Technical specification for High Resolution Field Portable Spectroradiometer along with suitable accessories for collecting reflectance, radiance and irradiance spectral data.

Spectroradiometer	Description	Tender Specification	Reasons
Technical Specification	Wavelength range	(350-2500) nm	For taking advantage of the most energetic region of natural solar illumination and the most useful spectral features for natural targets.
	Detector Type	512 element UV enhanced Si array for 350-1000nm; 256 element thermoelectrically cooled Extended InGaAs array for 970-1900nm; 256 element thermoelectrically cooled Extended InGaAs array for 1900-2500nm Spectrometer Type- 3 Diffraction Gratings.	
	Channel	2000 and above	For Hyperspectral applications.
	Spectral Resolution	≤2.8nm @ 700nm ≤8nm @1500nm ≤6nm@2100nm	In order to detect the most productive spectral features of natural targets and for re-sampling data to emulate other different spectral sensors of broader resolution. The enhanced spectral resolution is required to meet the rigorous demands of the next generation hyperspectral imaging systems such as AVRIS-NG and HySpex ODIN-1024.
	Wavelength Reproducibility	0.1 nm or better	To achieve high accuracy data
	Wavelength Accuracy	±0.5 nm or better	To achieve high accuracy data

	Noise Equivalence Radiance (NER)	VNIR 0.8x10-9 W/cm2/nm/sr@700nm, SWIR 1 1.2x10-9 W/cm2/nm/sr @ 1500nm, SWIR 2 1.8x10-9 W/cm2/nm/sr@2100nm	To achieve high accuracy data and to detect the most productive spectral features of natural targets
	weight	<10 lbs	
	sealing	Sealed against dirt/dust	
	Calibration:	NIST Traceable radiance calibration ±5% @ 400nm; ±4% @ 700nm; ±7% @ 2200nm All radiometric Calibration for snow radiation, albedo and atmospheric irradiance measurements	Or better

Features	Input path configuration	Standard 1.5 meter securely connected Rugged Fiberoptic cable input to channel directly the light from the target to the instrument. Field replaceable fiber optic cable	Fiberoptic cable for quick hand movement from point-to-point and/or practical mounting to a variety of platforms and for reducing reflected light from the operator and/or mounting apparatus and for a practical viewing distance from the target. To ensure maximum signal throughput without any signal loss because of detachable fiberoptic cable. To ensure radiometric calibration accuracy
	Field of View	1.5 meter Fiberoptic cable with Standard 20-degree field of view or above.	FOV is necessary to achieve a large spot size at practical distances to the target.
	Communication Interface	USB and wireless Bluetooth (includes USB interconnection cables)	Is required to interface with computer to allow fast contiguous spectrum collection and to maximize compatibility with modern style laptop computers and networking.

	Diagnostics features	• Battery power indicator • Run time meter. • Detectors stability indicator with temperature • Wireless status Indicator • Signal saturation warning • Fiber optic cable checker • Detectors temperature record with each scan •	• To save the data before the battery power goes off in the field. Run time meter to record the history of usage of instrument. • Detectors stability will indicate us when to collect the data and detectors are stable for the changing environmental condition. • Wireless status indicator to know the signal strength, Signal saturation warning to discard the data while collecting. • Fiberoptic cable checker to know the state of health of fiber inside the cable.
	Warranty	1 year	
	Rechargeable battery for spectrometer with Charger	12 volts, 7800mAh Li-Ion battery with run time 4 to 5hrs of continuous operation in field with suitable charger. Battery power cable- CONNECTS BATTERY TO SPECTROMETER Universal 100-240VAC 50/60 Hz battery charger	

Software	Data Acquisition Software and preliminary data processing software	Spectral acquisition software and provision to save spectrum along with GPS co-ordinates from a external GPS along with the spectrum data. Direct Interface with software like ENVI and preliminary data processing software. Acquisition Software along with online classification and predictions with feature to develop spectral libraries.	
Calibration	In lab self-Calibration capacity	It should be possible to calibrate spectroradiometer for radiance in the lab. Supplier should provide procedures and training that allow to create and upload calibration files into 4 user addressable firmware channels.	
Power and Environmental factors	AC input	90 - 240 VAC for laboratory use	
	Temperature Range	-5 to 40 Deg C operating range and -5 to 45 Deg C storage range	

Instrument Controller	Data Acquisition	Rugged tablet to control the Spectroradiometer to collect data, store data, and view Spectra.	Include GPS
Accessories	10 X 10 Inch Calibrated Diffuse White Reference Panel. Wooden Case Wooden case with Internal padding for White Reference Panel	For collecting the baseline Incident illumination input for real-time reflectance calculations. NIST Traceable calibration	100% reflectance reference panel for reflectance measurement.
	Pistol Grip Fiber Optic holder with triggering & Picotinny rail		
	Rigid foam lined protective travel case and Padded Backpack- for the portable spectrometers		

	Accessories for Atmospheric Measurements : and radiometric calibration	1) Diffuse transmission type Remote Cosine Receptor along with radiometric calibration for total Irradiance measurement 2) Direct irradiance measurement setup like Gershun tube 3) Sun tracker on equitable mount 4) additional spectroradiometer setup for simultaneous total and direct irradiance measurement 5) snow albedo spectral measurement setup 5) All associated radiometric calibration	Accessory for Irradiance measurement.
	Wavelength and Radiometric Calibrations	NIST traceable with documentation	
	Accessory with built-in light source for contact measurement of samples both in lab and Field.	Contact probe with spacer 5W tungsten halogen source with pistol grip, triggering port, sapphire lens and quick release fiber mount Compatible with the spectrometers- with high intensity convergent bulb Leaf clip attachment inclusion	Accessory for collecting spectral data in lab and field
	4-inch Reflectance/ Transmittance (RT) sphere with central sample holder facility	For reflectance, transmittance and absorbance measurement of particles in filter paper Diffuse hemispherical radiation setup included	
	Hand held weather probes	Portable temperature and humidity probes with data logger	
	Installation & testing at site for acceptance. Training to be provided on operating the instrument. Technical manual of the instrument to be provided.		
	Standard Warranty	1 year onsite warranty with technical support.	