Annexure-A

TECHNICAL SPECIFICATIONS FOR GC- SINGLE QUADRUPOLE MASS SPECTROMETER

The GC/MS system should be fully automated with single point software control for all the modules and the model quoted should be of latest configuration by the reputed company.

I. GC, MS and FID systems should be products of the same manufacturer.
II. The system should have GLP/GMP compliance and should strictly meet 21 CFR Part 11 guidelines. The system should enable for audit trails, electronic signature and other requirements related to GLP compliance. Further, required IQ, OQ and PQ reports should be generated to meet GLP regulatory requirements during installation and operation by your service personnel. All the necessary accessories, consumables, software etc. should be quoted
III. A certificate of the principals to be included stating the instrument spares and service will be available 7 years after the supply.
IV. Compliance statement for all **55** items listed below must be clearly provided.

I. Gas Chromatograph: (One)

1. The Gas Chromatograph system supporting the MS should be fully software controlled for accurate control of pressure/flow settings of inlets and detectors.
2. GC System should be capable to support simultaneously two injectors, one with large volume injection/PTV facility with minimum injection volume of 200 μL.
3. Gas Chromatograph system should be supplied with programmable temperature Split/split less (SSL) inlet with constant flow and pressure programming facility for all capillary columns
4. GC Inlet temperature, ambient to 400^{O} C or better
5. GC Oven operating temperatures from ambient to 450^{O} C with fast oven cool down and ramp.
6. GC-MS direct interface operating from ambient to 350^{0} C
7. 7-step or more oven temperature programming, maximum achievable temperature ramp rate: 120^{0}C or better
8. Electronic pneumatic controls of pressure and flow for all gas modules
9. Provision to use of capillary columns with different internal diameter, film thickness and length.
10. Should be able to use of helium or hydrogen as a carrier gas
11. Gas filters for all the gas inlets of GC (2Nos. each)
12. The system should have auto sampler
    a. Sample vial numbers : 15 or more
    b. Vial capacity : 2ml
    c. Sample injection capability: 0.1 µl to 10 µl
    d. Manual injection should be possible without any difficulty.

II. Single Quadrupole Mass spectrometer: (one)

13. A quadrupole mass analyzer with a mass range 2-1050 amu or better
14. Mass resolution minimum of 0.7 Da or better
15. Inert EI source with long lasting filament
16. Ionization modes: Electron ionization (EI) and chemical ionization (CI) source with positive and negative modes of operation
17. Provision for dual CI reagent gases with digital flow controls.

18. Provision for Dual filaments in EI mode for easy switching
19. Provision to keep the source clean for a long period through either quadrupole heating or a pre-quad filter.
20. Chemically inert ionization source with temperature programmable up to 350^0 C or more
21. Electron energy: Up to 150 eV or more
22. Mode of scanning: Full scan and SIM
23. Mass accuracy± 0.1 units over 48 hours
24. EI Sensitivity:Full Scan mode sensitivity, 1 pg/µLOFN, 1µL(S/N: 1500:1 or above), femtogram sensitivity under SIM mode
25. PCI mode sensitivity with 1 pg/uL (1µL) should be with S/N 300:1 or better for Benzophenone/OFN
26. NCI mode sensitivity with 1 pg/uL (1 µL) should be with S/N 2000:1 or better for OFN
27. Scan rate: 20,000 u/sec
28. Capable to collect SIM data and full scan data in the same acquisition.
29. Vacuum: Air cooled high capacity turbomolecular pump(s) of latest model back up with rotary pumps.
30. Electron multiplier detector for mass spectrometer

III. FID specifications: (One)

31. The system should have one FID detector with the Flame ionization detector cleaning kit. Should also include reamers, wire mini brushes, handle.
32. FID - Minimum detectable level more than 1.4 pg C/s or better (SPECIFY THE COMPOUND).
33. FID - Dynamic range of FID : > 107.
34. FID - Data acquisition rate : up to 500 Hz or better.
35. FID - Maximum operating temperature : 450^0 C.
36. FID - Linear dynamic range : Less than 10^7 (±10%).Full range digital data path enable peak to be quantified over the entire 10^7 concentration range in single run.
37. All gases flow should be adjustable/controlled by software only.

IV. Workstation/software Specification:

38. GC and MS systems should be integrated with the same work station for simultaneous setting, programming and user-friendly operation.
39. Provision to optimize MS parameters automatically (auto tune) or manually through tuning programs and print an Auto tune report
40. Provision to view the real-time plot for chromatograms and instrument parameters (GC, MS and FID) and print a real-time plot report
41. Latest versions of NIST and Wiley MS library(including original CDs with license number)
42. Suitable PC of a reputed brand with latest configuration (i7 processor, 2 TB or more HDD, 16 GB RAM or more) and 26" LCD/LED monitor along with latest laser printer– (One set)
43. The software should have all modes of scanning and quantification tools of both the detectors

V. Others:

44. Automated headspace sampler with atleast 48 sample vials tray (10 mL / 20 mL) or better should be quoted and easily hyphenated with quoted GC/MS system (single point software control).
45. Tool kit for routine maintenance of GC and MS, with all necessary cleaning and maintenance material.
46. On-site operation and application training for users
47. Five years comprehensive warranty should be quoted.
48. All the necessary calibrants of GC-MS to be provided along with the instrument (CoA also to be provided)

49. Gas cylinders for Helium, Nitrogen and Hydrogen (One number each should be included)
50. Double stage Gas regulators with steel diaphragm for Carrier gas, and CI reagent gases (Methane, Ammonia, Isobutane etc) from reputed manufacturer (one No. each)
51. Consumable spare parts for five years (EI and CI source filaments-6 Nos each, source heater -2 Nos., injection port glass liners-10 Nos., GC-septum-500 Nos., column inlet/outlet nuts – 10 each, inlet/interface ferrules- 100 each, vacuum oil-10 Nos)
52. GC Columns (length 30m, 0.25 mm id, 0.25 μ film thickness): HP-5MS (2 Nos.), DB-624 (2 Nos.), DB-WAX (2 Nos.) should be included.
53. All the documents, including operation, maintenance and service manuals with circuit diagrams should be provided
54. 10KVA UPS online batteries with 5 year warranty.
55. Purchase should be FOR-Jamia Hamdard.

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