SPECIFICATIONS FOR SITC OF 40 kVA, TRUE ON-LINE, DOUBLE CONVERSION, FULLY DPS CONTROLLED TYPE UNINTERRUPTIBLE POWER SUPPLY (UPS) SYSTEM ALONG WITH BATTERY BANK AND IN-BUILT ISOLATION TRANSFORMER (FOR 10 KW FM TRANSMITTERS IN SOUTH ZONE (FOR VHF FM TRANSMITTER SET UP)

CONTENTS

S. No.	Description	Page No.
1	A. Essential Requirement for tenderers	1-2
2	B. Essential Eligibility criteria for tenderers	2
3	Section 1.0, General Specifications	3 - 5
4	Section 2.0, Essential features	6 – 8
5	Section 3.0, Technical Specifications	9 – 13
6	Section 4.0 (A), Schedule of Requirements/Materials (Un-Priced)	14
7	Section 4.0 (B), Schedule of Requirements/Materials (Un-Priced) (Optional Items)	14

A. ESSENTIAL REQUIREMENT FOR THE TENDERERS:

1. (i) The tenderer should submit Schedule of Requirements/Materials for SITC without *price in the same format as given in* AIR Specification in the technical bid, failing which the tender shall be considered incomplete and is liable to be rejected.

   (ii) It is also mandatory to mention ***Make & Model of the offered equipment*** in the Schedule of Requirements/Materials of supply, failing which the tender shall be considered incomplete and is liable to be rejected.

2. Each statement of the technical specification has to be complied with & supported by printed technical literature, technical data sheets, schematic drawings and technical manuals, duly signed & stamped by respective Original Equipment Manufacturer (OEM) and countersigned by the tenderer to assess the full merit of the offer, failing which the tender shall be considered incomplete and is liable to be rejected.

3. The tenderer should submit the tender offer to AIR in the format given below, Section wise & Clause wise, in respect of all the Sections of technical specifications to assess the full merit of the offer, failing which the tender shall be considered incomplete and is liable to be rejected.

S. No. of AIR Specifications (Section wise & Clause wise) (1)	Details of AIR Specifications (Part/ Section wise &Clause wise) (2)	Compliance **(Yes/No)** (3)	The page no. of the tender offer, where the information/ supporting document is available. (4)	Remarks (5)
Section-1.0 Clause wise				
Section-2.0 Clause wise				
Section-3.0 Clause wise				
Section-4.0 (A) & (B) Clause wise				

4. The tenderer should also quote the rate/cost of individual items in the tender offer while submitting the offer in respect of spares **(OPTIONAL)** in commercial bid.

5. The complete Technical specifications (Section wise & Clause wise) compliance statement along with Schedule of Requirements/Materials (un-priced) must be signed & stamped on each page by the respective Original Equipment Manufacturer and countersigned by the tenderer in the tender document including the

clarifications, if any, asked by All India Radio, failing which the tender shall be considered incomplete and is liable to be rejected.

The manufacturer & tenderer should also mention their names in CAPITAL LETTERS & designation of the signatories, full address with pin code, phone number, fax number, e-mail addresses etc.

6. All the volumes of the entire technical bid must be page numbered.

7. The authorization and guarantee must be given by respective Original Equipment Manufacturer on their letterhead pad duly signed & stamped on each page. In case tender offer is from other than the Manufacturer, the tenderer must also give guarantee on their letterhead pad, duly signed & stamped on each page, failing which the tender shall be considered incomplete and is liable to be rejected.

8. Any change in the AIR technical specifications format or language or in parameters or of any other nature including the deletion of technical specifications clause, words, lines in the technical specification's compliance statement by the Original Equipment Manufacturer/ tenderer will not be acceptable to AIR and the tender is liable to be rejected.

9. ***Optional items will not be considered for ranking purpose.***

B. ESSENTIAL ELIGIBILITY CRITERIA FOR TENDERERS:

i. The bidder should have experience of at least three Years in the supply, installation, testing and commissioning of UPS on turn key basis.

ii. The UPS offered shall be a standard product of the manufacturer and shall be the manufacturer's latest design that complies with the tender specification.

iii. The bidder should have successfully completed SITC of the offered Model in the past and it should have been working satisfactorily for more than a year.

iv. List of clients where the offered Model of UPS have been supplied, installed and commissioned and Copies of Completion certificate issued by such clients should be enclosed.

v. OEM Authorization Certificate, if the bidder is not OEM.

vi. Detailed Catalogue / Data Sheet / technical literature of the offered UPS as proof for compliance to all parameters and features enumerated in the specification

vii. Catalogue and data sheets of offered 12 V batteries and Battery sizing calculation.

vii. Copy of valid ISO 9001 – 2008 Certificate of UPS & Battery Manufacturer.

viii. Technical compliance statement of specification should be signed and stamped by the bidder, in case of authorised dealer by both OEM and the bidder.

ix. For commercial terms and conditions, tender document shall be referred.

GENERAL SPECIFICATIONS:

1 SCOPE:

The specifications are for the SITC of 40 kVA, True on-line, double conversion (defined as VFI in the IEC62040-3 UPS Specifications), fully DSP controlled type Uninterruptible Power Supply (UPS) (3-Phase, 4 Wire input, three Phase, 4 Wire output) along with Battery Bank and in built isolation transformer for use in AIR FM transmitters set up at **FM Bangalore-3No. , 1 No. for Mysore, Mangalore , Dharwad (KA) Tiruchirapalli, Dharmapuri (TN), Kozikode (Kerala)**

. The UPS system has to operate in conjunction with the existing Building Electrical System and Diesel Generator to provide power conditioning, back-up power protection, and power distribution for the critical loads.

2 GENERAL:

The UPS should be reliable and stable in operation under Indian tropical conditions. In India, climate may be extremely humid and dusty besides varying from very cold to very hot. It should have a front panel LCD display to show various parameters of the system to ease the monitoring.

The UPS system shall be capable of running in stand-alone Mode as per the attached configurations shown in Fig. 1. UPS system is to be supplied with **40Nos of 12V,120AH batteries for providing backup** at full rated capacity.

3 INSPECTION:

(a) All the equipment to be supplied against the supply order for this tender shall be subjected to inspection at manufacturer's facility by AIR.

(b) The installation shall be subjected to inspection at site by AIR. The firm shall submit all the drawings, wiring/ connection diagrams etc. at the time of inspection. The Manufacturer shall provide all technical equipment required for inspecting the system to the inspector.

(c) The complete Acceptance Test Procedure/Protocol (ATP) will be prepared by the OEM and submitted to concerned Zonal office for approval **within 15 days** of issue of Acceptance of Tender. ATP will also indicate full details of setup for measuring/testing equipment's to be deployed during the performance measurements/inspection. The **approved ATP** shall form the basis for performance measurements/inspection to be carried out.

4 LANGUAGE/UNITS:

All information supplied by the tenderer and all markings, notes, designation on the drawings and associated write-ups including Instruction Manuals shall be in **"English language" only**. All dimensions and units on drawings and all references to weights, measures and quantities shall be in **SI units**.

5 INFORMATION TO BE SUPPLIED WITH THE TENDER:

(i) The complete technical specifications (Section wise & Clause wise) compliance statement along with Schedule of Requirements/Materials (un-priced), duly signed & stamped on each page by the respective Original Equipment Manufacturer and countersigned by the tenderer as per the format given above in clause A (3).

(ii) Complete printed technical literature, technical data sheets, schematic drawings and technical manuals of the offered equipment's, duly signed & stamped by the respective Original Equipment Manufacturer and countersigned by the tenderer in support of compliance statement.

(iii) Schedule of Requirements/Materials (un-priced) for SITC of UPS & accessories in the same format as given in AIR Specification. The tenderer must quote all items.

(iv) Descriptive information and complete details of each equipment offered shall be given by the tenderer.

(v) Country of Origin, Make, Type & Model of all the Equipment's/items offered should be mentioned including the name & address of their vendors.

(vi) A copy of the Technical Manual, Installation Manual and Operation/Maintenance manual must be enclosed with technical bid for assessing the Equipment offered.

6. **INFORMATION TO PRECEDE DESPATCH OF EQUIPMENT**:

Following information should be supplied to concerned Zonal office and each of the consignees prior to dispatch of equipment:

(a) Detailed list of equipment's under dispatch.
(b) Photograph showing location of various units/sub units with item numbers marked thereon.

7. INFORMATION TO BE SUPPLIED BY THE TENDERER WITHIN 15 DAYS OF ACCEPTANCE OF TENDER:

One set of Technical Manuals (Installation, Testing, Commissioning, Operation & Maintenance, including theory of operation and fault diagnosis, circuit diagrams) **COLOUR** printed and duly bound for UPS system including Battery Bank along with soft copy on CD must be supplied to concerned Zonal Office.

8. INSURANCE AND MARINE RISKS ETC.

Please refer to commercial terms.

9. INFORMATION TO BE SUPPLIED ALONG WITH EQUIPMENT:

Two Sets of Technical manuals (for Installation, Testing, Commissioning, Operation & Maintenance, including theory of operation and fault diagnosis, circuit diagrams) **COLOUR** printed and duly bound for UPS system including Battery Bank along with final performance measurements with soft copy on CD shall be supplied to concerned Zonal office and consignee.

10. DEMONSTRATION

The successful bidder shall arrange for demonstration of the offered product in case the purchaser desires to verify the compliance of the offered product to all the parameters / features enumerated in technical specification of the tender at our Chennai office.

11. GUARANTEE:

The tenderer shall submit with his tender an undertaking to accept the following guarantees:

(i) The guarantee of the Equipment's/items shall be **36 months** from the date of commissioning.

(ii) A guarantee that the equipment supplied will be in accordance with these specifications, varied only to the extent stated in his tender and agreed to in the contract.

(iii) A guarantee to make good within 10 days at tenderer's expense, if any component which becomes defective under normal operating conditions during guarantee period.

(iv) A guarantee to supply all components for a period of ten years from the date of acceptance of Equipment's/items, at rates at which these are being supplied by him to other customers and also should match prices of original manufactures of these components prevailing at that time.

(v) If at any stage during next 10 years, the manufacturer stops production of this model of Equipment's/items, the tenderer/OEM shall intimate All India Radio in advance to enable the latter to stock the critical items.

12. MAINTENANCE SUPPORT AND SPARES:

(a) The minimum recommended essential spares shall be quoted separately by the tenderer.

(b) The minimum recommended essential spares may be based on predicted rate of failure.

In case, the tenderer quotes the optional items as 'Set', the details of the components/items offered in the 'Set' must be spelt out clearly including their Make, Model and quantity.

(c) The UPS manufacturer shall have a field service network and the address of the service Centre's across the country may be provided along with the bid.

13. COMPLETION OF SITC:

The project, consisting of Supply, installation and commissioning of the Online UPS, will have to be implemented on turnkey basis in **2 months'** time from the date of placement of order.

14. INSTALLATION AND COMMISSIONING:

The firm shall be ready to carry out the installation work at any time of a day (24 Hrs.) and any day of the week (7 days) as permissible on the particular site.

SECTION-2.0

ESSENTIAL FEATURES:

1. (a) The system should be fully DSP controlled in all respects (i.e. rectifier control, inverter control, display, digital diagnostics), solid-state type, utilizing true On-Line Double Conversion technology (high frequency PWM using IGBT Rectifier & inverter section)

   (b) The system should be capable of providing continuous high quality sinusoidal waveform power for electronic equipment loads.

   (c) The system should conform to voltage frequency independent technology.

2. The DSP based controller should have following characteristics:

   1. Diagnostic monitoring achieved by Fast Fourier Transform (FFT) of spectrum analysis
   2. Adaptive control by having the speed to monitor and control the system concurrently
   3. Real time generation of smooth, near optimal reference profiles and move trajectories
   4. Control power switching and inverters and generate high resolution outputs

3. The UPS should offer low input current harmonic distortion (THDI), good regulation, excellent transient response and high stability.

4. (a) The system should have a monitoring panel (LCD Based) with various types of fault alarms and metering functions including:
   i. Output voltage, current & frequency.
   ii. Input voltage, current & frequency.
   iii. Bypass Voltage, Current & frequency.
   iv. Battery capacity, backup time left & bad battery indication.
   v. Temperature of System, Inverter section and Rectifier section.

   b) The UPS system should display both RMS value and Peak value of load current.
   c) The UPS system should have facility to generate aural alarm for bad Battery condition.

5. a) The system should have wide input voltage and input frequency tolerance as specified in Rectifier section.
   b) Transient Voltage Surge Suppressor (TVSS) should be provided at the input & output of the UPS System.

6. The system should have provision for controlling all the three phases individually, even in case of 100% unbalancing at the output with even 0% load on one phase. There should be no change in regulation in phase voltage with 100% unbalancing.

7. The system should be capable of supplying energy to load from commercial mains without any break in case of phase reversal at the input. It should also generate aural and visual alarm in such a case.

8. a) The system should have provision of protection for

   (i) Input under voltage
   (ii) Input Over Voltage
   (iii) Output Over Voltage
   (iv) Output Over load
   (v) Output short circuit
   (vi) Battery under Voltage
   (vii) Over temperature
   (viii) DC Over current

   b) The system should generate aural and visual alarms for above-mentioned conditions.

9. The system should have Controls as

   (i) Input Circuit Breaker
   (ii) Bypass Circuit Breaker
   (iii) Maintenance Bypass Switch
   (iv) Inverter ON / OFF Switch
   (v) Alarm acknowledge switch

10. (a) The system should have facility to store the Logs of the events being monitored by monitoring system.
    (b) The UPS system should have the capability to store a minimum of last 100 events.
    (c) The UPS should have in-built digital fault diagnostic through stored events in UPS system.

11. The UPS system will be connected to 60kVA Isolation Transformer, provided by AIR, externally at the Input of the UPS.

12. (i) The firm should specify the type of batteries, which shall be part of the system to be offered. **[The batteries of known & reputed world-class manufacturer only will be accepted.] The sealed maintenance free-batteries AGM-VRLA type shall only be acceptable. The detailed technical specification of batteries with their working life is also to be specified and provided with the offer.**
    (ii) All batteries within the battery string shall be of the same manufacturer and model.
    (iii) The designed life of the batteries shall be 10 years.
    (iv) The Battery system should be installed & supplied with MS Racks.
    (v) Battery system shall include the necessary inter-battery and inter-module connectors
    (vi) and terminal plates. The connectors shall be lead-tin plated copper and shall include stainless steel hardware.

13. A- The battery charger should have provision of

    (i) Monitoring battery temperature and accordingly adjusting the charging level to enhance the battery life.
    (ii) Programmable battery charging which can be programmed to enhance battery life.

    B- Battery charging current should be adjustable from 10% to 80% through Microprocessor & displayed.

    C- For battery sizing calculation, temperature is required to be taken as 0ºC.

    D- The Battery Charger system should be able to sense source of supply as mains or Diesel Generator. In case, the source of supply is Diesel Generator, it should disable battery charging and the rectifier circuit should only supply the load current. This is required to avoid overloading of the Diesel Generator.

14. The system should have communication port RS-232/RS-485, SNMP/HTTP network interface and should be compatible to integrate with NMS. Suitable software for monitoring & diagnostics etc. should be supplied.

15. The system should be designed with scientific forced air-cooling for proper ventilation. Acoustic noise level should be kept at minimum.

16. The UPS system output should be isolated from the DC circuit of the UPS.
17. The firm should specify the total area requirement for installation of the system including batteries. A floor layout plan should be attached.

18. The system that shall be quoted against this tender should include all switchgears, cables, earthing etc. Terminals for input 3-phase, 4 Wire, power supply & output 3-phase, 4 Wires should be provided.

Power supply sub distribution in the output is not in the scope of this tender. A block-schematic diagram with all items should be provided.

19. The system that shall be quoted against this tender should be capable of running continuously round the clock, seven days a week without interruption or failure.

20. The UPS System quoted must conform to the latest international standards of safety and EMC. The conformance to such standards (indicating standard's name & number) must be stated in compliance statement. A certificate issued to OEM by authorized international/ national agencies should be submitted along-with the declaration from OEM in this regard.In general, following standards should be met: -

    A. Safety: IEC 62040-1 / EN 50091-1

    B. Emission and Immunity: IEC 62040-2, Class A / EN 50091-2 (Class A)

    C. Performance: IEC 62040 –3/ EN 50091 – 3

    D. CE-Marked in accordance with EEC directives 73/23 "low voltage" and 89/336 "Electromagnetic compatibility"

21. The UPS manufacturer must be ISO 9001-2000 certified company. A copy of the certificate should be enclosed with the offer.

SECTION-3.0

DETAILED TECHNICAL SPECIFICATIONS OF UPS

3.0	The UPS shall produce high quality sinusoidal output. The UPS shall be designed to operate as true on-line, double conversion type UPS, strictly as per the definition of IEC 62040-3 as follows: **Make & Model of the offered UPS** shall be clearly mentioned.
3.1.1	**Normal Operation :** The critical AC load should be continuously supplied by the UPS inverter. The rectifier & charger should take power from the AC input source, convert it into suitable DC and supply to the inverter as well as charge the batteries on Automatic Float cum Boost Mode.
3.1.2	**Upon Mains Failure :** Upon failure of AC input power, the critical AC load should continue to be supplied by the inverter, which should obtain power from the battery. There shall be no interruption in power to the critical load upon failure or restoration of the AC input source.
3.1.3	**Upon Mains Restoration :** Upon restoration of AC input power, the Rectifier/Charger should automatically restart walk-in and gradually take over the supply to inverter and charging to the battery.
3.1.4	**Static Bypass :** Each UPS Module should have inbuilt 100% rated static bypass line**.**
3.2	**Static Transfer Switch :** Static Transfer Switch and bypass circuit shall be provided as an integral part of the UPS. The static switch shall be naturally commutated high-speed static (SCR type) device.
3.3	**Maintenance Bypass Isolator :**
3.3.1	**General :** A manually operated maintenance bypass isolator shall be incorporated into UPS cabinet to directly connect the critical load to the input AC power source, bypassing the rectifier/charger, inverter and static transfer switch.
3.3.2	**Maintenance Capability :** With the critical load powered from the maintenance bypass circuit, it shall be possible to check out the operation of the rectifier/charger, battery, inverter and static transfer switch.
3.4.1	**System continuous rating :** 40 KVA, 36 KW at 0.9 PF.
3.4.2	**Battery Capacity :** The UPS system must be capable of providing supply to the UPS inverter on 40 KVA /36KW - load in case of Main Power failure. The battery bank shall be of MF-VRLA type (reputed make similar to Amara Raja/HBL Nife/ Rocket etc.) consisting of 40Nos of 12V cells of 100AH installed in proper standard cabinets with proper connections and in factory-charged condition. Battery Bank Capacity: Minimum 48000 VAh. Normal Output Current Capacity: Minimum 100 AH. DC Voltage of the Battery Bank: Minimum 480V. Charging Voltage: Float : 13.5 ± 0.1V per Battery at 24º C Boost: 13.8 ± 0.1V per Battery at 24º C Cut off Voltage:1.7 - 1.75V per cell Life:10 years designed life at 27º C on full float The calculation sheet for battery capacity and the make ,model, quantity of batteries should also be furnished.
3.4.3	**Rectifier Input :** 415 Volts, three-phase, 4-wire-plus-ground Bypass Input : 415 Volts, three-phase, 4-wire-plus-ground Output : 415 Volts, three-phase, 4-wire-plus-ground
3.4.4	**Input Voltage Range :** 330 V to 460 V (415 V nominal) for 100% load
3.4.5	**Input Frequency :** 50 Hz
3.4.6	**Frequency Tolerance :** 45 Hz-55 Hz
3.4.7	**Power Walk-in** : 1-90 seconds (selectable)
3.4.8	**Rectifier hold-off:** 1-120seconds(selectable)
3.4.9	**Input Power Factor :** ≥ 0.99 for 100%load. ≥ 0.99 for 75%load. ≥ 0.98 for 50%load.
3.4.10	**Input Current Harmonic Distortion :** ≤ 3% THD at 100% load ≤ 3% THD at 75% load ≤ 4% THD at 50% load
3.4.11	**Output Voltage Regulation :** 1. ± 1% steady state for a static 100% balanced load 2. ± 2% steady state for a static 100% unbalanced load

	3. ± 5% for a 0 to 100 % load step
3.4.12	**Output Frequency :** 50 Hz ± 0.1 Hz free running (battery/mains operation) The output frequency of the inverter shall be controlled by an oscillator. The Oscillator shall hold the inverter output frequency to ± 0.1 Hz for steady and transient conditions.
3.4.13	**Output Power Factor:** 0.9
3.4.14	**Output Harmonic Distortion :** 1. ≤ 1% THD maximum for a 100% linear load 2. ≤ 3% THD maximum for a 100% non-linear load
3.4.15	**Crest Factor :** 3 : 1 or better
3.4.16	**Voltage Transient Response :** 1. ± 3% for a 50% load step 2. ± 5% for a 100% load step
3.4.17	**Voltage Transient Recovery Time** : 20 milli-seconds
3.4.18	Transient Voltage Surge Suppressor (TVSS) should be provided at the input & output of the UPS System.
3.4.19	**Phase Displacement :** 1. 120 degrees ±1° for balanced load 2. 120 degrees ±1° for 50% unbalanced load 3. 120 degrees ±2° for 100% unbalanced load
3.4.20	**Automatic Phase sequence Correction:** The system should be capable of supplying energy to load from commercial mains without any break, in case of phase reversal at the input. In case of input phase reversal, aural and visual alarm should be activated. **Details of Automatic Phase sequence Correction circuit should be provided in the technical bid.**
3.4.21	**Overload Capability :** **In normal mode :** 1. Upto 110% load for 60 minutes 2. 110% to 125 % load for 10 minutes 3. 125 % to 150 % load for 1 minute **In Bypass mode:** 1. 100% to 125% load for 60 minutes 2. 125% to 150% load for 10 minutes. 3. 151% to 200% load for 3 seconds.
3.4.22	**Short Circuit Withstand :** The UPS must withstand a bolted fault short circuit on the output without damage to the UPS module
3.4.23	**Overall Efficiency of the UPS with Isolation transformer at the output:** 1. ≥ 93% at 100% load, at nominal voltage with batteries fully charged. 2. ≥ 93% at 75% load, 3. ≥ 93% at 50% load.
3.4.24	**Acoustical Noise :** ≤ 60 dB (A) of noise, typical, measured at 1 meter from the equipment surface
3.4.25	The UPS Cubical and Battery Rack dimensions should be specified in meters (L X B X H). Floor layout plan may also be given with dimensions

3.5	**Environmental Condition:** The UPS shall be able to withstand the following environmental conditions without damage or degradation of operating characteristics
3.5.1	**Operating Ambient Temperature** : UPS Module : 0° C to 40 ° C Battery : 25 ° C
3.5.2	Storage/Transport Ambient Temperature : -30° C to +45°C
3.5.3	Relative Humidity : =<90% in 20° C
3.5.4	**Altitude Operating :** The UPS should be able to deliver the rated output upto 1000 metres above Mean Sea Level
3.5.5	**DC Filter :**

	The rectifier/charger shall have an output filter to minimize ripple voltage into the battery. The Ripple voltage should be less than 0.5%. The Ripple Current should be ≤ 5% of battery AH capacity.
3.5.6	**Battery Recharge :** In addition to supplying power for the inverter load, the rectifier/charger shall be capable of providing battery charging current to recharge the battery properly (up to 10% of battery AH capacity). Total battery management and monitoring should be available in the System. In addition to the above, automatic charging current control may also be provided. The Battery Charger system should be able to sense source of supply as mains or Diesel Generator. In case, the source of supply is Diesel Generator, it should disable battery charging and the rectifier circuit should only supply the load current. This is required to avoid overloading of the Diesel Generator as the existing 62.5 KVA Diesel Generator is sized optimally to take care of the present load of transmitter and allied equipment only and not the additional load of the 'UPS – Battery charging'. The normal functioning of Battery charging should be restored immediately on switching of prime source of supply as AC mains.
3.5.7	**Low Battery Voltage Protection :** To prevent total discharge or damage to the battery, the UPS must transfer to standby operation when the battery voltage reaches a minimum voltage level (programmable).
3.5.8	**Battery Disconnect :** An external MCCB is to be provided for protection and isolation of the battery bank from the rest of the system.
3.5.9	**RF Shielding :** The UPS must have RF(Radio Frequency) radiation shielding since it will be installed in strong RF field environment of 10 KW power. Any failure of electronics due to RF pick-up must be taken care of by the manufacturer.
3.6	**DISPLAY AND CONTROLS :**
3.6.1	**Monitoring and Controls :** The UPS shall be provided with a status display and control section designed for convenient and reliable user operation. A system power flow diagram, a percentage load and battery time remaining display shall be provided as part of the monitoring and controls sections which depict a single line diagram of the UPS. The monitoring functions such as metering and alarms shall be displayed on a multilingual Graphic fluorescent backlit LCD. Language features of the monitoring system shall be in English.
3.6.2	**Metering :** The following parameters shall be displayed : A] Input : Voltage & Currents, Frequency, Power Factor B] Bypass : Phase Voltage, Line-Line Voltages, Frequency C] UPS Output : Phase Voltages, Currents, Line-Line Voltages, Power Factor, Frequency D] Local Load : Load of each Phase Active Power (KW), Apparent Power (KVA) of each phase, Load Crest Factor E] Battery : Battery Bus Voltage, Battery Charge & Discharge current, forecasted battery back-up time, battery temperature battery capacity (AH)
3.6.3	**Warning, Protection and Alarm Messages :** [a] Input/Mains : Charger Fault, Input Fail, Mains Phase Reversed, Mains Voltage Abnormal, Main Frequency Abnormal generator connected, Input Disconnect Open/Closed
	[b] Rectifier/Input Inductor/DC Bus : Input Inductor over Temperature, Rectifier Fault, Rectifier Over-current, Rectifier Comm. Fail, Rectifier in setting, Rectifier Over Temperature, DC Bus Abnormal, DC Bus Over-Voltage,
	[c] Battery : Battery Over-Temperature, Battery Fault, Battery Low pre-warning, Battery end of Discharge, Battery contactor Fail,

	Battery Capacity Testing, Battery Maintenance Testing, Battery Fuse Fail, Battery Contactor Open/Closed, Battery Reverse, No Battery, Battery Float Charging, Battery Boost Charging. **[d] Inverter :** Inverter Over-Current, Inverter Asynchronous, Inverter Fault, inverter inductor over-temperature, Inverter Over-Temperature, Inverter communication Fail, Inverter STS Fail, inverter DC Offset, Inverter in Setting. **[e] Bypass :** Bypass STS Fail, Bypass Abnormal, Maintenance Disconnect Open/Closed, Bypass disconnect Open/Closed, Bypass Abnormal Shutdown, Bypass Phase Reversed, Bypass Over-Current.
	[g] Module's Common : Normal Mode, Battery Mode, bypass Mode, Ambient over-Temperature, Fan Fault, System Overload, Manual Turn-ON/OFF, Unit Overload TimeOut, Operation Invalid, Output Fuse Fail, Unit Overload, Joint Overload, Joint Mode, UPS Shutdown, Output Disabled, Transfer Confirm/Cancel, Unit OFF Confirm, System OFF Confirm, Fault Reset, Alarm Silence, Output Disconnect Open/Closed, Turn-ON Fail, Output Over-Voltage (reserved), Alarm Reset, Load Impact Transfer Time-Out, Setting Save Error, mains Neutral Lost, UPS System testing, Protocol Version Clash.
3.6.4	**POWER STATUS DIAGRAM :** A mimic panel shall be provided to depict a single line diagram of the UPS. Illuminating lights shall be integrated within the single line diagram to illustrate the status of the UPS. The three LEDs shall indicate the following status : A. Bypass voltage B. Load on Bypass C. Load on Inverter
	CONTROLS : The following controls have to be provided in the display unit. 1. Silence on audible alarm 2. Set the alphanumeric display language to English or the alternate language 3. Display or program the time and date 4. Enable or disable the automatic restart feature 5. Transfer to or from static bypass operation 6. Transfer to or from forced battery operation 7. Program the unit for economy operation 8. Program the battery charger 9. Calculate battery back-up time 10. Test battery condition on demand 11. Program the unit to periodically test battery condition 12. Program voltage and frequency windows 13. Calibrate metered parameters 14. Enable or disable adaptive slew rate. Set maximum slew rate 15. Adjust set points for different alarms 16. Program the remote shutdown contact (enable/disable remote shutdown, polarity display) 17. Set the delay of the common fault contact 18. Program the unit for soft start for use with a generator
3.6.5	**Communication Features :** RS-232/RS-485 interface ports as standard feature SNMP/HTTP Network Interface MODEM Card
3.6.6	**SNMP Adapter :** A Web-Enabled SNMP adapter for one or more network management systems (NMS) to monitor and manage the UPS in TCP/IP network environments should be available. The management information base (MIB) must be provided. The SNMP interface adapter has to be connected to the UPS via the RS232 serial port.
3.6.7	**UPS On & Off Switches :** Momentary UPS On & Off Switches must be provided in a user accessible area. Upon activation of the switches, the UPS must automatically connect the UPS output to the critical load. Upon de-activation of the switches, the UPS must remove power from the critical load.

3.6.8	The Integral maintenance bypass has to supply the load from the bypass source while the UPS is isolated for maintenance. UPS input, output, static bypass and maintenance bypass switch must be housed in the same cabinet. Each switch must be monitored and controlled by the UPS.
3.6.9	**Battery charger temperature compensation :** For units with external batteries, the battery charger temperature compensator has to monitor the temperature in battery cabinet.
3.6.10	**Automatic power upgrade:** Nominal power ratings refer to the most extreme environmental conditions: 40°C. In controlled environment (25°C) the output available power should be 10% higher.
3.7	**ENVIRONMENTAL CONDITION :** 1. Operating Ambient Temperature : 0° C to 40° C 2. Storage/Transport Ambient : -30° C to 45° C 3. Relative Humidity : up to 90%
3.8	**Remote Display Panel:** A remote display panel with interface cable of required length and connectors may be provided as part of UPS system for monitoring the status of UPS from a remote location. The panel shall provide for visual indication on working of UPS in Normal/Battery mode, alarm indications of Battery low, Bypass, overload, fault and Buzzer for audible alarm with buzzer cut off switch. The panel shall be powered from UPS through the interface cable.
3.9	**Capacity:** 40 KVA/36KW with inbuilt isolation Transformer
4.0	**Isolation Transformer** **UPS output should be fully isolated by double conversion and inbuilt isolation transformer within the UPS cabinet itself. External isolation transformer shall not be considered.**

4.1 ISOLATION TRASFORMER

1. AC Input: Delta 3-phase, 400 ± 10% (phase to phase)
2. AC Output: Star 3-phase, 400 V ± 10 % (phase to phase) 230 V (phase to neutral)
3. Frequency: 47 to 53 Hz.
4. Capacity - 40 KVA
5. Duty cycle and use 24 × 7 Continuous, Indoor.
6. Common Mode Noise Rejection -Better than 110 dB.
7. Inter winding capacitance - Less than 0.005 pF.
8. Insulation Resistance - More than 500 Mega Ω at 500 V.
9. Terminals Studs on fiber glass plate- at rear.
10. Cable entry - Bottom

Section-4.0(A)

Schedule of Requirements/Materials un-priced

{The tenderer must quote all items}

S. No.	Description	Qty.	Unit	Make	Model
1)	40 kVA, IGBT/PWM based (Rectifier & Inverter), true on-line double conversion fully DSP controlled type UPS system (3- Phase, 4 Wire input - 3 Phase, 4 Wire Output) with Control Switch gear, remote status display panel with interface cables etc., as per AIR specifications [Including Transient Voltage Surge Suppressor (TVSS) in input & output. (ANSI/ IEEE C62.41 1991 C1 (6KV @ 3KA))]	**9**	**No**		
2)	**12 V Batteries of Sealed Maintenance Free (AGM-VRLA type) Battery Bank as per following AIR specification.** **No of batteries with UPS: 40Nos** **Ah of each battery: 100AH** **DC bus voltage: 480V** **Size of battery bank: 48000AH**	**9**	**Set**		
3)	Any other item required for the completeness of the UPS system.	**9**	**Set**		
4)	Installation, Testing and Commissioning of the UPS system with Isolation Transformer (to be provided by AIR) at the output of the UPS system as per standards and AIR specifications	**9**	**Job**		

Note: Input Power and Earthing to UPS would be extended and provided by AIR.

Section-4.0(B)

Schedule of Requirements/Materials unpriced (Optional items)**(Not to be considered for Ranking)**

S. No.	Description	Qty.	Unit	Make	Model
1)	Recommended spares for each set of UPS System. (Items wise details with part No. if any, are to be given by the tenderer). i…… ii……... iii……..	**9**	**Set**		

Note: All India Radio at its own discretion may procure spares for a value not exceeding 10% of the cost of equipment's. The tenderer should quote all the essential spares.