramming, Timesharing, Batch, Real time and UNIX

**Internet :**
Introduction to Internet, Components, Services and working on internet, introduction to protocols, tools.
CRIT – 180

COMMUNICATION SKILL

Maximum Time : 3 hrs
Total marks : 200
University Assessment - 70%
Internal Assessment – 30%

Minimum Pass Mark – 40%

COURSE CONTENTS :

Unit 1: –
Introducing communication, importance & nature of business communication

Unit 2: –
Process of business communication, objectives, media of business communication

Unit 3: –
Types of communication, barriers in communications, principles of communication, essentials of goods communication

Unit 4: –
Business report writing, written & oral presentation of reports, preparation of office orders, memo, circulars.
SINGHANIA UNIVERSITY
RAJASTHAN
DETAILED SYLLABUS

(DRIT)
RADIO IMAGING TECHNOLOGY

(YEARLY PROGRAMM)
**COURSE TITLE**: DIPLOMA IN (RADIO IMAGING TECHNOLOGY)  
**DURATION**: 2 YEARS  
**TOTAL MARKS**: 1600

**FIRST YEAR:**

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**Note:**  
Theory Paper: 30% Continuous Internal Assessment and 70% University examination. Practical Paper: 30% Continuous Internal Assessment and 70% University examination.
### SECOND YEAR

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**Note:**

Theory Paper: 30% Continuous Internal Assessment and 70% University examination. Practical Paper: 30% Continuous Internal Assessment and 70% University examination.
ANATOMY

Maximum Time : 3 hrs.     University Assessment – 70%
Total Marks : 200          Internal Assessment – 30%
Minimum Pass Marks – 40%

COURSE CONTENTS :

1. Introduction of Bones of the Human body of :
   Upper limb, clavicle, scapula, humerus, radius, ulna, carpus, metacarpus and phalanges
   Lower Limb : hipbone, femur, tibia, fibula, tarsus, metatarus and phalanges Skull : nante
   the bones of skull and sutures between them
   Vertebral Column : cervical, thoracic, lumber, sacral and cocasial vertebrae

2. Surface Land Marks of the Human Body
   • Anterior land marks
   • Posterior land marks
   • Regions of Abdomen
   • Quadrants of Hip

3. Introduction of different Vital Organs :
   A. Respiratory Organs
      • Nasopharynx
      • Oropharynx
      • Larynx
      • Trachea
      • Bronchi
      • Lungs and their lobular segments
      • Thoracic cavity
      • Pleurae

   B. Circulatory Organs
      • Anatomical position of the heart
      • Pericardium
      • Chamber of the heart
      • Valves of the heart
      • Great vessels of the heart
C. Digestive Organs
   - Tongue
   - Teeth
   - Oral cavity
   - Pharynx
   - Oesophagus
   - Stomach
   - Small intestine
   - Large intestine

D. Joints and functions

PRACTICAL:

Labeled Diagrams of different organs and bones

Viva
COURSE CONTENTS:

1. Cell
   - Definition
   - Structure and functions the Cytoplasmic Organelles
   - Reproduction Meosis, Mitosis

2. The important physic-chemical laws applied to physiology
   - Diffusion
   - Osmosis
   - Bonding
   - Filtration
   - Dialysis
   - Surface Tension
   - Adsorption
   - Colloid

3. Fundamentals of different Organs Systems
   - Cardiovascular System
   - Respiratory system
   - Digestive system
   - Excretory system
   - Reproductive system
   - Endocrine system
   - Lymphatic system

PRACTICAL:

Diagram of different Vital Organs
Viva
PATHOLOGY

COURSE CONTENTS –

1) Pathology—

- Introduction
- State of Cell
- Inflammation
- Metabolism of cell and disorders
- Cause of disease
- Diseased state
- Degeneration

2) Immunity & Hypersensitivity

- Definition
- Immunity : Definition and Classification
- Antigen
- Antibodies – Immunoglobulin
- Antigen and antibody reaction
- Structure and function of immune system
- Immune response
- Hypersensitivity

3.) Principal & Procedure of Serological Tests.

- CRP, Brucella, Agglutination, ASO, Widal
- Cold agglutination, VDRL, TPHA

1. Human blood group antigens and antibodies

2. ABO Blood group systems
   - Sub. – group
   - Source of antigens and types of antibodies

3. Rh Blood group System
• Types of Antigen
• Mode of Inheritance
• Types of Antibodies

4. Erythroblastosis faetalis

5. Growth disorders and Heoplasia

• Neoplasia
• Tumouts
• Histopathology of diseases
DRIT—140  GENERATION AND PROPERTIES OF X-RAY

Maximum Time : 3 hrs.     University Assessment – 70%
Total Marks : 200               Internal Assessment – 30%
Minimum Pass Marks – 40%

COURSE CONTENTS :

INTRODUCTION:

- Properties and Production of X-Ray
- Electric system, Components and Control in X-Ray Circuit
- Basic X-Ray circuits transformers laws and types used in X-Ray machine. The rectification of high tension, control of kilo voltage, filament circuit ad tube current
- Exposure switches and relays timers and its radiographic application
- X-Ray tubes fixed and rotating anodes and faults in X-Ray tubes
- Image intensifier /fluoroscopic equipment, dental radiographic equipments
- Care and maintenance of X-Ray equipment and image intensifier

Clinical Lab :

- X-Ray tubes general features and mobile equipments.
- To study effects of KV and MAS
COURSE CONTENTS:

1. Introduction of various Hazards
   - Ionization chamber, GM and Scintillation Counter
   - Measuring radiation dose
   - Absorption co-efficient, grid, cones and filter
   - Inverse square low scattered radiation radio activity, curie, half life, decay factor

2. Doses, film Badge, Pocket Ionization chamber

   Maximum permissible Dose

3. Principle and Method of Protection

PRACTICAL

- Dark Room Procedure
- Equipments
- Developing technique
- Fixing technique
General Radiography

Maximum Time: 3 hrs. University Assessment – 70%
Total Marks: 200 Internal Assessment – 30%
Minimum Pass Marks – 40%

COURSE CONTENTS:

1. Patents and role of General Radiographer
2. Regional Radiography:
   a) Upper Limb – (30 Hours)
      i. Fingers
      ii. Hand, Carpal Tunnel
      iii. Wrist Joint
      iv. Fore arm
      v. Elbow Joint
      vi. Head of Radius and Ulna
      vii. Humerus
      viii. Soulder joint
      ix. Acromio-calvicular joint
      x. Scapula
      xi. Sterno – Clavicular joint
   b) Lower Limb – (20 hours)
      i. Toes
      ii. Foot
      iii. Calcaneum
      iv. Intercondylar Notch
      v. Ankle Joint
      vi. Tibia and Fibula
      vii. Patella
      viii. Knee Joint
      ix. Femur
   c) Hip and Pelvis (20 Hours)
      i. Theatre procedure for Hip Pinning and Reduction
      ii. Pelvis
      iii. Sacro iliac Joint
      iv. Pelvis Bone
      v. Acetabulum
BASIC COMPUTER SKILL

Maximum Time : 3 hrs.     University Assessment – 70%
Total Marks : 200           Internal Assessment – 30%
Minimum Pass Marks – 40%

COURSE CONTENTS :

Fundamentals of Computers

Introduction :
Classification of computer & generation, Basic architecture of computer and its building blocks, input devices, Computer memories.

Number System :
Binary, Octal, Decimal, Hexadecimal representation of characters : ASCII and EBDIC codes, Binary arithmetic and logic circuit.

Classification of Computer language :
Machine, Assembly and High level language, Brief idea of operating system, Assembler, Compiler and interpreter.

Fundamentals of Computer Programming :
Problem solving through computer algorithms and flow chart level of programming.

Operating System :
Introduction to O.S., Types of operating system, Multiprogramming, Timesharing, Batch, Real time and UNIX

Internet :
Introduction to Internet, Components, Services and working on internet, introduction to protocols, tools.
COMMUNICATION SKILL

Maximum Time : 3 hrs.                University Assessment – 70%
Total Marks : 200                    Internal Assessment –30%

Minimum Pass Marks – 40%

COURSE CONTENTS :

Unit 1: –
Introducing communication, importance & nature of business communication

Unit 2: –
Process of business communication, objectives, media of business communication

Unit 3: –
Types of communication, barriers in communications, principles of communication, essentials of goods communication

Unit 4: –
Business report writing, written & oral presentation of reports, preparation of office orders, memo, circulars.
Maximum Time : 3 hrs.     University Assessment – 70%
Total Marks : 200               Internal Assessment –30%
Minimum Pass Marks – 40%

COURSE CONTENTS :

* Introduction of difference Vital Organs

1. Reproductive Organs (In Brief):
   - Male and Female gonads : Testes, Prostate, Epidiymis, Ovary, Fallopian
     Tubes, uterus Vagina etc
   - Introduction of male Genital organs
   - Introduction of female Genital organs
2. Liver and Spleen : Ball Gladder
   - Introduction
   - Anatomical Position
3. Gall Bladder
   - Introduction & Anatomical Position
4. Excretory Organs
   - Introduction of Kidney
   - Cortex and medulla of the Kidney
   - Ureter
   - Urinary Ladder
   - Urethra (male and female)

PRACTICAL :

Labeled diagrams of different organs and bones

Viva.
PHYSIOLOGY

Maximum Time : 3 hrs.       University Assessment – 70%
Total Marks : 200            Internal Assessment – 30%
Minimum Pass Marks – 40%

COURSE CONTENTS:

Introduction of various systems:

1. Blood
   • Introduction
   • Composition
   • Function
2. Formation of different type of Blood Cells
   • Erythrocytes
   • Leucocytes
   • Thrombocytes
3. Mechanism of Blood Clotting
4. Cerebrospinal Fluid:
   • Composition
   • Formation
   • Function
5. Specials Senses (Introduction)
   • Hearing
   • Taste
   • Smell
   • Touch
   • Sight

PRACTICAL:

Diagram of Corpuscles

Viva
GENERAL RADIOGRAPHY

Maximum Time : 3 hrs.     University Assessment – 70%
Total Marks : 200               Internal Assessment – 30%
Minimum Pass Marks – 40%

COURSE CONTENTS :

1. Special procedure and related contrast Media
   • Contrast media
   • Emergency in Radiology Department
   • Excretory System
   a) IVP
   b) RGU
   c) MCUG
      • Oral Cholecystography
      • Percutaneous Transepatic Cholangiography
      • G.I. Tract
   a) Braium Swallow
   b) Barium Meal Series
   c) Barium meal Follow Through
   d) Barium Enema
      • Hystero Salpingography
      • Angiography
      • Tomography

2. Guideline for design and location of X-Ray equipments

3. Dark Room designing
   • Outline structure of Dark Room
   • Material used
   • Miscellaneous

PRACTICAL :

1. Radiography in various position for all the special radiological procedures, using contrast media as per syllabus

2. Positioning and treatment of various cancer patients by using
   a) Prescribed filters and wedges
   b) Protecting various organs
DRIT-240  MAMMOGRAPHY AND ULTRASOUND IMAGING

Maximum Time : 3 hrs.     University Assessment – 70%
Total Marks : 200     Internal Assessment –30%

Minimum Pass Marks – 40%

COURSE CONTENTS :

1. Mammography: Dedicated mammographic unit and its special features, Mammographic positioning and technical considerations, film screen mammography, digital mammography.

2. UltraSound
   • Principle of Ultra Sound
   • Types of Ultra Sound
   • Equipments description
   • Indication and Clinical Application
   • The physics of ultrasound imaging
   • The physics of transducers
   • The physics of Doppler
   • Ultrasound tissue characterization
   • The potential for three dimensional ultrasound
   • Artifacts in ultrasound
   • Comparison of ultrasound equipment
   • Computerization of data
   • Image recording
   • Safety of ultrasound
   • Medical sonography : reproductive effects and risks
   • Transvaginal ultrasonography
   • Transvaginal Doppler duplex system
   • Transvaginal color Doppler imaging
   • The obstetric ultrasound examination
   • Method of gynecologic ultrasound examination
   • Assessment of normal fetal growth
   • Fetal behavior states
   • Fetal breathing movements
   • Fetal activity
   • Twins and twinning
• Fetal tumors
• Placenta and umbilical cord
• Role of ultrasound in the delivery suite
• Vaginal ultrasonography of the pregnant cervix
• Screening for ovarian cancer
• Transducer
• Image Display
• Types of transducer
• Patient Preparation

PRACTICAL:

Applications of various procedures in well equipped Hospitals and Diagnostics Centers
DRIT—250  

CT SCAN

Maximum Time : 3 hrs.  University Assessment – 70%
Total Marks : 200                Internal Assessment – 30%
Minimum Pass Marks – 40%

COURSE CONTENTS :

1  C.T. Scan
   Basic principle of CT scan
   Equipment’s description
   Conventional CT
   Indications and Contra Indications

2  Computed Tomography
   Scanning principle
   Image reconstruction
   Image display and documentation
   Scanning parameters

3  Spiral CT
   Scanning principle
   Image reconstruction
   Scanning parameters
   Image review, display and documentation

   Multislice CT
   Scanning principle
   Detector types
   System performance
   Image reconstruction
   Scanning parameters
   Workflow, image review, display and documentation
   Radiation Safety
PRACTICAL:

Applications of various procedures in well-equipped Hospitals and Diagnostics Centers

DRIT—260

MRI

Maximum Time: 3 hrs.  University Assessment – 70%
Total Marks: 200  Internal Assessment – 30%
Minimum Pass Marks – 40%

COURSE CONTENTS:

MRI

- History of MRI
- Magnetism
- Artefacts in MRI
- Patient preparation
- Contrast used in MRI
- Basic Principle
- Equipment’s description Principles of magnetic resonance imaging
- Instrumentation
- Physical and physiological basis of magnetic relaxation
- Image contrast and noise
- Use of the inversion recovery pulse sequence
- Rapid scan techniques
- Fast spin-echo and echo-planar imaging
- Fast and water signal separation methods
- Spectroscopy
- Artifacts
- Flow phenomena
- Contrast agents
- Interventional magnetic resonance imaging
• Bioeffects and safety
• MRI Breasts, liver, Adrenal gland, kidney, Urinary bladder, Knee, Brain, Slaviery gland, Spine
• History of MRI

PRACTICAL:

Applications of various procedures in well equipped Hospitals and Diagnostics Centers
ORGANIZATIONAL BEHAVIOUR

COURSE CONTENTS:

Organisational Behaviour

UNIT 1:
Meaning, Concepts, Challenges & O.B. Model, individual difference & Learning Theories.
Job Satisfaction and Commitment, Personality and Behavior, emotional intelligence.

UNIT 2:
Perception and Attribution, Behavioral decision making, participating decision making,
Theories of Motivation

UNIT 3:
Goal Setting, Benefits, Group Structure, Group decision making, Effective Team, Managing Team, Processes and Issues, Theories and issues.

UNIT 4:

Reference:
1. Udai Pareek, Understanding Organisational Behaviour, Oxford
2. Mishra : Organizational Behaviour Bikas
3. Luthans, Fred : Organizational Behaviour
4. Mirza Saiyadain : Organizational Behaviour, TH
PERSONALITY DEVELOPMENT

Maximum Time : 3 hrs.                   University Assessment – 70%
Total Marks : 200                      Internal Assessment – 30%
Minimum Pass Marks – 40%

COURSE CONTENTS

Unit-I
Practical grammar basic fundamental of grammar and usage, how to improve command over spoken and written English with stress on Noun, Verb Tense and Adjective. Sentence errors, Punctuation, Vocabulary building to encourage the individual to communicate effective and diplomatically, common errors in business writing.

Unit-II
Introduction to Business Communication: Basic forms of communication, Process of communication, Principles of effective Business Communication, 7 Cs.
Media of Communication: Types of communication: Barriers of communication (Practical exercise in communication)

Unit-III
Business letter writing: Need, Functions and Kinds. Layout of letter writing. Types of letter writing:
Persuasive letters, Request letters, Sales letters, Complaints and Adjustments.

Departmental Communication: Meaning, Need and types: Interview letters, Promotion Letters,
resignation letters, news letters, Circulars, Agenda, Notice, Office memorandums, Office orders, Press
release.

Unit-IV
Aids to correct Business writing. Practical Grammar (basic Fundamentals), Sentence
errors-Punctuation, Vocabulary building.

Text Books:
4. Rogets Thesaurus.

Reference Books:
   Publishing House.
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