

WELCOME To Common facility center (CFC); Sophisticated analytical instrumentation facility (SAIF)



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Common Facility Centre at a Glance

The Common Facilities Centre (C.F.C) was started in 1984 under USIC with five instruments such as AAS, XRD, Ultra centrifuge, UV Visible, Dispersive IR. The intention was to provide analytical instrumentation facility to the university, university affiliated college researchers and academic staffs, research institutes and industries nearby. Although it was started with only five equipment's, now the Common Facility Centre is having total number of fourteen advanced state-of-the-art sophisticated analytical instruments housed under one roof with separate dedicated building. Many funding agencies supported financially to procure the sophisticated Analytical Instruments such as SAIF-DST, DST-PURSE, RUSA, UGC etc.,

The objective of the **'Common Facilities Centre**' under the University Science Instrumentation Centre (USIC) is;

- To provide characterization facility with very subsidized rate to the Academic Institutes, Universities, Colleges and Industries.
- To increase number of publications, IPRs and the level of research of the university.
- Conduct workshop on analytical instruments to make an awareness about the analytical instrumentation.

List of Sophisticated Analytical Instruments available at CFC

Sr. No.	Equipment
1)	Transmission Electron Microscopy (TEM)
2)	X-ray Photoelectron Spectroscopy (XPS)
3)	Bio- Atomic Force Microscopy (Bio-AFM)
4)	X-ray Diffraction (XRD)
5)	Gas Chromatography double Mass Spectroscopy- (GCMS-MS)
6)	Gas Chromatography Mass Spectroscopy (GCMS)
7)	Thermo gravimetric Analysis-Differential Thermal Analysis-Differential Scanning Calorimetric (TGA-DTA-DSC)
8)	Particle Size Analyzer zeta potential
9)	Micro-Raman
10)	Fourier Transform Infrared spectroscopy (FTIR)
11)	Vector network analyzer
12)	Ultra centrifuge
13)	Inductive Coupled Plasma-Optical Emission Spectroscopy (ICP-OES)
14)	Microwave Digester

Transmission Electron Microscopy (TEM):



Make: JEOL ASIA PTE LTD. Model: JEM 2100 PLUS

Brief description:

transmission electron microscope (TEM) is a microscope that use a electron beam to visualize specimens and generate highly magnified image than optical microscope.

Specification:

Accelerating voltage	200 kV
Electron source	Both W and Lab6 filaments
Resolution	≤ 0.23 nm
Operating modes	HRTEM, STEM, EDS, BF, DF, HAADF, SAED and NBD etc.

Applications: It provides topographical, morphological, compositional and crystalline information. It allows to view samples on atomic level, making it possible to analyze structure and texture.

X-ray photoelectron spectroscopy(XPS)



Make: JEOL ASIA PTE LTD Model: JPS 9030

Brief description:

X-ray photoelectron spectroscopy is surface sensitive quantitative spectroscopic technique based on the photoelectron effect that can identify the element exist within a material on its surface, its chemical state and overall electronic structure.

Specification:

X-ray sou	MgKa /ALKa
Resolution	1,000,000 cps or more
Analyzer	Electrostatic hemispherical analyzer
Etching ion source	Ar ion with 100NM/MIN etching rate

Applications: It is widely used to get the information about the composition, electronic structure, chemical structure and binding energy on the surface region of solids. we can also do depth profiling and obtain information about change in structure layer by layer.

Analytical Instrumentation Facility:



X-ray diffractometer (XRD)

Make: Bruker Ltd Germany Model: AXS D8 Advances

Brief description:

It is non-destructive technique for characterizing crystalline materials. It provides information about crystal structure, phase, preferred crystal orientation and other structural parameters such as grain size, crystalinity, stress, and strain.

Specification:	Geometry	θ - θ and θ - 2θ
	Scanning range	-110° to 168°
	Detector	LYNXEYE XE-T
	Target	Copper (Cu) $\lambda = 1.54 \text{ Å}$
	Resolution	0.0001°

Application: Pharmaceutical Industry, Forensic Science, Geological, Microelectronics Industry, Glass Industry, Corrosion Analysis, Environmental Science, Material Science

Bio - Atomic Force Microscopy(Bio-AFM):



Make: Park Syst. S. Korea Model: NX-10

Brief description:

It is used for imaging any type of surface, including polymers, ceramics, composites, glass and biological samples and works in all contact, non-contact, tapping modes. We can do lateral force microscopy, force modulation microscopy, phase imaging, magnetic force microscopy, electrical modes such as EFM, PFM, KPFM, CAFM and scanning ion conductance mode.

Specification:	Mode	Contact, non-contact and tapping mode
	XYZ stage	20μm x 20μm x 25 μm
	Resolution	XY scanner- 0.05nm & Z scanner- 0.015 nm.
	Resonance frequency	>9 kHz
	Sample size	100 mm x 100mm x 20mm

Applications: surface imaging, dielectric and photoelectric properties, magnetic, mechanical and electrical property measurement .

Micro-Raman:



Make: Renishaw UK Model: Renishaw INVIA0120-02

Brief description:

It is non destructive technique and mostly used for the determination of vibrational, rotational and other low frequency modes of molecules. It is used for the qualitative and quantitative analysis of covalently bonded molecules. The microscope arrangement allows to specific analysis of the area.

Specification:	Spectral range	50 cm ⁻¹ to 4000 cm ⁻¹
	Resolution	0.5cm ⁻¹
	Laser Source	Diode laser
	wavelength	532 nm
	Sample required	Thin film, powder, liquid with all solvents.

Applications: Chemistry Research Fields. Material Science, Biology Research Fields.

Gas Chromatography-double Mass Spectroscopy (GC-MS/MS):



Make: Shimadzu Japan. Model: TQ 8050 Plus with HS 20

Brief description:

This triple quad GC-MS/MS is capable of performing unprecedented quantitative analysis down to the femtogram level. This equipment is equipped with new, highly efficient detector with three forms of noise-reduction technology and head space sampler for volatile samples.

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Analyzer	Quadrupole with pre-filter
Mass range	4-1090 Daltons (amu)
Mass stability	0.1 m/z
Ionization modes	EI, CI, NCI and FID
Sampler	Auto injection and headspace sampler

Applications: environmental flavors, fragrances, pharmaceuticals, organic, petrochemicals, fine chemicals, nominal molecular weight calculation. Molecular structure, impurities in drinking water, waste water.

Gas Chromatography Mass Spectroscopy (GC-MS)



Make: Shimadzu Japan Model: QP2010

Brief description:

This is single quadrupole gas chromatography-mass spectrometer offers reliable, cost effective and most challenging laboratory analysis, such as environment and energy.

Specification:

Analyzer	Single quad
Mass range	4-1090 Daltons (amu)
Mass stability	0.1 m/z
Ionization modes	EI
Sampler	Manual injection

Applications: environmental flavors, fragrances, pharmaceuticals, organic, petrochemicals, fine chemicals, nominal molecular weight calculation. Molecular structure, impurities in drinking water, waste water.

Inductively Coupled Plasma - Optical Emission Spectrometry (ICP-OES):



Make: Agilent Technology Model: ICP-OES 5100

Brief description:

ICP-OES is used to determine concentration of different metals in different materials, arsenic in food and trace elements bounds to proteins.

Specification:	Analysis	Dual view analysis (vertical and horizontal)
	Detector	CCD detector

Applications:

- •Determination Of Metals In Wine,
- •Arsenic In Food
- •Trace Elements Bound To Proteins.
- •Minerals Processing
- •Pharmaceutical And Energy Industries.

Vector Network Analyzer (VNA):



Make: Keysight Technology Model: ENA E5063A

Brief description:

It is used for measuring microwave properties of the material, network parameters such as S parameters, reflection, transmission etc. and also used for the measurement of different test parameters of microwave antenna. It is also used for testing component specification and verify design simulation.

Specification:

Frequency range	50 kHz to 18 GHz	
Frequency resolution	1 to 11Hzfor (100 kHz to 18 GHz)	
Power resolution	0.5 dB	
Measurement	Material measurement & antenna test accessories.	

Applications: It is mostly used for microwave design application, material characterization, antenna design, testing designs or prototypes in wireless communication industries etc.

Thermo Gravimetric Analysis-Differential Thermal Analysis-Differential Scanning Calorimetric (TGA-DTA-DSC):



Make: TA Instruments Model: SDT Q600

Brief description:

It provides the simultaneous measurement of weight change (TGA) and true differential heat flow (DSC) on the same sample from ambient to 1500 °C. It is most popular to determine a materials thermal stability and fraction of volatile components.

Specification:	System design	horizontal balance and furnace
	Sample capacity	200mg or 350 mg including sample holder
	Balance sensitivity	0.1 μg
	Temperature range	Ambient to 1500 °C
	DTA sensitivity	0.001 °C

Applications: Pharmaceutical Industries, Petrochemical, Cement Chemistry, Mineralogical Research, Environmental Studies, Material Science etc.

Particle Size Analyser With Zeta Potential (PSA-ZP):



Make: Malvern Model: Nano ZS90

Brief description:

Particle size analyzer and zeta potential is very popular analytical technique, which is used to determine size distribution of the particles in the suspension, size of the nanoparticles and for determination of zeta potential on these particles.

Specification:

Size range	0.5 nm to 5 μm
Zeta potential range	+/- 500mV
Mobility range	+/- 20 μ.cm/V.s
Laser	Helium neon laser (633nm, max 4mW)

Applications: It is applicable in variety of fields such as chemical industries, food technology, mining, forestry, agriculture, nutrition, pharmaceutical and energy industries.

Microwave Digestive System :



Make: Anton Paar Model: Multiwave Pro

Brief description:

It is generally used for the sample preparation for ICP-OES equipment. It can digest all type of samples including food, biological, environmental samples, agricultural samples, cosmetic and pharmaceutical samples. It is designed for the easiest handling with low investment and running costs.

Specification:	Digestion type	Microwave; acid
	Microwave power	1400 watt
	Temperature	Max 300 °C
	Pressure	0-140 bar

Applications:

It is generally used for sample preparation for ICP-OES by digesting all types of soft and hard materials. It is also used for liquid samples containing organic compounds, combustible solids protein hydrolysis, solvent extraction, drying and evaporation.

Ultra Centrifuge:



Make: Beckman Coulter Model: Optima XPN-100

Brief description:

The ultracentrifuge is a centrifuge optimized for spinning a rotor at very high speeds, capable of generating acceleration as high as 100000 rpm for separating Nano-particles from the liquid with controlled environment, temperature and speed.

Specification:

Maximum speed	1,00,000 RPM
Speed control	\pm 2 rpm of set speed (above 1000 rpm)
Temperature range	10°C to 35 °C
Temperature control	± 0.5 °C

Applications: It is commonly used in molecular biology, biochemistry and cell biology for separation of viruses, viral particles, proteins, protein complexes, liproteins, RNA and plasmid DNA.

Fourier Transform Infrared Spectroscopy (FTIR):



Make: Bruker Model: ALPHA

Brief description:

It is qualitative technique and used for analysis of organic and inorganic compounds for determination of functional group and characterizing covalent bonding information.

Specification:

Operating Modes	ATR and KBR optics
Spectral range	$375 - 7500 \text{ cm}^{-1}$
Resolution	Better than 2 cm ⁻¹
Wavelength precession	<0.0005 cm ⁻¹ @ 2000 cm ⁻¹
Samples	Solid, liquid and gasses.

Applications:

It is used for functional group determination in geological research, chemical field, material science and biological research field.

<u>Rate List for Analysis</u>

Sr.No.	Equipment Name	University Charges	Other University	Industry Charges
1)	XRD	Rs.300/-	Rs.500/-	Rs.1500/-
2)	GCMS	Rs.500/-	Rs.1000/-	Rs.1500/-
3)	FTIR	Rs.300/-	Rs.600/-	Rs.1000/-
4)	ICP-OES	Rs.500/- (Per	Rs.1200/-	Rs.2500/-
		Sample)		
5)	Sample Preparation Microwave	Rs.400/- (Per	Rs.800/-	Rs.1200/-
	Digestive	Sample)		
6)	GCMS-MS Analysis	Rs.750/-	Rs.1500/-	Rs.3500/-
7)	DSC/ TGA	Rs.500/-	Rs.900/-	Rs.1500/-
8)	Particle Size Analyzer	Rs.150/-	Rs.300/-	Rs.800/-
	Zeta Potential	Rs.300/-	Rs.600/-	Rs.1200/-
9)	Micro-Raman	Rs.300/-	Rs.900/-	Rs.2000/-
10)	TEM-Imaging+EDS+EDS	Rs.2000/-	Rs.3500/-	Rs.5500/-
	Mapping			
	TEM-Imaging+HR-TEM+SAED	Rs.2000/-	Rs.3500/-	Rs.5500/-
	TEM-Imaging+HR-	Rs.2500/-	Rs.4000/-	Rs.7000/-
	TEM+SAED+EDS+EDS Mapping			
11)	Vector network	Rs.400/-	Rs.600/-	Rs.1000/-
	analyzer(Sample Charges)			
	VNA-Sample Preparation	Rs.400/-	Rs.600/-	Rs.1000/-
	charges			
12)	Ultra centrifuge	Rs.50/-	Rs.100/-	Rs.200/-
13)	XPS	Rs.2100/-	Rs.3100/-	Rs.6100/-
14)	Bio AFM	Rs.500/-	Rs.1000/-	Rs.2000/-



Contact Us

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