

TECHNICAL SPECIFICATIONS AND OTHER ALLIED REQUIREMENT

SI No.	Description of items	Quantity
PUR/519/COE-FM&PA/BB/E/2019-20		
1	SUPPLY AND COMMISSIONING OF REMOTELY PILOTED AIRCRAFT [RPA] WITH MULTISPECTRAL IMAGING SYSTEM FOR PRECISION AGRICULTURE	1

1. INSTALLATION, COMMISSIONING AND TRAINING

- 1.1. The ordered goods are required to be installed and commissioned within 15 days of receipt of goods at final destination. Installation should be carried out only by expert engineers of Supplier / Manufacturer. During the course of installation, necessary training on operation and maintenance of the goods shall be imparted to Institute's Scientist / Engineers/Technicians.

2. WARRANTY

- 2.1. Comprehensive on-site warranty for a period of one year must be provided to be effective from the date of completion of installation and commissioning and final acceptance of the items / equipment at the user's laboratory / Institute.

3. SPARES AND CONSUMABLES

- 3.1. Essential Spares and consumables required for 3 years of operation together with the individual costs are to be mentioned separately in the quotation [uploaded as .pdf file on the CPP portal]. This costs / price components are not to be entered in the MS-EXEL BOQ file.

4. COSTS FOR NON COMPREHENSIVE AMC

- 4.1. Costs for non-comprehensive AMC shall be quoted separately in the quotation [uploaded as .pdf file on the CPP portal]. This cost / price component is not to be entered in the MS-EXEL BOQ file.

**Specifications of Remotely Piloted Aircraft (RPA) with
Multispectral Imaging System for Precision Agriculture**

Propulsion type	Multi-rotor with compatible electronic speed controller (ESC) operated using Ground Control Station (GCS)
Frame	Light weight, resistant to adverse weather conditions Tool less assembly & disassembly Frame size (motor to motor diagonal): 650 mm (minimum) Foldable Frame architecture is highly preferred.
RPA Maximum take-off Weight	Less than 4 kg
Payload capacity	Preferably up to 1.0 kg
Flying Radius	1 km or higher
Altitude/Flying Height	Up to 200 m AGL or better
Flying Speed	0 - 7 m/s or better
Endurance	With standard payload – 30 minutes minimum
Flight Control	Fully autonomous from takeoff to landing Built-in failsafe for low battery and communication loss Return to home
Battery	<ul style="list-style-type: none"> ▪ Rechargeable Lithium based battery for RPA and Ground Control Station. ▪ <u>System must include the battery charger.</u>
Ground control system	<ul style="list-style-type: none"> ▪ Rugged laptop with 10 inch (minimum) sunlight readable display, ▪ Windows 10 Operating system, ▪ Installed with proprietary Mission Control Software OR Commercial License of Mission Control Software, which is having: <ul style="list-style-type: none"> ✓ RPA Telemetry should have capability for real-time display, ✓ Easy to use interface for command and control of RPA flight and payload, ✓ Should have capability to dynamically define and change flight plan of RPA, ▪ Rechargeable battery, ▪ Maximum transmission range: at least 1 km.
Communication	<ul style="list-style-type: none"> ▪ DATA Link: Rx Tx- 2.4 GHz, Secured & Encrypted 128 bit AES encryption ▪ Meets all regulatory approvals and compliance ▪ Manual operation range- 1 km (minimum)
Gimble	Provided for the sensor should integrate with the RPA provided
GPS	horizontal: 10 mm + 1 ppm vertical: 20 mm + 1 ppm GNSS: GPS/GALILEO/GLONASS

[Handwritten signatures]

Operating Conditions	<ul style="list-style-type: none">▪ Temperature: -10 to +50 °C▪ Humidity: 90% RH at 40 °C▪ Winds: Up to 25 km/h▪ Dust/ drizzle resistance: IP53		
Accessories	<ul style="list-style-type: none">▪ Battery Chargers (for RPA & GCS); Joy Stick; Necessary Cables & Connectors; Operation Manual Flight Logbook & other items to make the RPA functional and operational		
	<ul style="list-style-type: none">▪ Maintenance kit for on-field maintenance and replacement of spare parts		
	<ul style="list-style-type: none">▪ 2 (two) nos. of portable rugged backpacks for system packaging		
Spares	<ul style="list-style-type: none">▪ Hard, rugged transport case to store and transport the backpacks		
	<ul style="list-style-type: none">▪ 2 (two) Nos. of RPA batteries▪ 2 (two) set of RPA propellers▪ 2 (two) set of RPA landing gears		
Warranty	1 year		
Payload: MULTISPECTRAL CAMERA			
Spectral Bands (colour, wavelength, bandwidth)	Blue (475 nm center, 20 nm bandwidth) Green (560 nm center, 20 nm bandwidth) Red (668 nm center, 10 nm bandwidth) Red edge (714 nm center, 10 nm bandwidth) near-IR (840 nm center, 40 nm bandwidth)		
Ground Sample distance	8cm per pixel (per band) at 120m AGL		
Image Resolution	1290 x 960 pixels		
Capture Rate	It should capture at-least 1 capture per second (all bands), 12 bits RAW or better.		
Tilt	15° tilt		
Field of View	47.9°		
Weight	Less than 300 g		
Interfaces	It should have below listed interfaces: <div><div><ul style="list-style-type: none">a. Serial.b. 10/100/1000 Ethernet.c. Removable Wi-Fi.d. GPS</div><div><ul style="list-style-type: none">d. External Trigger (GPIO, PWM, Serial and Ethernet Options)f. SDHC</div></div>		
Triggering Options	The following triggering options should be present:		
	<div><div><ul style="list-style-type: none">a. Timer modeb. Overlap mode.</div><div><ul style="list-style-type: none">c. External trigger moded. Manual capture mode.</div></div>		
On-board storage	SDHC 64GB (Minimum), Class 10 SD card with a write-speed capability of at least 40 MB/s and read-speed capability of at least 90MB/s		
Payload Accessories:	<div><div><ul style="list-style-type: none">a. Calibrated Reflectance Panelb. Light Sensorc. Hard Carrying Case for camera</div><div><ul style="list-style-type: none">d. Mounting Screws for drone attachmente. Necessary Cable sets.</div></div>		
Payload Warranty	One year onsite warranty		

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GENERAL REQUIREMENTS

- a) The Bid should be for delivery destination: CSIR-CMERI CoEFM, Gill Road, Ludhiana - 6
- b) Integrated system only will be acceptable.
- c) The multi-spectral images – R, G, B, Red-Edge and near IR should be calibrated against real-time ambient light.
- d) The multispectral images should be unaffected by overcast and weather conditions.
- e) RPA should be equipped with flashing anti-collision strobe lights.
- f) RPA should be embedded with fire-resistant identification plate for engraving license number.
- g) The flight controller should have flight data logging capability
- h) RPA should possess pre-flight checks/self-test before every flight.
- i) Should be registered/recognized by central or state nodal agencies for manufacture & supply of RPA's.
- j) Vendor should assist CSIR-CMERI with the procedures, and documentation for obtaining relevant licenses from the concerned authorities.
- k) Vendor should arrange for Equipment Type Approval (ETA) of quoted RPA from relevant Departments of Govt. of India.
- l) Vendor should assist CSIR-CMERI for training and obtaining Unmanned Aircraft Operator Permit (UAOP) for at least two officials.
- m) The RPA should be DGCA certified as per DGCA RPAs Guidance Manual.
- n) RPA should possess NPNT or 'No Permission – No Take-off' capability to obtain a valid permission through digital sky platform, DGCA.
- o) RPA should also possess obstacle detection and avoid capability.
- p) Full literature with appropriate reference should be provided to support technical offer.
- q) Advanced onsite training on launching of RPA, mission handling, ground control system, landing and entire control system to be provided for a period of 3-5 working days.
- r) All sensors should be compatible with the RPA.
- s) The manufacturer should provide a free comprehensive onsite warranty of at least 1 year after commissioning of the RPA. The manufacturer should simultaneously take on the work of servicing and routine maintenance once in six months during the warranty period.
- t) Essential consumables and spare to be provided for 3 years of operation.
- u) The supplier shall provide detailed application notes, manuals, user instructions, operation, troubleshooting manual.
- v) In case the Equipment / System remains non-operational for more than 30 days then warranty period will be extended for the equivalent period for which Equipment / System remained non-operational. Warranty extension in such case shall be done without prejudice to any other Term & condition of the contract.
- w) Non-comprehensive Annual Maintenance Cost (AMC) of the system shall be quoted separately after warranty period.

