

Annexure- III

Specification of GC-MS/MS with FID		
Sl No.	Features/ Particulars	Specification/ Description
1.	Application	
1.1	Equipment Configuration	A. A Latest and highly sensitive Gas Chromatograph with tripe/ Tandem quadruple mass spectrometer system required with software, auxiliary equipment, accessories and data base.
1.2	Area of analysis	The equipment shall have capability to quantify at 1/4 th of the maximum residue limit set by national and international regulatory authority for milk and milk products. a. Analysis of pesticides in milk and milk products as per FSSAI. b. Milk fat purity by Triglycerides as per ISO 17678/2010 on GC-FID c. Fatty acids in milk and milk products
2	Gas Chromatograph (GC)	
2.1	Compatibility/capabilities	a. A benefit top gas chromatograph system shall be compatible with offered mass spectrometer, Flame Ionization detector (FID), Auto sampler, Inlets (02 nos), columns (min 3 Nos.) and all other necessary consumables for operation of one year. b. Oven of Gas chromatograph shall have enough space to install two columns and other accessories.
2.2	Gas Supplies	a. The gases and flow rate requirements on 24 hrs. of continuous working shall be specified with the offer. b. The purification filters required for all the gases to be used in equipment shall be included c. System shall have Electronic pneumatic/ pressure controls of all the gasses.
2.3	Auto sampler	a. Auto sampler automatic injection devices with minimum 15 or more vial tray. b. It shall have reproducibility < 0.5% RSD when injected Iul. c. Auto sampler shall have provision for minimizing the carry over. It shall have facility to wash syringe with more than two solvents before and after the injections.
2.4	Inlet (2 No's)	a. System should be offered with two inlets 1) MMI/PTV for pesticide analysis 2) On Column injector for Triglyceride analysis or any other suitable inlet for triglycerides analysis as per ISO 17678:2010 subject to successful demonstration. b. System shall have advanced electronic flow

		control modules with Pressure set points adjustable in increments of 0.01 psi or better, with typical control a 0.01 or better for the range 0.000 to 140 psi for both injectors.
		c. System shall be easy to perform maintenance activities like removal of liner, changing of septa, o rings
		d. System shall have total flow setting range for N ₂ to be 0-200 ml/min while he 1200ml/min
2.5	Column Oven	<p>a. System shall have provision to install two columns simultaneously during routine work</p> <p>b. Operating temp range of oven from near ambient to 450°C</p> <p>c. Support 15 oven ramps or better in a single run</p> <p>d. Ramp rate shall go up to 100°C/min or more</p> <p>e. Supplier shall supply</p> <p>1) Two suitable columns for pesticides (30 Meter Length) for use on GCMS/MS.</p> <p>2) One suitable column for Fatty Acid-100 M Length.</p> <p>3) One suitable column for Triglyceride analysis- 5 Meter Length, 0.53 mm ID; 0.17Um with non-polar stationary phase (as per ISO 17678:2010)</p>
2.6		a. GC should have facility of retention time locking/or other suitable equivalent mechanism to avoid change in retention times.
		b. The system should have independently heated GC-MS/MS interface to avoid loss in analytes due temperature gradient in after elution from column.
3	Mass Spectrometer	
3.1	Ion Source	a. The equipment quoted with EI mode of ionization.
		b. The system shall have ability to program ion source temperature up to 350 °c or better
3.2	Mass filters/analyser	<p>a. Triple quadruple with suitable mechanism for calibration, auto tune, compound optimisation, quantitation and confirmation</p> <p>b. Quadruple shall be made up of inert material to have better mass transfer efficiency and shall have provision for keeping quadruple clean from dirty matrix</p> <p>c. Collision Energy must be selectable up to 60eV</p> <p>d. System shall analyse masses from 10 to 1050 AMU</p> <p>e. Scan speed up-to 20000 dalton/ sec (u/s) or better .</p> <p>f. Mass stability should be up to 0.10 amu/24 hrs or better</p> <p>g. MRM speed (transitions/ sec) 800 or more enabling automatically quantifying and confirming more targets in a single method run.</p> <p>h. Minimum MRM Dwell Time must be at least 0.5msec</p>
3.3	Detector	a. System should have Electron multiplier detector or photo multiplier detector with Jong life and better sensitivity.
		b. It shall have digital dynamic range <! 1 X 10 ⁶ or better
3.4	Calibration of mass spectrometer	<p>a. Mass spectrometer shall have suitable mechanism for injecting the calibration solution for calibration system .</p> <p>b. Manufacturer shall provide calibration of the instrument quarterly during warranty period.</p>

3.5	Acquisition mode	System shall be capable of acquiring data in full scan, product ion scan, selected ion monitoring and multiple reaction monitoring.
3.6	Sensitivity	EI MRM Sensitivity: 1ul of 100 fg/ ul octafluoronaphthalene (OFN) RMS S/ N minimum 30,000: 1 for MS/ MS transition of m/ z 272-+222 or Numerically equivalent, if estimated by injecting different amount of concentration of OFN.
3.7	Vacuum System	a. The pumps in required numbers to be offered to meet the instrument vacuum requirement and sensitivity. b. All accessories required for the proper functioning of vacuum system shall be supplied. c. Vacuum system shall have proper venting/exhaust system to remove effluents from pumps and sample split out of laboratory .
4	Flame Ionisation Detector	
	FID	a. Compatible with capillary columns of different diameters b. Shall have Flame out detection and automatic re-ignition facility c. Minimum Detectable Level (MDL):< 1.5 pg C/s for tridecane d. Linear dynamic range: > 10 ⁷ e. Temperature: 440 °C or More f. Standard electronic pneumatic control for three gases i.e. Air; Hydrogen and Makeup gas (N ₂ or He) shall be available for operation .
5	Computer Work station with System Software	
5.1	Computer work station	Latest model of branded computer with preloaded software, laser jet duplex printer shall be offered. The monitor shall have large screen preferably of 24 inches or better.
5.2	Software	a. Preloaded fully automated data acquiring & processing software for with original Software CD and license number of Software shall be supplied with the system. b. Software shall have control over all operations of Auto sampler, gas chromatography, mass spectrometer and printer simultaneously or separately.
5.3	Software features	a. Software shall have necessary functions to carry out data acquisition peak integration, quantification for accurate quantitation and confirmations of the analytes of interest/ indicating ion ratios. b. Software shall perform simultaneous SIM and SCAN mode of data acquisition. c. Software shall have auto flagging facilities in certain parameters as 1. Auto flagging for the ion ratio which falls out of the confirmation criteria 2. Auto flagging for the concentration which is falling below limit of quantitation 3. Auto flagging for recovery/ QC values which is falling out of the defined range of acceptance

5.4	Databases / Libraries	<p>a. Bidder shall provide a database of GC amenable compounds like Pesticides, PCBs, PAH, Dioxins, other contaminants etc. Database should have information like molecular formula, mono isotopic mass, parent and daughter ions cone voltage, collision energy, and other parameters required to standardise analysis method for any compound</p> <p>b. NIST Library.</p>
6	Calibration solution/standards, consumables and accessories	
6.1	Toolkits/ consumable kits/calibration kit/spares	The supplier shall include and specify the kits of relevant equipment parts and accessories along with tool kit.
6.2	Calibration solution/ standards	All calibration standards for mass spectrometer / gas chromatograph / auto sampler shall be offered .
7	Installation	
7.1	Pre-installation	The party need to submit the pre-installation requirement with the offer
7.2	Installation	The installation to be undertaken while ensuring all the criteria for compliance as per specification are met and demonstrated .
7.3	IQ/OQ/PQ	Supplier shall perform all these tests during the installation .
8	Warranty	
8.1	Warranty	Supplier shall provide comprehensive warranty for one year covering all parts of equipment. The warranty of equipment would be extended by a month, if equipment has been down for more than 10 days in a year, whereas, warranty of equipment would be extended by 1 year, if equipment has been down for more than 30 days due to malfunctioning of any part supplied by bidder during warranty period.
8.2	AMC	1 year free comprehensive maintenance be provided and AMC charges from 3 rd year onwards should be quoted separately.
9	Training	
	Operation and application training	<p>a. One week operational training after installation covering GCMS/ MS; GCFID, software features, instrument troubleshooting and maintenance .</p> <p>b. Supplier shall provide one week application training on method development and standardization</p>
10	Method Set Up	
	Bidder shall develop the methods as per application requirement of tender after installation. It shall Cover equipment optimization, and sample preparation. It shall meet the performance criteria.	<p>a) Pesticides in two products i.e. Liquid milk and ghee or any product suggested by the end user as per FSSAI requirement for GC amenable pesticides (Refer Sr. no. 14).</p> <p>b) Standardisation of method for analysis of triglycerides profile as per IS017678/2010 in milk, milk products.</p> <p>c) Standardisation of method for analysis of fatty acid profile as per AOAC 996.06</p>

11	Service & Supply	
11.1	Local service facility	<p>a. The supplier shall have service facility and trained engineers located in nearby metros to provide breakdown services within 24-48hrs of complaint registration.</p> <p>b. The supplier shall have application laboratory in India to support the application requirement and training needs.</p> <p>c. Supplier shall be responsible for providing the service during the warranty and AMC period for the instruments and accessories offered from other manufacturers also.</p>
11.2	Stock inventory	The supplier shall keep inventory of spares and consumables in India for the repair of equipment.
11.3	Number of installations	The supplier shall provide a list of installations of GC- triple quadruple mass spectrometer in food testing laboratories from government and private sector during last three years with contact details.
11.4	Warranty extension	The warranty of equipment would be extended by a month, if equipment has been down for more than 10 days in a year, it would be extended by 1 year, if equipment has been down for more than 30 days due to malfunctioning of the any part supplied by bidder or want of spares.
12	Performance verification and compliance	
12.1	Demonstration and Evaluation	a) We reserves the right to verify the performance of equipment at any stage of purchase process
		a. The bidder are requested to arrange all the pre-requisite and set up applications (as per Sr. no. 1.2a) at their facility for timely, successful demonstration and evaluation.
12.2	Compliance	<p>a. The bidders are requested to provide point wise compliance for each point in specification along with documentary evidences.</p> <p>b. The reference of compliance information in submitted offer shall be clearly specified.</p> <p>c. The offer with incomplete/ untraceable information may not be considered.</p>
12.3	Canvassing	a. Any type of unwarranted canvassing for selection of instrument may lead to rejection of the offer.
12.4	No offering of refurbished / assembled / demo modules	a. No part of the offered instrument shall be refurbished or used in demonstration purpose. Kindly submit undertaking.
13.0	General conditions	<p>It is the responsibility of vendor to supply a complete solution / unit for the analysis.</p> <p>Vendor should be able to supply all the spares / consumable required for repair at least 8- 10 years after installation.</p>

14.0 Reference to Sr. No. 10.0 the list of Pesticides and LOQ to be set up.

Requirement of GC amenable pesticides as per FSSAI in milk and milk products			
Sr. No	Name Of compound	MRL (mg/kg) PPM	Limit of Quantification
1	Aldrin and dieldrin	0.01	1/4 th of Maximum Residue Limit
2	Chlordane	0.01	
3	DDT, DDD & DDE	0.01	
4	Fenithrothion	0.01	
5	Heptachlor	0.01	
6	Lindane	0.01	
7	Chlorpyriphos	0.02	
8	Cypermethrin	0.05	
9	Fenthion	0.01	
10	Fenvalerate	0.01	
11	Phorate	0.05	
12	Pirimiphos-methyl	0.05	
13	Endosulfan (sum of alpha, beta isomers and endosulfan sulfate expresses as endosulfan)	0.01	
14	Heptachlor Epoxide	0.01	
15	Diazinon	0.01	
16	Parathion methyl (sum of parathion-methyl and paraoxon-methyl expressed as parathion methyl)	0.01	
17	Bifenthrin	0.2	
18	Chlorothalonil	0.07	
19	Deltamethrin	0.05	
20	Dichlorvos	0.01	
21	Etofenprox	0.02	
22	Fenproprathrin	0.1	
23	Triaccontanol	0.01	
24	Metiram as CS2	0.05	
25	Mancozeb	0.05	
26	Phosphamidon	0.01	
27	Captafol	0.01	
28	Formothion	0.01	
29	Simazine	0.01	

Requirement of GC amenable pesticides as per EIC-RMP 2019-20 in milk products

Sr. No	Name Of compound	MRL ($\mu\text{g}/\text{kg}$) PPB	Limit of Quantification
1	Aldrin and dieldrin	6	1/3rd of Maximum Residue limit
2	Chlordane	2	
3	Endosulfan (Sum of Alpha,beta and Sulfate)	50	
4	Lindane	1	
5	Heptachlor (Sum of heptachlor and epoxide)	4	
6	Methoxychlor	10	
7	Diazinon	10	
8	Fenthion	10	
9	Malathion	20	
10	Parathion-methyl	20	
11	Phosalone	10	

Annexure - IV

Technical Specification of Inductively Coupled Plasma Mass Spectrometer (ICP-MS)

ICP-MS with accessories such as auto-sampler, microwave digestion system, chiller, exhaust fume hood, computer, printer, etc.; is required for the following application:

Application requirement:

A: The equipment should be able to analyze heavy metals in milk, milk products and food samples as per FSSAI and International regulation. Some of the typical limits to be quantified accurately in samples are given below.

Sr No.	Sample	Analyte	Concentration (ppb)
1	Liquid Milk	Lead	10
2	Sugar	Chromium	10
3	Infant food	Arsenic	25
4	Water	Aluminium	15
		Arsenic, lead, selenium	5
		Cadmium	1.5
		Mercury	05

Technical specification

The bidders are requested to provide point wise compliance for each point in specification along with documentary evidences. The reference of compliance information in submitted document shall be clearly specified. The offer with incomplete/untraceable information may not considered.

Vendor should quote only one model which is latest, fastest in scanning and delivers high throughput without affecting accuracy. End user reserves the right to verify the performance characteristics of the equipment to check the accuracy, precision, speed and ease of operation.

Sr. No.	Technical specification ICP MS with required accessories		
1	Basic configuration of equipment		
A	A complete unit consisting of mass spectrometer with inductively coupled argon plasma to quantify heavy metals at ½ of MRL of FSSAI levels in milk, milk products and food samples is required.		
B	ICP MS should have reaction and collision cell technology to reduce the influence of polyatomic ions and suitable gas ports and gas flow controller should be available. The equipment should have a complete provision to use various gases such as argon, helium, hydrogen, oxygen etc. simultaneously for the analysis of heavy metals in different modes to remove interferences in a single method.		
C	Bidders are required to submit application note or data by using quoted model on the following samples with the offer. I. Recovery of heavy metals in milk or milk products or food samples.		
2	Detector		
	The detector should have linear dynamic range up to 9 order of magnitude or more.		
A	The mass range of the equipment should be 3-260 AMU or wider.		
B	The equipment should meet following guaranteed or typical performance criteria		
C	Sr No	Characteristics	Criteria
	I	Sensitivity (mcps/ppm)	Li (7) or Be(9)
			Y (89) or In (115)
			Tl (205) or U(238)
		Requirements	
			≥6
			≥100
			≥ 80

	II	Oxide ratio (%)	CeO ⁺ /Ce ⁺	≤ 3
	III	Doubly charged ratio (%)	Ce ⁺⁺ /Ce ⁺ or Ba ⁺⁺ /Ba ⁺	≤ 3
	IV	Background (cps)	Measured at mass 9 or m/z 4.5 or Mass 220	≤ 1
	V	Detection limit (ppt)	Be (9)	≤ 0.5
			In (115)	≤ 0.25
			U (238) or Bi (209)	≤ 0.25
	VI	Isotope ratio precision (%RSD)	Ag (107)/Ag (109)	≤ 0.1
3	Sample Introduction system			
A	Suitable nebulizers, injectors and spray chambers for the analysis of various analytes in milk and food matrix should be supplied along with equipment.			
B	Equipment should have peltier cooling facility to control the temperature.			
C	High precision peristaltic pump with at least 3 channels 10 rollers should be available.			
D	Auto-sampler consisting of suitable sample trays to analyze at least 50 samples at a time should be supplied with complete software package.			
4	Plasma			
A	The equipment should have suitable RF generator. It should have variable power range from 500-1600 watt.			
B	Suitable quartz torch for food samples should be available.			
5	Interface			
A	Suitable sampler and skimmer nickel cones should be supplied with the equipment to meet different application requirements.			
6	Software of equipment			
A	The equipment should be supplied with all required software for instrument optimization, sample analysis, data analysis, auto sampler and data export to excel.			
7	Basic consumables, kits and spares			
A	All required solutions, kits, spares to optimize and check the performance of equipment should be supplied.			
B	Individual standards (1000 ppm -100 ml size) such as arsenic, cadmium, lead, mercury, copper, tin, zinc, chromium, aluminium, selenium bismuth, yttrium, scandium, germanium etc. should be supplied.			
8	Re-circulating chiller, gas lines and exhaust system			
A	A suitable re-circulating chiller should be supplied.			
B	A suitable exhaust system should be included. Bidders are encouraged to visit the site for actual assessment of work.			
9	Basic utilities			
A	A suitable factory configured computer system with CPU and a monitor minimum 24-inch flat panel with pre-loaded with latest Windows operating system, MS Office and other required software should be supplied.			
B	Laser jet automatic duplex printer should be provided.			
10	Installation and training			
A	The pre-installation requirement should be submitted with the offer.			
B	The supplier has to perform IQ and OQ of the system at the site.			
C	The bidder will provide 5-7 days operational and application training.			
D	The bidder has to undertake complete validation for application. It includes sample preparation, digestion, extraction, analysis and interpretation of the results.			
11	Microwave digestion system:			
A	Vendor has to supply a latest model of microwave digestion system capable of digesting minimum 10-12 milk, milk products and food samples together for heavy metal analysis.			
B	The volume of TFM/PTFE vessels should be minimum 50 ml. The vessels should be light in weight to keep them on analytical balance for weighing and easy handling.			
C	It should be able to reach temperature up to 250 °C with 40 bar pressure. Installed microwave power should be minimum 850 watt.			
D	Filling volume should be 3-25 ml.			
E	Equipment should be able to digest sample up to 2 g per vessel.			
12	Warranty and Service			

A	Minimum 1 year warranty including all parts and 1 year free comprehensive maintenance from the date of installation should be given. AMC for 3-5 years should be quoted.
B	The supplier should have inventory of spare parts and consumables in India.
C	The warranty of equipment would be extended by a month, if equipment has been down for more than 10 days in a year, whereas, warranty of equipment would be extended by 1 year, if equipment has been down for more than 30 days due to malfunctioning of any part supplied by bidder or want of spare.
D	The bidder shall have service facility and trained engineers located in the state /region to provide the breakdown service within 24 – 72 hours of complaint registration.
E	The supplier shall have application laboratory in India to support the application requirement and training needs.
F	Bidder shall provide a list of factory trained service/application engineers/experts of the model quoted and submit a certificate.
G	The bidder should have minimum 15 installation of quoted model in last financial year in India and should provide list of users.
H	General conditions It is the responsibility of vendor to supply a complete solution / unit for the analysis. Vendor should be able to supply all the spares / consumable required for repair at least 8-10 years after installation.

Annexure - V

FTIR (Fourier Transform Infrared) Technology Based Milk Analyzer)

1. Application

- a) The equipment should be used for analysis of milk and milk products, adulteration screening and quality determination of raw, intermediate and processed milk.
- b) Products to be analysed: Milk (Raw and processed), Cream, Whey and Yoghurt and Ice cream mixes.

2. Equipment shall be capable of analysing at least below parameters in the range provide:

- a) Fat (Up to 50 % or higher)
- b) Protein (Up to 7 % or higher)
- c) Lactose (Up to 7 % or higher)
- d) Total solids (Up to 55 % or higher)
- e) Solids not Fat (To meet the product requirement as per Sr. No.1)

The above are the minimum performance criteria of equipment. However, measurement ranges should fulfil the compositional criteria for the products outlined at Sr. No. 1.

The additional parameters like Total Acidity / Density / FPD / FFA/ Citric Acids / Casein / Urea / Glucose / Galactose / True protein /NPN / pH etc. which could be analysed by the equipment should be indicated by the bidder along with the range of analysis.

3. The equipment should be supplied with all required calibrations and software for the products at Sr. No.1. It shall have the provision to upgrade / modify from time to time, if needed.

4. Equipment should be provided with a standard pre-calibrated module and required software for screening of adulterants like

- a) Ammonium Sulphate
- b) Detergent
- c) Glucose
- d) Maltose
- e) Melamine
- f) Salt
- g) Sodium Carbonate
- h) Sodium citrate
- i) Sorbitol
- j) Starch
- k) Sucrose
- l) Urea
- m) Vegetable Oils when mixed with Chemical Emulsifiers
- n) Formaldehyde

5. In other products, equipment shall be able to analyze the following parameters:

- a) Milk: Fat, Protein, Total Solids, Lactose, SNF
- b) Yoghurt: Fat, Protein, Total Solids
- c) Whey: Fat, Protein, Total Solids, Lactose
- d) Cream: Fat, Protein, Total Solids, SNF
- e) Ice cream: Fat, Protein, Total Solids, SNF

6. Method Set Up: It would be a responsibility of the bidder to set up all the methods in different products and standardize the instrument for work after proper verification.

7. The equipment should be based on FTIR technology and should follow IDF (International Dairy

Federation) standard 141 / ISO 9622 I AOAC Official Method 972.16.

8. The equipment should be supplied with a networking software along with all necessary accessories to transfer data to client server.
9. The equipment software should have the quality control features for monitoring instrument stability and status.
10. The equipment should comply with international safety guidelines. Certificate of these shall be submitted.

11. Technical requirements: -

- a) Accuracy: < 1% CV on major milk components for different varieties of milk
 - b) Repeatability: < 0.25% CV on major milk components
 - c) Analysis time: Maximum 40 seconds per sample for milk
 - d) Sample Volume: Less than or equal to 10 ml
 - e) Sample Temp: Approx. 5 - 42° C or wider on both sides
 - f) Cleaning Should be Automatic and Programmable
 - g) Optical System: Should be adequately sealed and protected
12. Vendor should provide branded PC and suitable printer for equipment operation for sufficient data storage, speed and ease of operation, sufficient ports for transferring online data and support data transmission should be available.
- 1 GHz CPU speed
 - 8 GB RAM
 - 64 GB free disk space
 - NTFS File system
 - 4xUSB connector
 - 1 GB Ethernet
 - DVD R/W Drive
 - Windows 7, or higher suitable for software of milk analyzer, either 32 Bit or 64Bit versions
13. **Consumable and Accessories:** Equipment should be supplied along with appropriate reagents, consumables, spares and accessories for routine operations for approximate analysis of 20000samples during the warranty period.

The requirement of these supplies for samples would be given to bidder on six monthly basis or on mutually agreeable dates.

14. **Training:** Basic training on operation/maintenance to be arranged by the bidder after installation of the equipment along with calibration development to be done for parallel/alternate milk products. The advance training on these should be conducted as per the request from end user, on mutually agreeable dates. The equipment should also be supplied with user manuals required for installation and training.
15. **Warranty:** Equipment shall be supplied with minimum a warranty of one year from the date of installation. Bidder should undertake on site minimum two preventive maintenance visits during the warranty period apart from the breakdown visits. Warranty would apply to all the accessories supplied by bidder.
- Bidder shall provide one year free comprehensive maintenance for the equipment.
- Bidder shall provide service within 48 hrs after registering the complaint during warranty and AMC period.

Warranty extension: The warranty of equipment would be extended by a month, if equipment has been down for more than 10 days in a year, whereas, warranty of equipment would be extended by 1 year, if equipment has been down for more than 30 days due to malfunctioning of any part supplied by bidder or want of spare
Demonstration and Evaluation: Purchaser reserves the right to verify the performance of equipment at any stage of purchase process. The bidder is requested to arrange all the pre-requisite timely for successful demonstration and evaluation if demanded by OMFED.

- 16. Compliance:** The reference / traceability of compliance information in the offer shall be clearly specified with supporting documentary evidences. The offer with incomplete/untraceable information may not be considered. Any type of unwarranted canvassing for selection of instrument may lead to rejection of the offer.
- 17. No offering of refurbished/assembled/demo modules:** No part of the offered equipment shall be refurbished or used in demonstration purpose undertaking must be submitted.
- 18. The AMC charges shall be quoted separately** after the expiry of warranty period (1 Year) and free maintenance for one year.
- 19.** It is the responsibility of vendor to supply a complete solution / unit for the analysis.
- 20.** Vendor should be able to supply all the spares / consumable required for repair for at least 8- 10 years after installation.
- 21.** The vendor should have few installations in major dairies/laboratories of the country and has demonstrated satisfactory performance of the equipment to the concerned stakeholders

Annexure - VI

Bacteria and Somatic Cell Analyser

1. The instrument should provide Integrated and Automatic Individual Bacteria Count (IBC) and Somatic Cell Count (SCC) in raw milk of cow and buffalo by using Flow-Cytometry as per the approved method of by IDF and ISO.
 2. The sample processing module comprising of preparation, incubation, sonication, reagent addition can be located internally in the instrument or external to the analyser.
 3. After placing the sample for analysis, all the above operations (at Sr. No. 2) shall be done automatically, without any manual intervention
 4. Instrument should be capable of analyzing raw milk samples without dilution or pre-heating.
 5. Speed of Analysis:
 - a) Should be able to process minimum 14 samples/hour while doing both IBC and SCC measurements.
 - b) Should be able to process minimum 39 samples/hour for only SCC measurements.
 - c) Should be able to process minimum 14 samples/hour for only IBC measurements.
 6. Sample intake should be: less than 20 ml
 7. Sample temperature should be in the range of : 2 – 42°C
 8. The instrument should be able to estimate IBC and SCC in a wide measuring range
 - IBC: 5000 to 10 million IBC/ml or better
 - SCC: 0 to 10 million cells/ml or better
 9. The instrument should provide an accuracy in comparison to standard methods of analysis on the below criteria:
 - IBC: Typical S_y , $x \leq 0.3$ log units from SPC / standard methods
 - SCC: $\leq 10\%$ relative mean different from Direct Microscopic SCC/ standard methods
 10. Repeatability:
 - IBC: $S_r \leq 0.07$ Log relative at 10 to 50 IBC / μl
 - $S_r \leq 0.05$ Log relative at 51 to 200 IBC / μl
 - SCC: $CV \leq 6\%$ at 100000 cells / ml
 - $CV \leq 4\%$ at 300000 cells / ml
 - $CV \leq 3\%$ at 500000 cells / ml
 11. The instrument should be supplied with Control Samples and appropriate reagents for analysis.
 12. The instrument should have self-cleaning program to minimize carry-over contamination from previous samples.
 13. The instrument should have appropriate software for IBC and SCC calculation.
 14. Analyser shall be capable of calculating bacteria and somatic cell counts by a single or two (intakes / injections) of sample, preferably with a provision of integrated results of particular sample.
 15. IBC and SCC should be performed simultaneously or individually.
- System should be provided with Sensors in reagent bag to indicate the consumption of reagent and inform the remaining number of tests that can be performed.

14. Both, bacteria and somatic cell counts should be performed by doing individual cell counts and results should be given in IBC (Individual Bacterial Counts) and SCC (Somatic Cell Counts)

15. IBC and SCC should be performed simultaneously or individually.

16. The instrument should be User friendly, preferably with a provision for indicator for reagent replacement, sample coding, export of results to spreadsheet etc.

17. The instrument should be supplied with software, suitable branded PC with original operating system and suitable laser printer. There shall be a facility to transfer data from the equipment to PC in a suitable format, which could be transmitted to customer software.

18. Supplier should provide Installation, validation, and also the demonstration of the equipment performance

Consumable and Accessories: Equipment should be supplied along with appropriate reagents & consumables for approx. 10000 samples for each IBC and SCC. The requirement of these supplies for samples would be given to bidder on six monthly basis or on mutually agreeable dates or as per tender norms.

Instrument should be supplied with spares and preventive maintenance kits and accessories for routine operations of 2 years.

19. **Training:** Basic training on operation/maintenance to be arranged by the bidder after installation. The advance training on these should be conducted as per the request from end user, on mutually agreeable dates. The equipment should also be supplied with user manuals required for installation and training.

20. **Warranty:** Equipment shall be supplied with minimum a warranty of one year and one year free comprehensive maintenance from the date of installation. Bidder should undertake on site preventive maintenance visits - minimum 2 visits during the warranty/maintenance period apart from the breakdown visits. Warranty/maintenance would apply to all the accessories supplied by bidder.

21. **Warranty extension:** The warranty of equipment would be extended if equipment remains down during the warranty period, for more than period mentioned below: -

- If equipment has been down for more than 10 days in a year, warranty would be extended by one Month,
- If equipment has been down for more than 30 days due to malfunctioning of the any part supplied by bidder or want of spares/ consumable, warranty would be extended by one Year

22. **Demonstration and Evaluation**

Customer reserves the right to verify the performance of equipment at any stage of purchase process. The bidder is requested to arrange all the entire pre- requisite timely for successful demonstration and evaluation.

23. **Compliance:** The bidders are requested to provide point wise compliance for each point in specification along with documentary evidences. The reference of compliance information in submitted offer shall be clearly specified. The offer with incomplete/untraceable information may not be considered.

Any type of unwarranted canvassing for selection of instrument may lead to rejection of the offer.

24. **No offering of refurbished/assembled/demo modules.** No part of the offered instrument shall be refurbished or used in demonstration purpose for which undertaking must be submitted.

25. **Maintenance & service** for one year shall be free after the expiry of warranty period and thereafter AMC charges from 3rd year onwards should be quoted separately.

26. It is the responsibility of vendor to supply a complete solution / unit for the analysis.

27. Vendor should be able to supply all the spares / consumable required for repair at least 8-10 years after installation.

28. The vendor should have few installations in major dairies/laboratories of the country and has demonstrated satisfactory performance of the equipment to the concerned stakeholders.

Annexure - VII

Electronic milk Analyser with adulteration testing facility

1. Product to be analysed: Raw milk
2. Raw Milk Quality and Adulteration Screening Analyser should be based on the FTIR / MIR / or other suitable techniques, individually or in combination (hybrid).
3. Equipment should be able to give a measurement of Fat, SNF and Protein.
4. The equipment should be supplied with all required calibrations with provision to upgrade / modify from time to time, if needed.
5. Equipment should be able to detect at least below mentioned adulterants:
 - a) Urea - LOD of 0.2 % or lower
 - b) Ammonium sulphate - LOD of 0.1% or lower
 - c) Maltodextrin - LOD of 0.6 % or lower
 - d) Sucrose - LOD of 0.6 % or lower
 - e) Water - LOD of 20 % or lower
 - f) Equipment should compare the spectrum of the sample with the spectrum of pure milk by using suitable statistical techniques and software to detect abnormality.

Additional adulterants, if any analysed using the equipment shall be specified by the bidder.

6. Equipment should be able to analyse Fat, SNF & Protein in the range of
 - a) Fat: 0.5-12 %
 - b) Protein: 2-6 %
 - c) SNF: 6-12%

The above ranges are the minimum required criteria; equipment with wider working range on both sides would be acceptable.

7. Accuracy of milk parameters for compositional analysis should be minimum as below:
 - a) Fat \leq 0.1 (Either in terms of SD or in absolute amount)
 - b) Protein \leq 0.2 (Either in terms of SD or in absolute amount)
 - c) SNF \leq 0.2 (Either in terms of SD or in absolute amount)
8. Repeatability of compositional parameters shall meet the relevant international standards (ISO/IDF/AOAC or others) and document for the same need to be submitted.
9. Analysis speed required - Approx. 40-50 seconds
10. Sample Temperature: Raw Milk should be able to be measured in a temp range of 5-35 deg. C or wider.
11. Sample Volume: Less than 10 ml.

12. Display: LCD, graphical display / Colour TFT display.

13. Built-in Diagnostics: Equipment shall be able to perform all the required test to ensure accurate and error free operations.

14. System shall have the capability to transfer data by any suitable means from equipment through RS-232 or SD Card or Wi-Fi or facility of PC based software.

15. Consumable and Accessories: Equipment should be supplied along with appropriate reagents, consumables, spares and accessories for routine operations for approximate analysis of 10000 samples during the warranty period.

The requirement of these supplies for samples would be given to bidder on six monthly basis or on mutually agreeable dates.

16. Training: Basic training on operation/maintenance to be arranged by the bidder after installation of the equipment along with calibration development. The equipment should also be supplied with user manuals required for installation and training.

17. Warranty: Equipment shall be supplied with minimum warranty of one year from the date of installation. Bidder should undertake on site minimum two preventive maintenance visits during the warranty period apart from the breakdown visits. Warranty would apply to all the accessories supplied by bidder.

AMC - 1 year free comprehensive maintenance be provided and AMC charges from 3rd year onwards should be quoted separately.

Warranty extension: The warranty of equipment would be extended by a month, if equipment has been down for more than 10 days in a year, whereas, warranty of equipment would be extended by 1 year, if equipment has been down for more than 30 days due to malfunctioning of any part supplied by bidder during warranty period.

18. Demonstration and Evaluation

Purchaser reserves the right to verify the performance of equipment at any stage of purchase process. The bidder are requested to arrange all the pre-requisite timely for successful demonstration and evaluation as per tender / bidder specification.

19. Compliance

The reference / traceability of compliance information in the offer shall be clearly specified with supporting documentary evidences. The offer with incomplete/untraceable information may not be considered. Any type of unwarranted canvassing for selection of instrument may lead to rejection of the offer.

20. No offering of refurbished/assembled/demo modules: No part of the offered equipment shall be refurbished or used in demonstration purpose. Kindly submit undertaking.

21. The AMC charges for two years after the expiry of warranty period shall be quoted separately.

22. It is the responsibility of vendor to supply a complete solution / unit for the analysis.

23. Vendor should be able to supply all the spares / consumable required for repair for at least 8- 10 years after installation.

24. The vendor should have few installations in major dairies/laboratories of the country and has demonstrated satisfactory performance of the equipment to the concerned stake

Annexure - VIII

Automatic Kjeldahl Unit

1.0 Quantity

Number of unit's required-01 with all the required accessories

2.0 Functional Requirement

Estimation of protein content in milk and milk products. The offered equipment shall have digestion and distillation unit with automatic addition of reagents for efficient operation. Titration would be undertaken manually.

3.1 Technical Specification

3.1 Digestion Unit

- i. Six place block digestion system able to hold 250 ml borosilicate glass tubes.
- ii. Operational temperature: Ambient to 4500 C or higher.
- iii. Display should show set value and current value of temperature and timer.
- iv. It must have auto heating cut off on completion of digestion cycle.
- v. Efficient exhaust manifold system for removing acid fumes.
- vi. Material of construction: Corrosion resistant

3.2 Scrubber unit

- i. Unit should have fume trap condensation unit followed by water and alkali neutralization.
- ii. Alkali and water container capacity: 2 lit (Minimum)
- iii. Operation pump must be made up of non-corrosive material
- iv. Unit shall have a mechanism to remove acid from exhaust air through dissolution in water tank / carbon filter / any other suitable technique.

3.3 Distillation unit

- i. Unit shall have automatic steam injection.
- ii. Unit shall have automatic water addition / dilution.
- iii. Unit shall have automatic alkali and boric acid / acid addition.
- iv. Unit shall give warning / indication for open door during operation and hold / deactivate the process.
- v. Unit shall have facility for adjustable steam power.
- vi. Material of construction: Corrosion resistant.
- vii. Chemical storage tanks shall be provided with minimum 2.5 lit capacity
- viii) Auto cut off sensor for water circulation shall be provided

4.0 Equipment shall be supplied with minimum 1 year warranty & one year free comprehensive maintenance.

5.0 Unit shall be supplied with 12 borosilicate tubes (250 ml), required accessories, water connection pipes required for installation, demonstration and routine operations for at least 300 analyses.

6.0 Demonstration :

- i. Vendor must optimize digestion and distillation method for liquid milk and dried milk samples.
- ii. Vendor must provide training to end user.
- iii. Vendor must provide demonstration to end user including manual titration and verify the distillation recovery of >99%.

7.1 Others:

- i. All the pre-requisite required for installation of the equipment shall be indicated by the vendor.
- ii. AMC charges for the 3rd and 4th year shall be indicated separately.
It is the responsibility of vendor to supply a complete solution / unit for the analysis.
- iii. Vendor should be able to supply all the spares / consumable required for repair at least 8-10 years after installation.

Annexure - IX

Laminar Air Flow Unit

- 1) UV sterilization system with high density UV-decontamination (Min 975 Lux and lamp min 250 nanometer 10-15-watt.
- 2) Laminar airflow velocity of minimum 0.30 m/s (60 fpm.)
- 3) Low noise level (<58 dBA) with low power consumption.
- 4) HEPA filter efficiency 99.999% / at 0.3 um along with Pre-Filter.
- 5) **LED display** (microprocessor control) with digital timer, light on-off...etc.
- 6) Alarm for filter replacement and maintenance if any.
- 7) **Interlock function:** UV lamp only can be switched on when the front window is closed ensuring operator safety.
- 8) **UV light protection** (Front & Side windows: Toughened glass, Manual front window, and anti-UV).
- 9) **UV timer** (1-99 minutes): when the set time expires, the UV lamp automatically switches off in preparation for the next experiment.
- 10) Waterproof power socket for power supply (min two sockets).
- 11) **Material:** main body: electro galvanized steel with epoxy-polyester powder coating (antimicrobial coating) and work table: 1.2 mm (0.05") 18 gauze stainless steel grade 304 (minimum).
- 12) **Size:** External Size (W*D*H)- 1035 x 617 x 950 mm, Internal Size (W*D*H)- 935 x 538 x 550 mm and Work Surface Height-750mm
- 13) **Plug type-** Indian
- 14) Essential standard accessories along with the equipment
 - 15) Revolving base table with Adjustable height. Adjustable height range 660-940 mm (26.0"-37.0"), adjustable in 25.4 mm (1.0") increments.
- 16) Instrument should comply with worldwide standard in the regards of Air Quality, Filtration and Electrical Safety.
- 17) Calibrated in laboratory as per ISO-17025.
- 18) Commissioning and installation will be done by the party.
- 19) It is the responsibility of vendor to supply a complete solution fit for use.
- 20) Vendor should be able to supply all the spares / consumable required for repair at least 8-10 years after installation.

Annexure – X

Technical Specification - 9

Specification of Sodium Potassium Analyser

Name of Equipment	Flame Photometer	
Application	Measurement of Sodium and Potassium content in milk	
Equipment Specification		
Sl No	Parameter	Description
1	Unit of Measurement	System shall display results directly in ppm.
2	Range of Measurement	should measure Na, K in the range of : 2 -200 ppm or better on both sides.
3	Sensitivity	Na: 2 ppm ; K: 1 ppm
4	Linearity	3% or lower
5	Reproducibility	Less than 2 % Coefficient of Variation
6	Calibration	Minimum 5 point calibration facility should be present in the instrument. Relevant set of chemicals for calibration standards of Na (min. 100 ml of 100 ppm) and K (min. 100 ml of 100 ppm) should be provided by bidder.
7	Detector	Silicon Photodiode or equivalent or better detection system
8	Auto flame ON/ OFF detection	Facility should be present in the system
9	Ignition System	Automatic Ignition
10	Flame System	LPG/PNG & Dry Oil Free Air
11	Gas Control	Provision for Gas Control should be available
12	Filter Selection	Provision for Filter Selection should be available
13	Atomiser	Axial Flow Type
14	Display	Alphanumeric LCD Display or digital LED display
15	Power Supply	Standard Indian – Single phase

16	Air supply unit	The instrument should be supplied with air compressor unit to supply required gases.
17	Data storage and Printing	System shall be able to store data of at least 500 analysis
		RS 232 port for data transfer. All cables/ software for data transfer to be offered along with a suitable printer
18	Accessories to be provided	<p>Following accessories should be provided with the instrument:</p> <p>Two filters (Na and K) , calibration standards (as indicated at Sr. No. 6) , Atomizer Tube, Gas Lighter, Sample Beaker (Min.6 No), USB interface cable, LPG Tube, Air line PU Tube, power cord etc.</p> <p>All the other accessories required for smooth installation, demonstration and operation of the equipment for above application should be provided.</p>
19	Other	At the time of installation, the performance of the equipment should be demonstrated as per the provided specifications or OEM catalogue whichever is better.
		The accessories required for commissioning of the equipment shall be in the scope of supplier.
20	Training	Training to end user to be provided
21	Demonstration & Method Set up	Bidder has to standardize and optimize the Equipment for analysis of Sodium and Potassium at the installation site.

Annexure - XI

SPECIFICATION OF GERBER CENTRIFUGE

- 1. Electrically Operated (220 – 240 Volt)**
- 2. Capacity :- 8 to 12 Milk Butyrometers with Rotors**
- 3. Digital Timer & Tachometer**
- 4. Digital Temperature Controller**
- 5. Microprocessor (preferable)**
- 6. Speed:- 1400 rpm minimum**
- 7. Auto Brake (preferable)**
- 8. Cover Lock.**

Annexure - XII

SPECIFICATION OF ANALYTICAL WEIGHING BALANCES 220 G (0.001)

- 1. Electronic Analytical Weighing Balance**
- 2. Capacity – 220 gm.**
- 3. Accuracy – 0.1 mg**
- 4. Least Count – 0.1mg**
- 5. Digital Display (LCD)**
- 6. Power supply – 220 to 240 Volt**
- 7. Battery Backup**
- 8. Pan size – 80 mm**