Annexure - 15

PERIYAR UNIVERSITY

SALEM – 636 011.

PERIYAR INSTITUTE OF DISTANCE EDUCATION

[PRIDE]

DIPLOMA IN RADIO IMAGE TECHNOLOGY (2Years)

SYLLABUS / REGULATIONS

[Candidates admitted from 2007-2008 onwards]

Diploma in Radio Image Technology

Mode: Through Distance Education and as an off – campus Programme

Eligibility: A Pass in the plus 2 examination Preference will be given to those who have chosen Science subjects.

Duration: Two Year under Non – Semesters Pattern

Medium of Introduction: English Only

Course of Study:

First Year

Paper – 01 Biomaterials

Paper – 02 Biomedical Instrumentation – I

Paper – 03 Practical - I

Second Year

Paper – 04 Biomedical Instrumentation - II

Paper – 05 Radiation Physics

Paper – 06 Practical - II

Scheme of Examinations:	**Duration**	**Max. Marks**
1. Biomaterials	3 hrs	100
2. Biomedical Instrumentation – I	3 hrs	100
3. Practical - I	3 hrs	100
4. Biomedical Instrumentation -II	3 hrs	100
5. Radiation Physics	3 hrs	100
6. Practical - II	3 hrs	100

Classification of successful candidates, Candidates who obtain 75% of marks, and above in aggregate will be placed in First class with Distinction.

Candidates who secure not less than 60% of the aggregate will be placed in First Class. Candidates who secure between 50% and 59% in aggregate will be placed in second class. Candidates who secure less than 40% and 49% in aggregate will be placed in Third Class.

Question Paper Pattern with out Practical

Time: 3 Hours **Max. Marks:100**

Section – A: 5x8 = 40 Marks

Answer any five Questions

Each answer not to exceed 2 pages.

Section – B: 6x10: 60 Marks

Answer all Questions

Each answer not to exceed 4 pages.

PAPER – I: BIO MATERIALS

UNIT – I

Carbohydrates: Monosaccharide – definition – classification, structure, properties and biological significance Polysaccharides – Types and bilogical importance.

UNIT - II

Vitamins classification, occurrence, deficiency symptoms, biochemical functions of fat soluble and water soluble vitamins

UNIT - III

Basic rules of a Microbiology laboratory - Basic requirement of Microbiology laboratory – Basic Principles, operating mechanism and application of autoclave, hot air oven, laminar air flow and pH meter.

UNIT - IV

Biotechnology – definition and history Enzyme biotechnology – Enzyme production from microbes, applications – Enzyme immobilization.

UNIT - V

NMR Spectroscopy: Principle – Theory and Experiment, MR parameters, Nuclear over Hauser effect NMR application in chemistry, Bio chemistry and Bio physics – NMR in medicine molecular modeling optimizing the model.

Books of Study:

1. Jain J.L. (2003) Fundamentals of Biochemistry S. Chand and Company Ltd, New Delhi.
2. Satyanarayana. U (2005) Essentials of Biochemistry, Books and Allied (P) Ltd, Kolkata.
3. Veerakumari. L (2005) Biochemistry MJP Publications, A unit of Tamilnadu Book House, Chennai.
4. Satyanarayana. U (2005) Biotechnology 1st Edition, Books and Allied (P) Ltd, Kolkata.

5. Prakash. M and Arora C.K. Laboratory instrumentation Anmol Publication Pvt, Ltd.

6. Vasanta patlabhi and N. Gautham – Biophysics Reprint 2004, Narasa Publiship House, 35-36 Greams Road, Thousand Lights, Chennai.

PAPER – II: BIOMEDICAL INSTRUMENTATION - I

UNIT – I

TRANSDUCERS:

Transducers & transudation principles – Active principles – piezoelectric effect –n Thermoelectric effect – Photoelectric effect – Passive transducers – Passive transducers using inductive, capacitive, active circuits elements – Transducers for biomedical applications.

UNIT – II

BIOELECTRIC POTENTIALS

Sources of bioelectric potentials- Resting and acting potentials – Propagation of action potentials – Bioelectric potentials

UNIT – III

ELECTRODES:

The Electrocardiogram (ECG) – The Electroencephalogram (EEG) – The Electroencephalogram (EMG) – Electrodes – Electrode theory - Biochemical electrodes – Biochemical transducers.

UNIT – IV

CARDIOVASCULAR MEASUREMENTS:

Blood Pressure- Characteristics of blood flow – heart sounds – Electrocardiography – ECG amplifiers – electrodes & leads ECG recorder principles – Measurement of blood flow and cardiac output – Measurement of heart sound – Pacemakers systems – Pacing modes and pulse generators – Power sources of electromagnetic interference.

UNIT – V

BIO SENSORS:

Sensors – Principles – applications – Biosensors – Example – applications.

References:

1. Biomedical Instrumentation Dr. M. Arumugam

Paper – III: Practical – I

1. Blood Grouping
2. Blood Pressure Measurement
3. Blood Analysis: Sugar, Urea, Uric acid, Creatinine, Protein, Cholesterol
4. Estimation of Hemoglobin in Blood
5. Determination RBC, WBC, ESR, PCV
6. Urinary Calculai Analysis
7. LILID PROFILE

PAPER – IV: BIO MEDICAL INSTRUMENTATION - II

UNIT – I

RESPIRATORY SYSTEM:

Tests & Instrumentation for the mechanics of breathing – Lung volumes & capacities – Measurement of gaseous exchanges & diffusion – Ventilator & respirator – Measurement of systemic body temperature – Thermograph – Skin temperature measurements.

UNIT - II

ULTRASONIC IMAGING:

Ultrasonic imaging – Ultrasonic diagnosis – Ultrasonic transducers – Echoencephalography – Ophthalmic scans – Ultrasonic imaging – Neuronal firing measurements – electromyography measurements

UNIT – III

SCANNERS:

Biomedical application – Computer analysis of the Electrocardiogram – Computerized axial tomography (CAT) scanners.

UNIT – IV

MAGNETIC IMAGING:

Magnetic Imaging Principles – Theory – Magnetic Variance imaging.

UNIT – V

Electrophoreses:

Basic Principles and their application - Agarose gel electrophoreses – SDS PAGE – Blotting – southern and western – Auto radiography

Books for study:

1. Leslic Cromwell, Fred J.Weibell, Erich A. Pfeiffer – Biomedical Instrumentation & Measurements – Second Edition (Pearson Education)
2. Asokan P (2001) Analytical Biochemistry. 1st edition, 2nd reprint china publishers, Vellore, Tamilnadu.

PAPER – V: RADIATION PHYSICS

UNIT – I

Biological effects of radiation – Structure of the cell - Radiation effects on cells – Biological effects – Lethal dose – Radiation sickness – Stochastic and non stochastic effect. Radiation units and operational limits – Activity – Exposure – Dose – Dose Equivalent – Dose rate – Operational limits – Dose equivalent limit.

UNIT – II

Interaction of changed particles with mater – Heavy charged particles – Electrons – Absorption of gamma rays by matter – Photoelectric effect – Compton scattering and pair production – Detectors of radiation – Solid state counter – G.M. counter – Nuclear emulsion plates – Scintillation counter.

UNIT - III

Industrial and Analytical applications – Tracing, Gauging, Material modification, Sterilization – Food preservation and other applications, Radiation protection and safety – Area monitoring – Gun monitoring – Mini Rad Survey meter - Radiation survey meter – Personal monitoring – Film badge dosimeter – Pocket dosimeter – Control of radiation hazards – Distance and time shielding – Shielding thickness calculations.

UNIT - IV

Diagnostic imaging and application to Radiation therapy – Radio isotopes used for Brach therapy – Digital Radiography – Digital X-ray detectors, digital subtraction angiography

UNIT – V

Computed tomography – Nuclear medicine – Properties of radioactive pharmaceuticals – Nuclear medicine imaging – Positron emission Tomography.

Books for Study.

1. Baldev Raj and B.Venkataraman, (2004), Practical Radiography – Narosa Publishing House.
2. William R. Herndee, Geoffrey S. Ibbott and Eric G. Hendee, Radiation Theray Physics. 3rd Edition, john Wiley & sons, INC., Publication.
3. John R.Lamarsh. (1992), Introduction to nuclear Reactor Theory, 2nd edition, Addision Wesley Publishing Co,
4. Paul F.Zweifel, (1973), Reactor Physics, McGraw Hill Book Company, India.

Books for Reference:

1. R.S. Khandpur, (2003) Hand book of Biomedical Instrumentation, 2nd Edition, Tata McGraw – Hill publishing Co.
2. Meridith,(1992), Radiation Physics, 3rd Edition, Varghese Publishing House, New Delhi.
3. Richard Stephenson,(1974), Introduction to Nuclear Engineering, McGraw Hill Book Company, New York.
4. Suresh Gard, Feroz Ahmed and L.S. Kothari, McGraw Hill Book Company, London.

Paper – VI: Practical – II

1. Urine Analysis: Sugar, albumin, Globulin
2. X – ray Measurement
3. Measurement of ECG
4. Measurement of EEG
5. MRI Image Analysis
6. Sequence analysis using

   Bioinformatics software