

Annexure No.	34 H
SCAA Dated	29.02.2008

BHARATHIAR UNIVERSITY :: COIMBATORE – 641 046

CERTIFICATE COURSE IN INSTRUMENTATION

(For the Candidates admitted during the academic year **2008-2009** onwards)

(UNIVERSITY DEPARTMENT)

ELIGIBILITY CONDITIONS FOR STUDENTS

The eligibility conditions for admission to the Certificate course in Instrumentation shall be as follows:

1. A pass in any bachelor degree in Science / Engineering
2. A pass in triple major (Maths, Physics & Electronics) or (Maths, Electronics & Computer Science).

All the above changes shall take effect for the students admitted during the academic year 2008-2009 and onwards.

SCHEME OF EXAMINATION

Sl. No.	COURSE CODE	COURSE TITLE	Instructional Hours (180 Hours)	University Examinations	
				Duration in hours	Max. Marks
1	PAPER – I	Electronic Test Instruments	75	3	75
2	PAPER – II	Analytical Instrumentation	75	3	75
3	PAPER – III	Practical	30	3	50

1.ELECTRONIC TEST INSTRUMENTS

Certificate course Paper I

UNIT I ANALOG METERS

D.C,A.C voltmeters, ammeters, multimeter,power meter,Q-meter,true RMS meter, vector impedance meter, vector voltmeter, component measuring instrument.

UNIT II SIGNAL SOURCES

Sine wave generator-Frequency synthesized sine wave generator-Sweep frequency generator, pulse and square wave generator-Function generator-Wave analyzer-Applications-Harmonic distortion analyzer-Spectrum analyzer-Applications-Audio Frequency generator-Noise generator.

UNIT III OSCILLOSCOPES

General purpose oscilloscope-Screens for CRT graticules-Vertical & horizontal deflection systems- Time base operation, triggers – sweep control, z axis input - Delay line-Multiple trace-Dual beam & dual trace-Probes-Oscilloscope techniques-special oscilloscopes-Storage oscilloscope-sampling oscilloscope-digital CRO.

UNIT IV DIGITAL INSTRUMENTS

Digital method for measuring frequency, period, phase difference, pulse width, time interval, total count-Digital voltmeter-Types-Automatic polarity indication, automatic ranging, and auto zeroing-DMM-Microprocessor based DMM-DPM-swept – spectrum analyzer-network analyzer-discharge analyzer- logic probes-logic analyzer.

UNIT V DISPLAY AND RECORDING DEVICES

Bar graph display-Segmental and dot matrix display-X-Y recorders, magnetic tape recorders-Digital recording-Data loggers-Interference and screening-Electrostatic and electromagnetic interference & earth loops.

TEXT BOOKS

- 1.Albert D. Herlfrick & William D. Cooper, “Modern electronic Instrumentation & Measurement Techniques” Prentice Hall of India,2002.
- 2.A.J.Bouwens,’Digital Instrumentation” Tata Mc Graw Hill, 1997.
- 3.RobertA.Witte,’Electronic Test Instruments,Theory and applications’ Prentice Hall, 1993.

REFERENCE BOOKS

- 1.B.M.Oliver and J.M.Cage, ”Electronic Measurements & Instrumentation” Mc Graw Hill International Edition, 1975.
- 2.Joseph, J.Carr, ”Elements of Electronic Instrumentation & Measurements” III edition, Pearson Education,2003.
- 3.C.S.Rangan, G.R.sarma, V.S.V.Mani, ”Instrumentation Devices & systems” Tata Mc Graw Hill, 2002
- 4.D.A.Bell, “Electronic Instrumentation and Measurements” Prentice Hall of India,2002.
- 5.Rajendra Prasad, ”Electronic Measurements and Instrumentation”, Khanna Publishers, Delhi,2003.
- 6.B.R.Gupta, ”Electronics and Instrumentation”S.Chand Co. (P)Ltd., Delhi,2003.

2.ANALYTICAL INSTRUMENTATION

Certificate course Paper II

UNIT I

COLORIMETRY AND SPECTROPHOTOMETRY

Special methods of analysis- Beer-Lambert law-colorimeters-UV-ViS spectrophotometers-Single and double beam instruments-Sources and detectors-IR Spectrophotometers-Types-Attenuated total reflectance flame photometers- Atomic absorption spectrophotometers-sources and detectors-FTIR spectrophotometers-Flame emission photometers.

UNIT II

CHROMATOGRAPHY

Different techniques-Gas chromatography-Detectors-Liquid chromatographs-Applications-High pressure liquid chromatographs-Applications.

UNIT III

INDUSTRIAL GAS ANALYZERS AND POLLUTION MONITORING INSTRUMENTS

Types of gas analyzers-Oxygen,NO₂ and H₂S types, IR analyzers, thermal conductivity analyzers, analysis based on ionization of gases. Air pollution due to carbon monoxide, hydrocarbons, nitrogen oxides, sulphur dioxide estimation-dust and smoke measurements.

UNIT IV

pH METERS AND DISSOLVE COMPONENT ANALYZERS

Principle of pH measurement, glass electrodes, hydrogen electrodes, reference electrodes, selective ion electrodes, ammonia electrodes, biosensors, dissolved oxygen analyzer-sodium analyzer-silicon analyzer.

UNIT V

RADIO CHEMICAL AND MAGNETIC RESONANCE TECHNIQUES

Nuclear radiations-Detectors-GM Counter-Proportional counter-Solid state detector-Gamma cameras-X-ray spectroscopy-Detectors-Diffractometers-Absorption meters-Detectors NMR-Basic principles-NMR spectrometer-Applications. Mass spectrometers-Different types-Applications.

TEXT BOOKS

- 1.R.S.Khandpur,"Handbook of Analytical Instruments"Tata Mc Graw Hill publishing Co. Ltd.2003.
- 2.H.H.Willard, L.L.Merrit, J.A.Dean, F.A.Settle,"Instrumental methods of analysis" CBS publishing & distribution, 1995.

REFERENCE BOOKS

- 1.Robert D.Braun,"Introduction to Instrumental Analysis"Mc Graw Hill, Singapore,1987
- 2.G.W.Ewing,"Instrumental Methods of Analysis" Mc Graw Hill 1992.
- 3.DA Skoog and D.M.West,"Principles of Instrumental Analysis" Harper and Row publishers, 1974.

Practical

Certificate course Paper III

1. Using multimeters, DVM
2. Study of Waveforms using CRO
3. Using ocular scope for Measurement of time and frequency
4. Using functional generator
5. Simple fault finding of pH meters etc.,
6. Identification different type pH electrodes
7. Preparation and analysis of Sample using UV/ VIS/ NIR Spectrophotometer
8. Preparation and analysis of Sample using HPLC
9. Preparation and analysis of Sample using Atomic Absorption Spectrophotometer
10. Preparation and analysis of Sample FTIR