

**BHARATHIAR UNIVERSITY, COIMBATORE-641 046**

**B.Sc. PHYSICS DEGREE COURSE (Colleges)**

**REVISED SCHEME OF EXAMINATIONS (CBCS PATTERN)**

**(For the students admitted from the academic year 2016-2017 and onwards)**

| Part                | Study Components  | Course Title | Ins. hrs / Week | Examinations |     |       | Credit |             |
|---------------------|---|--------------|-----------------|--------------|-----|-------|--------|-------------|
|                     |   |              |                 | Dur.Hr       | CIA | Marks |        | Total Marks |
| <b>Semester I</b>   |   |              |                 |              |     |       |        |             |
| I                   | Language-I  |              | 6               | 3            | 25  | 75    | 100    | 4           |
| II                  | English-I   |              | 6               | 3            | 25  | 75    | 100    | 4           |
| III                 | Core I – Mechanics, Properties of Matter and Sound  |              | 6               | 3            | 25  | 75    | 100    | 4           |
| III                 | Practical I   |              | 3               | -            | -   | -     | -      | -           |
| III                 | Allied A - Mathematical Paper I * (or)<br>Chemistry Theory I **   |              | 7               | 3            | 25  | 75    | 100    | 4           |
|                     |   |              | 4               | 3            | 20  | 55    | 75     | 3           |
| III                 | Allied Practical**  |              | 3               | -            | -   | -     | -      | -           |
| IV                  | Environmental Studies #   |              | 2               | 3            | -   | 50    | 50     | 2           |
| <b>Semester II</b>  |   |              |                 |              |     |       |        |             |
| I                   | Language-II   |              | 6               | 3            | 25  | 75    | 100    | 4           |
| II                  | English-II  |              | 6               | 3            | 25  | 75    | 100    | 4           |
| III                 | Core II – Heat and Thermo Dynamics  |              | 6               | 3            | 25  | 75    | 100    | 4           |
| III                 | Practical I   |              | 3               | 3            | 40  | 60    | 100    | 4           |
| III                 | Allied A - Mathematical Paper II * (or)<br>Chemistry Theory II **   |              | 7               | 3            | 25  | 75    | 100    | 4           |
|                     |   |              | 4               | 3            | 20  | 55    | 75     | 3           |
| III                 | Allied Practical**  |              | 3               | 3            | 20  | 30    | 50     | 2           |
| IV                  | Value Education - Human Rights #  |              | 2               | 3            | -   | 50    | 50     | 2           |
| <b>Semester III</b> |   |              |                 |              |     |       |        |             |
| I                   | Language-III  |              | 6               | 3            | 25  | 75    | 100    | 4           |
| II                  | English-III   |              | 6               | 3            | 25  | 75    | 100    | 4           |
| III                 | Core III – Optics   |              | 4               | 3            | 25  | 75    | 100    | 4           |
| III                 | Practical II  |              | 2               | -            | -   | -     | -      | -           |
| III                 | Allied B - Mathematical Paper I * (or)<br>Chemistry Theory I **   |              | 7               | 3            | 25  | 75    | 100    | 4           |
|                     |   |              | 4               | 3            | 20  | 55    | 75     | 3           |
| III                 | Allied Practical**  |              | 3               | -            | -   | -     | -      | -           |
| IV                  | Skill Based Subject – Instrumentation I   |              | 3               | 3            | 20  | 55    | 75     | 3           |
| IV                  | Tamil @ / Advanced Tamil# (OR)<br>Non-major elective - I (Yoga for Human Excellence)#<br>/ Women's Rights # |              | 2               | 3            | 50  |       | 50     | 2           |
| <b>Semester IV</b>  |   |              |                 |              |     |       |        |             |
| I                   | Language-IV   |              | 6               | 3            | 25  | 75    | 100    | 4           |
| II                  | English-IV  |              | 6               | 3            | 25  | 75    | 100    | 4           |
| III                 | Core IV – Atomic Physics and Spectroscopy   |              | 4               | 3            | 25  | 75    | 100    | 4           |
| II                  | Practical II  |              | 2               | 3            | 40  | 60    | 100    | 4           |
| III                 | Allied A - Mathematical Paper II * (or)   |              | 7               | 3            | 25  | 75    | 100    | 4           |

| Part | Study Components | Course Title   | Ins. Hr / week | Examinations |     |       | Credit |     |
|------|------------------|--|----------------|--------------|-----|-------|--------|-----|
|      |                  |  |                | Dur Hrs      | CIA | Marks |        |     |
| III  |                  | Chemistry Theory II **   | 4              | 3            | 20  | 55    | 75     | 3   |
| III  |                  | Allied Practical**   | 3              | 3            | 20  | 30    | 50     | 2   |
| IV   |                  | Skill based Subject - Instrumentation II                                       | 3              | 3            | 20  | 55    | 75     | 3   |
| IV   |                  | Tamil @ /Advanced Tamil # (OR)<br>Non-major elective -II (General Awareness #) | 2              | 3            |     | 50    | 50     | 2   |
|      |                  | <b>Semester V</b>  |                |              |     |       |        |     |
| III  |                  | Core V – Mathematical Physics  | 4              | 3            | 25  | 75    | 100    | 4   |
| III  |                  | Core VI – Electronics  | 4              | 3            | 25  | 75    | 100    | 4   |
| III  |                  | Core VII – Solid State Physics   | 4              | 3            | 25  | 75    | 100    | 4   |
| III  |                  | Core VIII – Electricity and Magnetism  | 4              | 3            | 25  | 75    | 100    | 4   |
| III  |                  | Practical III - Electronics Alone  | 2              | -            | -   | -     | -      | -   |
| III  |                  | Practical IV - Digital and Micro Processor                                     | 2              | -            | -   | -     | -      | -   |
| III  |                  | Elective –I  | 4              | 3            | 25  | 75    | 100    | 4   |
|      |                  | Practical - C and C++  | 3              | -            | -   | -     | -      | -   |
| IV   |                  | Skill based Subject - Instrumentation III                                      | 3              | 3            | 20  | 55    | 75     | 3   |
|      |                  | <b>Semester VI</b>   |                |              |     |       |        |     |
| III  |                  | Core IX – Quantum Mechanics and Relativity                                     | 6              | 3            | 25  | 75    | 100    | 4   |
| III  |                  | Core X - Nuclear Physics   | 5              | 3            | 25  | 75    | 100    | 4   |
| III  |                  | Practical III - Electronics Alone  | 2              | 3            | 30  | 45    | 75     | 3   |
|      |                  | Practical IV - Digital and Micro Processor                                     | 2              | 3            | 30  | 45    | 75     | 3   |
| III  |                  | Elective –II   | 4              | 3            | 25  | 75    | 100    | 4   |
| III  |                  | Elective –III  | 5              | 3            | 25  | 75    | 100    | 4   |
| III  |                  | Practical V - C and C++  | 3              | 3            | 40  | 60    | 100    | 4   |
| IV   |                  | Skill based Subjects Practical -Instrumentation                                | 3              | 3            | 30  | 45    | 75     | 3   |
| V    |                  | Extension Activities @   | -              | -            | -   | -     | 50     | 2   |
|      |                  | <b>Total</b>   |                |              |     |       | 3500   | 140 |

\* For subjects without practical \*\* For subjects with Practical

@ No University Examinations. Only Continuous Internal Assessment (CIA)

# No Continuous Internal Assessment (CIA). Only University Examinations.

| List of Elective papers (Colleges can choose any one of the paper as electives) |   |  |
|---|---|--|
| Elective – I  | A | Principles of Programming Concepts and C Programming |
|   | B | Energy Physics                                       |
|   | C | Agricultural Physics                                 |
| Elective – II   | A | Micro Processors                                     |
|   | B | Optical Fibers and Fiber Optic Communication Systems |
|   | C | Bio-Physics  |
| Elective - III  | A | Object Oriented Programming with C++                 |
|   | B | Geo Physics  |

**Note:** The syllabus for the above papers (except skill based subjects I, II, III and Practical) be the same as prescribed by the modified scheme of examination for the academic year 2016-17. The syllabus for the semester III – skill based subject – Instrumentation – I, Semester IV – Skill based subject Instrumentation II , Semester V skill based subject Instrumentation III and Skill based subject practical are furnished below.

**\*\* This modification is also applicable to the students admitted in the academic year 2015-16 for their V and VI semesters only.**

**SEMESTER – III**  
**SKILL BASED SUBJECT -INSTRUMENTATION I**

**No. of Credit Hours: 3 Hours**

**Subject Description**

To study the instrument with its principle and observe the method their functioning

**Goal and objectives**

To provide a good foundation in measurements

To provide a knowledge of the behaviour of instruments

To inspire interest for the knowledge of concepts regarding measurements

**UNIT 1**

**(9 hrs)**

**Basic Concept of Measurement**

Introduction – System configuration – Problem Analysis – Basic Characteristics of measuring devices – Calibration

**Transducers**

Capacitive transducers – Piezoelectric transducers – Photoelectric effect – Photoconductive transducers – Ionization transducers – Hall Effect transducers – Digital displacement transducers.

**UNIT 2**

**(9 hrs)**

**Performance Characteristics of an Instrumentation system**

Introduction – Generalized measurement – Zero order system – first and second order system – Dead time element – Specification and testing of dynamic response

**UNIT 3**

**(9 hrs)**

**Pressure Measurement**

Mechanical Pressure measurement devices – Bourdon tube Pressure gauge – The Bridgeman Gauge – Dead weight tester – Low Pressure measurement – The Mc lead gauge – Pirani thermal Conducting gauge – The Knudsen gauge.

**Unit 4**

**(9 hrs)**

**Flow Measurement**

Positive displacement methods – Flow Obstruction methods – Flow measurement by drag effects – Hot wire and Hot film anemometers – Magnetic flow meters.

**Unit 5**

**(9 hrs)**

**Measurement of Temperature**

Temperature scales – The ideal gas thermometer – temperature measurements by mechanical effects – temperature measurements – Thermistors – Thermoelectric effects.

**Book for Study**

Unit 1 & 2: Instrumentation Devices and Systems –C S Rangan, G R Sharma, V S V Mani TMH.

Unit 3 & 4: Experimental Methods for Engineers – Ja cy P Hofman, TMH.

Unit 5: Experimental methods for experiments by Jack P Holman

**SEMESTER – IV**

**SKILL BASED SUBJECT - INSTRUMENTATION II**

**No. of Credit Hours: 3 Hours**

**Subject Description** To study the instrument with its principle and observe the method of their functioning

**Goal and objectives**

To provide a good foundation in measurements

To provide a knowledge of the behaviour of instruments

To inspire interest for the knowledge of concepts regarding measurements

**UNIT 1**

**(9 Hrs)**

**Temperature Measurement by Radiation:**

Effects of heat transfer and temperature measurements – Transient response of thermal systems – Thermocouple compensation – Temperature measurement flow in high speed flow.

**Thermal and transport property Measurement.**

Thermal conductivity measurements – Thermal conductivity of liquids and gases – Gas diffusion – Calorimeter.

**UNIT 2**

**(9 Hrs)**

**Force, Torque and Strain Measurements**

Introduction – Mass balance measurements – Elastic elements for force measurements – Torque Measurement – Stress and Strain measurements – Electrical resistance – strain gauges.

**UNIT 3**

**(9 Hrs)**

**Vibration**

Random Vibration – Shock – Analyzing vibration sensing devices – Generalized second order System – Absolute displacement – Absolute velocity and acceleration vibrating sensing devices – Velocity transducer.

**UNIT 4**

**(9 Hrs)**

**Thermal and Nuclear Radiation Measurements**

Introduction – Detection of thermal radiation – Measurement of emissivity – Reflectivity and Transmitting measurements – Solar radiation measurements – Detection of Nuclear radiation – The Geiger Muller counter.

**UNIT 5**

**(9 Hrs)**

**Air Pollution Sampling and Measurements**

Introduction – Units of pollution measurements – Air pollution standards – General air sampling – Train gas sampling techniques – Particulate sampling techniques – Sulphur dioxide measurements.

**Books for Study:**

Unit 1, 2, 4 to 5: Experimental methods for Experiments by Jack P Holman

Unit 3: Instrumentation Devices and Systems –C S Rangan, G R Sharma, V S V Mani TMH.

**SEMESTER – V**  
**SKILL BASED SUBJECT -INSTRUMENTATION III**

**No. of Credit Hours: 3 Hours per week**

**Subject Description**

To study the instrument with its principle and observe the method their functioning

**Goal and objectives**

To provide a good foundation in measurements

To provide a knowledge of the behaviour of instruments

To inspire interest for the knowledge of concepts regarding measurements

**UNIT 1**

**(9 hrs)**

**Data Acquisition and Conversion**

Introduction – Signal conditioning of the inputs – Single channel data acquisition systems –  
– Data conversion – Digital of Analog converter – Analog to Digital converter.

**UNIT 2**

**(9 hrs)**

**Basic meter movements**

Permanent magnetic moving coil movements – Practical PMMC movements — Moving ion type instrument – Concentric vane repulsion type (Moving ion type) – Display devices: LED – LCD.

**UNIT 3**

**(9 hrs)**

**Digital Instruments**

Introduction – Digital Multi meter – Digital panel meters – Digital frequency meters – Digital Measurement of time – Universal counter – Digital measurement of frequency – Digital Tacho meter.

**UNIT 4**

**(9 hrs)**

**Oscilloscope**

Introduction – Basic principles – CRT features – Basic principles of signal displays – Block Diagram of oscilloscope – Simple CRO – Vertical amplifier – Horizontal deflecting system – Delay line in triggered sweep – CRT connection.

**UNIT 5**

**(9 hrs)**

**Biomedical Instrumentation**

Basics of Biomedical Instrumentation system – Blood flow measurement – magnetic blood flow rate – Ultrasonic meter – ECG-EEG-EMG –X-ray Imaging and CT scan- MRI scan

**Book for Study:**

1. Instrumentation Devices and Systems – C S Rangan, G R Sharma, V S V Mani TMH,
2. Electronic Instrumentation by H S Kalsi TMH.
3. M.Arumugam, “Bio-medical Instrumentation, Anuradha agencies, 2003
4. Nandhini K.Jog, Electronics in medicine and Biomedical Instrumentation, PHI, 2010

**SEMESTER – VI – SKILL BASED**  
**INSTRUMENTATION PRACTICAL (ANY TWELVE)**

1. Construction and Service of Power supply - 2, 4, 6 Volts
2. Regulated power supply construction and service - 5V & 12V
3. Dual power supply construction and service - (-12)-0- (+12)
1. Regulated power supply service - 5V & 12V
2. Dual power supply service - (-12)-0- (+12)
3. Servicing - Microscope
1. Servicing Telescope
4. Servicing - Spectrometer
5. Servicing -Galvanometer,
6. Servicing - Voltmeter
7. Servicing - Ammeter.
8. Servicing --UPS
9. Servicing ---Stop clock and Stop watch
10. Servicing ---Physical Balance
11. Servicing.—Mixie
12. Servicing.—Resistance box and Capacitance box
13. Servicing --- Signal Generators
14. Fixing and servicing a B.G.
15. Cutting, drilling, polishing and trimming.
16. Servicing.—Iron Box
17. Conversion of Galvanometer to an ammeter and volt