

Department of Physics

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No. 04/IIEST/Phy/Web.Not./Lab.Equip/2017-18

Dated: 08.12.2017

Notice Inviting Quotation

Sealed quotations are invited for supply of the following items/equipments or to carry out works listed below as per mentioned specifications. The relevant bidding document can be downloaded from the website. The document can be also obtained from the Department of Physics (**Contact: Dr. Abhijit Bisoi**) between 11.00 a.m. and 5.00 p.m. on all working days. The quotation should **include all kinds of taxes/duties and delivery charges etc** of the items and to be sent to the Office of the **Head, Department of Physics, IEST, Shibpur, Howrah-711103**. Last date of submission of sealed quotation is **7 working days from the date of publication** in the Website of the Institute and tenders will be opened on the next working day at 12 noon.

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List of items and their specifications:

Item No.-1: Portable Contamination cum survey Monitor for alpha, beta and gamma radiation (Qty-1 no.)

Specifications

Gamma detector	Geiger-Mueller counter
Dose equivalent rate (DER) indication range	0.01 μ Sv/h - 130.0mSv/h
DER measurement range	0.1 μ Sv/h - 100.0mSv/h
Accuracy of DER measurement	$\pm(20+K/X)\%$ Where X-DER value in μ Sv/h, K=1.0 μ Sv
X-ray and gamma radiation energy range	0.05 to 3.0MeV
Energy dependence relative to 0.662MeV(^{137}Cs) in the energy range 0.06-3.0Mev, not more than	$\pm 30\%$
Beta flux density indication range	0.1-10 ⁴ min ⁻¹ .cm ⁻²
Beta flux density measurement range	6.0-10 ³ min ⁻¹ .cm ⁻²
Accuracy of beta flux density measurement relative to ($^{90}\text{Sr} + ^{90}\text{Y}$)	(20+A/ ϕ)% Where ϕ - beta flux density, min ⁻¹ .cm ⁻² , A=60 min ⁻¹ .cm ⁻²
Beta radiation energy range	0.1 to 3.5 MeV
Beta sensitivity relative to ($^{90}\text{Sr} + ^{90}\text{Y}$), not less than	3.5 counts-cm ²
Communication with computer	USB interface
Power requirement	Two AA batteries or external from PC via USB
Batteries lifetime	6 months typical
Environmental -temperature range -relative humidity	-10 to +50 ⁰ C Up to 95% at 35 ⁰ C
Weight, max	290g
Dimensions	148 85 40 mm
Alpha flux density indication range	0.1-10 ⁴ min ⁻¹ .cm ⁻²
Alpha flux density measurement range	90-10 ⁴ min ⁻¹ .cm ⁻²

Optional Specifications

Beta flux density measurement range	6.0-10 ⁴ min ⁻¹ .cm ⁻²
Dose equivalent (DE) indication range	0.01 μ Sv-10.0 Sv
DE measurement range	1.0 μ Sv-10.0 Sv
Accuracy of DE measurement	$\pm 20\%$
Accuracy of alpha flux density measurement on ^{239}Pu	$\pm(20+A/\phi)\%$ Where ϕ - alpha flux density, min ⁻¹ .cm ⁻² , A=60 min ⁻¹ .cm ⁻²

Item No.-2: Single channel gamma spectrometer (Qty- 1 no.)

Specification

Electronics		All solid state, Si-Lab micro-Controller based design
Preset Time		Time settable between 1 and 9999 seconds in Step of 1 second
No. of Runs		Settable between 1 to
Display	1000	Counts : 999999 Time : 9999 Runs :
HV Supply	1000	Adjustable to 1500V by setting front panel mounted helipot with calibrated dial
Spectroscopy Amplifier		Gain – x 1 or x 2 by the Ten turn Helipot with graduated dial Input Polarity – Positive Output – Positive Polarity (0 to 9 V) pulse Output pulse – near Gaussian shape
Single Channel Analyzer		LLD – 0.1 to 10 V Adjustable by helipot with graduated dial ULD – 0.1 to 10 V Adjustable by helipot with graduated dial Mode – Threshold or Window Input – Unipolar Positive pulse Output – TTL Pulse of Width 1 μ Sec (approx.)
Data Storage		Store and recall facility for data up to 1000 readings
User Interface		4 keys keypad with 16x2 line LCD for displaying Key function
Data Transfer	Port	To PC - USB / Ethernet

Item No.- 3: 100 MHz 2 Channel Oscilloscope (Qty- 1 nos.)

Specification

Bandwidth	100MHz
Channels	2
Sample rate on each channel	2.0GS/s
Record length	2.5k points at all-time bases

Vertical system – Analog channels

Vertical resolution: 8 bits

Input sensitivity range: 2 mV to 5 V/div on all models with calibrated fine adjustment

DC gain accuracy: $\pm 3\%$, from 10 mV/div to 5 V/div

Maximum input voltage: 300 VRMS CAT II; derated at 20 dB/decade above 100 kHz to 13 V_{p-p} AC at 3 MHz and above

Offset range: 2 mV to 200 mV/div: ± 1.8 V. >200 mV to 5 V/div: ± 45 V

Bandwidth limit: 20 MHz

Input coupling: AC, DC, GND

Input impedance: 1 M Ω in parallel with 20 pF

Vertical zoom: Vertically expand or compress a live or stopped waveform

Horizontal system — Analog channels

Time base range 50 MHz and 70 MHz models: 5 ns to 50 s/div

100MHz, 150MHz and 200MHz models: 2.5 ns to 50 s/div

Time base accuracy: 50 ppm

Horizontal zoom: Horizontally expand or compress a live or stopped waveform

Input/Output ports

USB interface: USB host port on front panel supports USB flash drives

USB device port on back of instrument supports connection to PC

GPIB interface: Optional

Data storage

Nonvolatile storage

Reference waveform display: 2.5K point reference waveforms

Waveform storage without USB flash drive: 2.5K point

Maximum USB flash drive size: 64 GB

Waveform storage with USB flash drive: 96 or more reference waveforms per 8 MB

Setups without USB flashdrive: 10 front-panel setups

Setups with USB flash drive: 4000 or more front-panel setups per 8 MB

Screen images with USB flashdrive: 128 or more screen images per 8 MB (the number of images depends on file format selected)

Save All with USB flash drive: 12 or more Save All operations per 8 MB

A single Save All operation creates 3 to 9 files (setup, image, plus one file for each displayed waveform)

Course content: 100 MB

Acquisition system

Acquisition modes

Peak Detect: High-frequency and random glitch capture. Captures glitches as narrow as 12 ns (typical) at all time base settings from 5 μ s/div to 50 s/div.

Sample: Sample data only

Average: Waveform averaged, selectable: 4, 16, 64, 128

Single Sequence: Use the Single Sequence button to capture a single triggered acquisition sequence

Roll: At acquisition time base settings of >100 ms/div

Trigger system

External trigger input: Included on all models

Trigger modes: Auto, Normal, Single Sequence

Trigger types

Edge (Rising/Falling): Conventional level-driven trigger. Positive or negative slope on any channel. Coupling selections: AC, DC, Noise Reject, HFReject, LF Reject

Video: Trigger on all lines or individual lines, odd/even or all fields from composite video, or broadcast standards (NTSC, PAL, SECAM)

Pulse Width (or Glitch): Trigger on a pulse width less than, greater than, equal to, or not equal to, a selectable time limit ranging from 33 ns to 10 s

Trigger source: Two channel models: CH1, CH2, Ext, Ext/5, AC Line

Trigger view: Displays trigger signal while Trigger View button is depressed.

Trigger signal frequency readout: Provides a frequency readout of the trigger source.

Waveform measurements

Cursors

Types: Amplitude, Time

Measurements: ΔT , $1/\Delta T$, ΔV

Automatic measurements: Period, Frequency, Pos Width, Neg Width, Rise Time, Fall Time, Maximum, Minimum, Peak-Peak, Mean, RMS, Cycle RMS, Cursor RMS, Phase, Pos Pulse Cnt, Neg Pulse Cnt, Rise Edge Cn, Fall Edge Cn, Pos Duty, Neg Duty, Amplitude, Cycle Mean, Cursor Mean, Burst Width, Pos Overshoot, Neg Overshoot, Area, Cycle Area, High, Low, Delay RR, Delay RF, Delay FR, Delay FF

Waveform math Arithmetic: Add, Subtract, Multiply

Math functions: FFT

FFT: Windows: Hanning, Flat Top, Rectangular 2048 sample points

Sources: Two channel models: CH1 - CH2, CH2 - CH1, CH1 + CH2, CH1 \times CH2

Autoset menu

Single-button, automatic setup of all channels for vertical, horizontal, and trigger systems, with undo autoset.

Square wave: Single cycle, multicycle, rising or falling edge

Sine wave: Single cycle, multicycle, FFT spectrum

Video (NTSC, PAL, SECAM): Field: All, Odd, or Even Line: All or Selectable Line Number

Autorange

Automatically adjust vertical and/or horizontal oscilloscope settings when probe is moved from point to point, or when the signal exhibits large changes.

Frequency counter

Resolution: 6 digits

Accuracy (typical): + 51 parts per million including all frequency reference errors and +1 count errors

Frequency range: AC coupled, 10 Hz minimum to rated bandwidth

Frequency counter signal source: Pulse width or edge selected trigger source

Frequency counter measures selected trigger source at all times in pulse width and edge mode, including when the oscilloscope acquisition is halted due to changes in run status, or acquisition of a single shot event has completed.

The frequency counter does not measure pulses that do not qualify as legitimate trigger events.

Pulse Width mode: Counts pulses of enough magnitude inside the 250 ms measurement window that qualify as triggerable events (e.g. all narrow pulses in a PWM pulse train if set to "<" mode and the limit is set to a relatively small number).

Edge Trigger mode: Counts all pulses of enough magnitude.

Display system

Interpolation: Sin (x)/x

Waveform styles: Dots, vectors

Persistence: Off, 1 s, 2 s, 5 s, infinite

Format: YT and XY

Courseware software

System requirements: The following PC configuration represents the minimum requirements needed to install the Courseware software.

Operating System: Windows XP, Windows 7, Windows 8, Linux (ubuntu 12.04, 12.10, 13.04 or fedora 18,19)

RAM: 512 Megabytes (MB)

Disk space: 1 Gigabyte of available hard disk space

Display: X VGA 1024×768 with 120 dpi font size recommended

Removable media: CD-ROM or DVD drive

Peripherals: Keyboard and Microsoft mouse or other compatible pointing device

Power source

Power source voltage: 100 to 240 V ±10%

Power source frequency:

100 V to 240 V 50 Hz to 60 Hz

115 V 400 Hz ±10%

Power consumption: 30 W maximum